

Ex-Post Project Evaluation 2017 :

Package II-7 (Uganda, Democratic Republic of Congo, Rwanda)

November 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

GLOBAL GROUP 21 JAPAN, INC.

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Republic of Uganda

FY2017 Ex-post Evaluation of Japanese Grand Aid Project

“The Project for Rural Electrification Phase 3”

External Evaluator: Ryutaro Koga, Global Group 21 Japan, Inc.

0. Summary

The Project for Rural Electrification Phase 3 (hereinafter referred to as “this project”) was implemented with the objective of improving the infrastructure of the power grid by procuring and installing long-distance power distribution equipment and materials in the eastern five districts of Uganda where industrial revitalization could be expected, thereby contributing to the improvement of rural electrification. This project is part of Ugandan rural electrification strategy plan and is consistent with the country's development plan. Considering the rural electrification rate still as low as 10% in Uganda, the necessity of electrification is high, and it is consistent with Japan's aid policy. Therefore, the relevance of this project is high. The project cost ended up within the planned budget due to a decrease in construction quantities, and even though the project period on the Ugandan side was delayed by five months, the construction period on the Japanese side fell within about 80% of the planned schedule (four months shortened), so this project's efficiency is considered high. Connections to unelectrified public facilities has advanced at a rate faster than planned, and the number of connections to customers, who are mainly households, commerce and industry, is expected to reach about 80% of the target by the target year (2018). In addition, considering that there are instances of multiple households connected to one electricity meter, the overall household connection number is even larger than grasped. The positive impacts on living convenience for residents and the positive impacts on regional economic revitalization are widely observed, so the effectiveness and impacts of this project are high. As the target areas of electrification are located in regions with low profit margins, a part of the maintenance expenses is planned to be covered by government subsidies. The operation, maintenance and management of this project are free from problems in terms of organizational, technological, financial aspects etc. Therefore, the sustainability of this project is high.

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

1. Project Description



Project Location



Namayingo District Office electrified by this project and a transformer

1.1 Background

The power consumption per capita of the Republic of Uganda, 69.5 kWh (2009), was only about one eighth of the average of Africa as a whole, the rural electrification rate was as low as 7% as of 2012, the spread of electricity to the whole nation has been delayed. For this reason, *the National Development Plan (NDP)* took up the promotion of rural electrification as one of the issues to be addressed, and in 2009 the Rural Electrification Agency (REA) formulated the *Rural Electrification Master plan (IREMP)* that identified regions that needed urgent electrification while also looking for donor support, thus promoting projects in various places. This project is based on this IREMP and covers unelectrified areas of high priority in the eastern five districts, including district capitals and the areas facing major national highways with the prospect of industrial revitalization. Through the electrification of not only general households but facilities such as health centers, education facilities and commercial centers which have high needs for electrification, it was expected that the improvement of social services, revitalization of regional economy, job creation and wage increases were to be realized. Pertaining to support of rural electrification projects through grant aids from Japan, this project follows *The Project for Rural Electrification (1998 to 1999)* and *The Project for Rural Electrification Phase 2 (2007 to 2008)*.

1.2 Project Outline

As part of the rural electrification plan promoted by REA, this project was conducted in five eastern districts of Uganda (Mayuge, Iganga, Bugiri, Namayingo, Busia; with electrification target population of approximately 76,000 people in 9,600 households), by procuring and

installing 33 kV MV¹ power distribution equipment and materials (transformers, disconnectors, distribution lines, insulators, power utility poles, ammeters/ voltmeters, etc.). This project aimed at improving the long-distance power grid infrastructure in the target area and contributing to the improvement of the electrification rate and civilian life. The procurement and installation of the 415/240V LV² line and the lead-in line construction work to each customer is handled by Uganda.

E/N Grant Limit/ Actual Grant Amount	1,204 million yen/ 1,204 million yen
Exchange of Notes Date/ Grant Agreement Date	July 2013/ July 2013
Executing Agency	Rural Electrification Agency (REA)
Project Completion	December 2014 (Japan side construction work)
Main Contractor	NISHIZAWA LIMITED.
Main Consultant	Yachiyo Engineering Co., Ltd.
Cooperation Preparatory survey	The Preparatory Survey on the Project for Rural Electrification Phase 3 in the Republic of Uganda (2011- 2012)
Related Projects	“The Project for Rural Electrification” (Grant aid Project, 1998) “The Project for Rural Electrification Phase 2” (Grant aid Project, 2007-2008)

2. Outline of the Evaluation Study

2.1 External Evaluator

Ryutaro KOGA (Global Group 21 Japan, Inc.)

2.2 Duration of the Evaluation Study

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

Duration of the Study: August 2017- December 2018

Duration of the Field Study: November 24, 2017 - December 27, 2017/ April 9-18, 2018

¹ Medium Voltage

² Low Voltage

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

3.1 Relevance (Rating: ③⁴)

3.1.1 Consistency with the Development Plan of Uganda

Uganda government's *Rural Electrification Strategic Plan: RESP (2006)* at the time of planning aimed to raise the rural electrification rate to 10% by 2012. However, the actual result for 2012 remained at 7%⁵, not reaching 10% until 2014. Based on this situation, the *National Development Plan II (2015/16- 2019/20)* aims to accelerate rural electrification as a policy objective of the energy sector. This includes increasing power generation and distribution capability through the power grid in not only the city but also the rural areas, effectively promoting overall economic growth. With the aim of increasing the electrification rate of 20%⁶ in 2014 to 30% by 2020 nationwide, the Ugandan government is, while closely monitoring the electrification rates by region, working on specifically raising the electrification rate in rural areas which is lagging progress. Also, in the *Second Rural Electrification Strategy Plan (2013 - 2022): RESP II (2013)*, the rural electrification target of 2022 is set at 26%, by 2030 all lighting by kerosene is to be replaced with electrical lighting, and by 2040, global access (electrification of all households) is aimed. Taking the above into consideration, this project is deemed consistent with Uganda's development policy at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Uganda

As stated in “1.1 Background of Project”, at the time of planning (2012), the rural electrification rate was only 7%. After that, the rate increased to 10% (only 5% is on-grid distribution) at the time of the 2014 Census⁷, and although it is thought that it has continued to grow, the target rate of 26% in 2022, and 100% in 2040 is still far from being achieved. Therefore, from the viewpoint of the improvement of civilian life in rural areas by the electrification of general households/ social services, such as administrative facilities, health care facilities, educational facilities, and from the viewpoint of promoting regional industry by stable power

³ A: “Highly satisfactory”, B: “Satisfactory”, C: “Partially satisfactory”, D: “Unsatisfactory”

⁴ ③: “High” ②: “Fair”, ①: “Low”

⁵ Source: Second National Development Plan II p.24

⁶ Source: 2014 Census (National Population and Housing Census 2014 Main Report) p.31

⁷ The main report of the 2014 Census was published in March 2016. There is no reliable data after this Census, and at the time of the ex-post evaluation REA is also using the electrification rate of this Census.

supply to business persons in trading centers⁸ etc., the development needs relating to the promotion of rural electrification continues to be high⁹.

Taking the above into consideration, this project is highly consistent with the development needs at the time of planning and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

This project is consistent with the *Power Supply Enhancement Program* included in the *Environmental Improvement to Realize Economic Growth* that is a priority area of Japan's *Uganda Country Assistance Policy*. Also, it is consistent with *Infrastructure Supports for Acceleration of Growth* which is a priority focus of the TICAD¹⁰ IV Yokohama Action Plan. As a rural electrification cooperation from the Japanese government, this project is following two grant aid projects, *The Project for Rural Electrification (1998 - 1999)* and *The Project for Rural Electrification Phase 2 (FY 2007-2008)* and is highly consistent with the Japanese ODA policy.

From the above, implementation of this project is fully consistent with Ugandan rural electrification policy, development needs and Japan's aid policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ③)

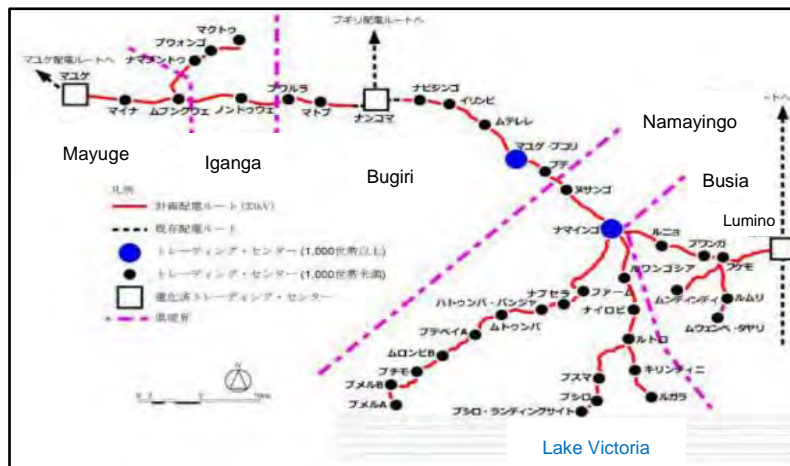
3.2.1 Project Outputs

In this project, it was planned to develop a power distribution network based on around 130km, 33kv Medium Voltage lines between Mayuge and Lumino located on the north of Lake Victoria (Fig. 1).

⁸ There are about 40 places in this project area where commercial facilities along the highway have accumulated. It is not an administrative area.

⁹ In 2012, the Bujagali hydroelectric power plant (250 MW) was completed and other small hydropower stations were also constructed. As a result, the serious supply shortage has been resolved. Although the power demand rate increase in recent years has gone as high as 10 to 12% per year, other new power source developments such as the Karma hydroelectric power plant (600 MW scheduled to be completed in December 2018) is being implemented, and there is no fear of power shortage in the short-medium term.

¹⁰ Tokyo International Conference on African Development: An international conference with the theme of development in Africa, since 1993, led by the Japanese government, and jointly held with the United Nations, the United Nations Development Program (UNDP), the African Union Commission (AUC) and the World Bank.



Source: Cooperation Preparation Report

Figure 1 Distribution Route and Trading Centers

Table 1 Outputs of this project - Plan and Actual

Plan (at Cooperation Preparatory survey)	Actual (at Ex-post evaluation)
(1) Civil works, Procurement of Equipment	
【Installation】 Procurement and Installation of Distribution Equipment	
MV Distribution network (33kV lines, about 134.4km in total)	about 127.8km in total
・ Mayuge – Nankoma (about 21.5km)	ditto
・ Mpungwe – Makutu (about 10.2km)	ditto
・ Nankoma – Lumino (about 37.5km)	ditto
・ Namayingo – Bumeru A and Bumeru B (about 29.9km)	ditto
・ Namayingo – Busiro port and Lugala (about 24.8km)	ditto
・ Hukemo – Mundindi and Mwenbe-Tayari (about 10.5km)	・Hukemo – Mundindi primary school (about 3.9km)
【 Equipment 】 Distribution lines, Distribution materials, Distribution transformers, Electricity meters	
(a) 33/0.415-0.240kV Distribution transformers (50 in total)	47 in total
(b) Electricity meters for trading 4 sets	ditto
(c) Automatic reclosing devices 4 sets	ditto
(d) Load switches 14 sets	ditto
(e) Parts, Maintenance tools etc.	ditto
(2) Content of consulting service / soft components	
Detailed design, Implementation management	ditto

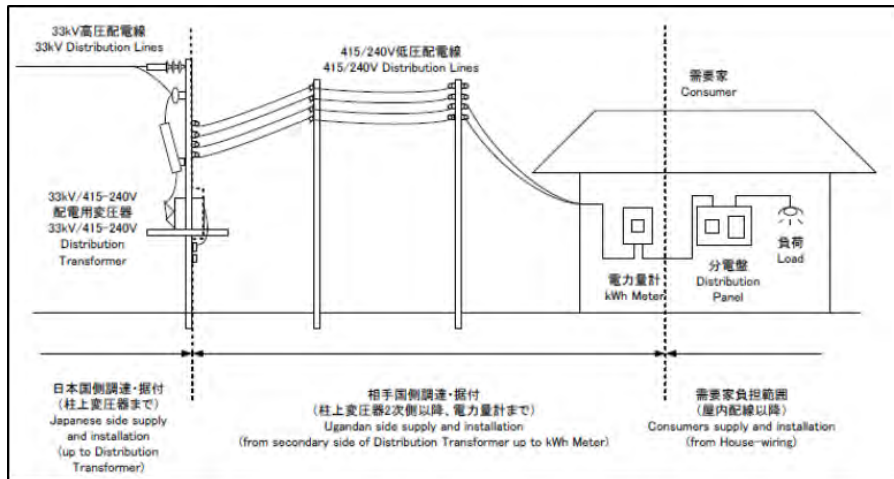
Output from Ugandan side

Plan (at Cooperation Preparatory survey)	Actual (at Ex-post evaluation)
(1) 33kV distribution line route survey and tree cutting	(1) completed
(2) LV distribution line procurement and installation (1.5km x 50)	(2) 109.8km were installed
(3) Customer electricity meters and Lead-in line procurement and installation (4800 connections)	(3) procurement of Customer electricity meters completed, installation of lead-in lines progressed 45% (2,163 connections: as of June 2017) Total investment amount: 10 billion UGX (about 2.8million USD)

This project was mostly implemented as planned (see Table 1), however, the amount of some of the equipment was reduced, as the estimated cost at the time of the detailed design exceeded the budget amount due to exchange rate fluctuation. Specifically, the 33 kV MV distribution line laying (between Hukemo - Mundindi and Muwenbe-Tayari) was decreased by 6.6 km (about 4.9% of the originally planned total), and three less transformers (6% of the originally planned) installed.

As shown in Figure 2, the construction responsibility for the Japanese side was the 33 kV distribution lines, the LV distribution lines (415/240 V) from the pole transformers to facilities of customers were borne by the Ugandan government. The wiring within the customer's house was planned to be borne by the customers. However, according to the field survey and hearings from beneficiaries including residents, it was found that additional laying of utility poles is necessary for connecting buildings that are 30m or more away from the LV distribution poles built by UEDCL (Uganda Electricity Distribution Corporation Limited, in charge of power distribution and management under the umbrella of REA). This burden falls currently on the customer. In other words, the connection costs borne by the customer are (1) connection fee, (2) indoor wiring fee, (3) utility pole laying cost (if necessary), and this total amount is expensive. This is a factor¹¹ impeding the rapid increase in the number of connections.

¹¹ Costs of a customer for connection are as follows: (1) a flat rate connection fee (136,000 UGX since April 2017: about 39 USD) to UEDCL, (2) an indoor wiring fee (depending on the size of the house and the number of rooms, About 300,000 to 600,000 UGX: 85 USD to 170 USD), and for some customers, (3) one or more utility pole installation costs (about 150 USD / pole). From the above, there were many households which could not be connected due to high connection fees. There are many households that cannot be connected because utility poles are not nearby, but there are also many households that cannot be connected even with a nearby pole because they cannot pay the indoor wiring fee and connection fee. Furthermore, for connection, it is necessary to be a permanent building, which omits structures with traditional walls and grass-roofed houses where the risk of electric leakage is high, such as during rain. In the Namayingo District, the percentage of houses with permanent walls is 20%, which is the smallest in the target five districts, and to further improve the electrification rate in Namayingo District, improvement of the house structures is needed.



Source: Cooperation preparatory survey

Figure 2 Construction burden classification (conceptual diagram) between the Japanese side and Ugandan side

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was planned to be 1.204 billion yen, and the actual was the same 1.204 billion yen (100%) as planned. As described in the section on output, responding to the foreign exchange fluctuations, the construction quantity was adjusted to keep it within the planned budget by reducing the distribution line distance by about 5%, and the number of distribution transformers by 6%. The subject area where the reduction occurred was a relatively less influential area located at the end of the route, which was decided to be implemented by the Uganda side.

3.2.2.2 Project Period

The project period was scheduled to take 22 months, and ended up being 18 months from July 2013 (G/A) to December 2014 (issue date of completion certificate), 4 months ahead of schedule (82% of the planned length). According to a project management consultant, the reason it proceeded ahead of schedule was due to the following. The installation contractor, subcontractor and the field contractor who received the order by tendering were the same as those of the preceding *Rural Electrification Phase 2* and since they were accustomed to the construction, efficient construction was possible. Also, because of the demand of the local contractor, construction work was frequently carried out on Saturdays. It should be noted that it was agreed upon in advance by both countries that construction of the 415/240V LV lines, which is required for consumer connection, would be constructed by Ugandan side almost in parallel with

construction of the 33 kV MV lines. It was completed in November 2015, the following year after completion of this project¹².

From the above, although there was a slight reduction of construction quantity, the project cost was basically as planned, and the project period was considerably shortened from the planned period. Therefore, efficiency of the project is high.

3.3 Effectiveness and Impacts¹³ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative effects (Operation and Effect Indicators)

The purpose of this project was to provide electrification to customers in households, commerce and industry, public facilities etc. in the target area. As an indicator to measure this achievement, the number of connections to various customers are analyzed (Table 2).

As for the “consumer connection” (Indicator 1), the actual number is 2,163 as of June 2017 compared to the target number of 4,800, and the achievement level is only 45.1% (see Table 2). However, it should be noted that at the time of the ex-post evaluation about 1 year was remaining until the target deadline (end of 2018). In addition, considering that the procurement of consumer watt-hour meters, LV lines etc. has already been fully completed, the executing agency believes that it can sufficiently achieve Indicator 1. There was a record 1,600 connections in 2016 when promotion measures to discount the connection fees were implemented, and the executing agency considers that it can achieve the new-connection target for 2018 (as many as 2016) by implementing connection promotion measures again. In the case of this, the cumulative number of connections will be 3,600 to 3,700, which would be 80% of the target number, 4,800.

¹² For the preceding project, Rural Electrification Project Phase 2 (FY 2007 - 2008), it was considered that a reason for its delay in consumer connection was due to the LV line work not starting until the completion of the MV line. Therefore, in this project, a countermeasure for this was attempted responding to JICA's request. At the same time, it is recognized that electrification in this project was promoted because UEDCL was selected as a distribution operator in charge of operation and maintenance. Because it is highly interested in global access (electrification of all households), but private operators are not aggressive in increasing the number of connections in low profitability areas. Most Ugandan distribution services are entrusted to private operators, however, UEDCL is supposed to play a role as an underwriter when the power distribution service contract with private operators is terminated in some circumstances.

¹³ Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 2 Connection Number of Customers (Plan and Actual) *1

	Reference value	Plan	Actual		
	2013	2018	2015	2016	2017*2
	【Survey/ Plan】	3years after completion	Project completion year*3	One year later	2 years later
Indicator 1 : Consumer connection *4	0	4,800	200 (200)	1,800 (1,600)	2163 (363)
Indicator 2: Connection to public facilities not electrified*5	① Namayingo District Office: Not connected	Connected	—	2016/4/5	—
	② Namayingo Police Station: Not connected	Connected	—	2016/4/15	—
	③ Buinja Health Center (IV): Not connected	Connected	—	2016/10/5	—
	④ Other Health facilities :	7	0	9 (9)	19 (10)
	⑤ Educational facilities (school etc.): (Primary school)	About 50	0	25 (25) 0	32 (7) 22 (4)
	(Secondary school)		0	7 (7)	10 (3)
Indicator3: Local Industry	Industrial consumers	Not set		17 (17)	23 (6)

Source: Executing Agency, Japan International Cooperation Agency (JICA)

* 1: Numbers in () shows the increased number of connections each year

* 2: Indicator 1 is as of the end of June 2017, other indicators are as of the end of November 2017

* 3: Construction of the 33 kV MV line was completed in December 2014 (project completion year), and the construction work of the 415/240V LV line burdened by Ugandan side, was completed 11 months later (November 2015).

* 4: The target value is about 50% of the target area households totaling about 9600, that includes both single and three-phase connections.

* 5: The target value is about 50% of the facilities in the connectable range

In Table 2, the annual connection number of consumers from 2016 to 2017 decreased. According to the executing agency, there were two reasons for this as follows.

Ferdsult Corporation, one of the private power distribution operators that had posted a deficit in 2014 - 2016, did not renew their contract after expiration in December 2016. REA decided to entrust the distribution services previously covered by Ferdsult to UEDCL, which was the sole underwriter. As a result, the equipment and materials procured for this project but not connected by 2016 (for about 2,600 connections out of 4,800) were rapidly deployed by UEDCL into the areas with strong connection needs outside the targeted area.

In March 2017, a promotional connection fee¹⁴ of 20,000 UGX (Uganda Shilling) terminated and the connection fee went up to 136,600 UGX. Many consumers responded in interviews that it was expensive. According to REA, they are planning to re-introduce the discount system¹⁵ again after June 2018, and furthermore, if required, the agency will consider applying the use of a subsidy, *Output Based Aid*, which is used for low-income households in areas where connection is delayed.

The numbers in Table 2 are those of customers contracting with UEDCL. From the Ugandan JICA office, however, information was obtained that there were quite a few general customers not included in those. To check this, we conducted a related investigation during the field survey and confirmed that there was a considerable number of cases where one electricity meter was shared by multiple customers/ households. Factoring this, the likelihood of achieving the target number of connections (households) further increases. In principle, one electricity meter is installed for each customer or household, but there are many cases in trading centers¹⁶ developing along the highways that about 2 - 6 tenants have moved in a collective shop building, and that individual houses are built behind these buildings. In these cases, often one watt-hour meter is installed in a building and its owner collectively pays to UEDCL, while each tenant pays his/ her burden to the owner. Because of this, many of the tenants are not registered as customers.

Table 3 shows the survey results¹⁷ of the electricity meters and number of customers that was conducted at 15 trading centers during site visits. The number of customers per electricity meter is 2.2, the actual number of customers (837) is more than twice the number of customers contracted with UEDCL (382), and regarding only the 15 trading centers surveyed, the number of actual customers was 455 more than the number of electricity meters¹⁸.

¹⁴ The connection fee collected by UEDCL consists of the distribution line laying cost from the nearest distribution pole, the wiring inspection fee in connected houses, the initial electricity charge, and in cases where the pole is not nearby, the expenses for laying additional electric poles are also required separately.

¹⁵ As for a connection support, from 2012 the connection assistance system, *Output Based Aid: OBA*, is being budgeted and used. This system is applied to customers/ households not connected for 18 months after a LV line was laid nearby. This project has not used this subsidy since not much time has passed since the completion of the project. The executing agency, REA, is planning to decide whether to utilize OBA after considering the future connection progress.

¹⁶ Trading center refers to the areas where commercial facilities along the highway gather, and there are about 40 places in this project area. It is not an administrative unit.

¹⁷ For each survey, we selected a collective building store along the highway (2 to 6 tenants in a one-story building) at each trading center from every other three places starting from the nearest transformer etc., and checked a prepaid electricity meter, the number of lead-in lines and the number of stores in business. After that we conducted an interview with the tenants. During the interviews, if there were landlords, we prioritized the interview with them. The following point needs attention; Different from consumers in agriculture and fishery occupying many of the surroundings, these tenants are in the business of sales-merchandising (restaurants, miscellaneous goods etc.), service industry (printing, mobile phone charging, cash exchanging, etc.), processing industry (welding, wood processing, etc.).

¹⁸ The extent to which the number of residents of these TCs accounts for the total number of residents in the target area is unknown because there are no statistics as the TC is not an administrative area, and the executing agency

Table 3 Comparison of Number of Connection (electricity meters) in Trading Centers and Actual Consumer

Name of TC	Mayuge TC	Mpungwe	Nama vundu	Makutu	Nondwe	Nankoma TC	Nabigingo	Muterere	Mayuge-Bukholi	Namayingo	Bumeru B	Bumeru A	Busiro Landing Site	Lugala	Hukemo	Total
Description																
Number of buildings	30	26	30	20	30	30	30	38	56	20	10	15	38	20	27	363
Number of meters	31	27	31	21	34	34	30	40	59	21	10	15	39	21	28	382
Number of customers	69	61	69	33	116	116	64	80	89	55	23	28	63	40	54	837
Customers per meter	2.2	2.259	2.226	1.571	3.412	3.412	2.133	2	1.508	2.619	2.3	1.867	1.615	1.905	1.929	2.2
TC magnitude	□	●	●	●	●	□	●	●	◎	◎	●	●	●	●	●	

Note: □ Electrified before the project ● Less than 1000 households ◎ More than 1000 households

Responding to our question to customers in the field survey “why electrification is not necessarily going smoothly, although there is an enormous potential number of customers wishing prompt access to power?”, many pointed out that, in addition to the connection fee, the indoor wiring cost is high. For connection, it is necessary to complete the indoor wiring work in advance and to get the inspection and approval by UEDCL. Therefore, there were some households that quit pursuing after obtaining an indoor wiring cost estimate, because it was expensive, including some schools and health facilities that applied for connection budget but could not get permission. Indoor wiring costs depend on the number of rooms and size of the house. It takes 100,000 to 200,000 UGX per room. Resulting in a total of 600,000 to 800,000 UGX per house as many houses have 3-4 rooms, which is far more expensive than the connection fee itself. To further increase the electrification rate, it is therefore recognized that financial support systems such as loans for indoor wiring cost coverage, as well as assistance for connection fee is needed.

As shown in Table 2, “electricity supply to unelectrified public facilities” (Indicator 2), has already achieved targets earlier than planned for government institutions and healthcare facilities, and connections to education facilities is going smoothly (as of the end of November 2017, 32 facilities out of 50 facilities connected: 64%). “Connection to local industry etc.” (Indicator 3) is the number of three-phase electricity¹⁹ users (part of Indicator 1) required for induction motors

has no data. According to a local consultant who carried out the above survey, it is estimated that at present only two years have passed from electrification, and the trading center and its surrounding residents are the majority of consumer connections.

¹⁹ 240V single phase Alternating Current is used for connection to general households, and many of the shops also use single phase for store operations. The work for three-phase AC connections for industrial use is different from single-phase AC connections and application to UEDCL is separately necessary.

etc., and includes facilities in the woodworking industry, milling industry, gas stations, etc. Businesses within the electrified areas are utilizing the electricity, showing signs of growth.

From the above, the number of consumer connections (Indicator 1) is expected to reach about 80% of the target by 2018. In TCs which occupy many of the number of connections so far, multiple households are using electricity for each connection. As a result, it is considered that the number of electricity customers being reached is more than the number of contracts with UEDCL. In addition, power usage (Indicator 2 and 3) by public facilities and local industries is progressing. Therefore, the effectiveness of this project is judged to be high.

3.3.1.2 Qualitative Effects (Other effects)

As for the qualitative effects of this project, it was expected after electrification that the quality of social services such as the Namayingo district government, the police station, the health facilities, the educational facilities, etc. would improve, stimulating the local economy. This is explained further in detail in the following “impacts” section.

3.3.2 Impacts

3.3.2.1 Intended Impacts

This project aimed to contribute to improving the rural electrification rate by constructing the power grid in the target area. In connection with the improvement of the rural electrification rate, impacts such as improvements to the living convenience of residents and the regional economy were assumed²⁰. Here, we analyze these impacts by dividing into (1) the contribution of this project to improving the electrification ratio, and (2) the impact on the living convenience of residents and regional economy improvements.

(1) Contributions to improving the electrification rate by this project

Against the extension target of distribution lines to the rural areas outlined in *the Rural Area Electrification Master Plan (2013-2022)* created by the Ugandan government (7,300 km 33 kV

²⁰ As a qualitative effect of this project, improvement of services at public facilities after electrification, and improvement of production efficiency of regional industries was expected. In this evaluation, in order to grasp the impact of the project, we conducted individual and group interviews with the staff of government agencies, health care facilities, educational facilities, commerce and industry men, individual households etc. in about 40 trading centers in the target area electrified in this project. Those are, as for individual interviews, six local government departments including the Namayingo District government office (regional development officers), Namayingo Police station, eight health care facilities of level II to IV including Buinja Health Center IV (physicians, nurses, facility chiefs), eight primary and secondary level educational institutions (principals and veteran teachers), eight business owners in commerce and industry, three visits to electrified private residences, one visit to unelectrified personal home, for a total of 51 individuals. As for group interviews, 69 residents of seven groups consisting of approximately five men and women in each group.

MV line in a 5-year period from 2013-2018), this project is equivalent to about 1.8% (128 km), which is the contribution stemming from the improvement of the power grid infrastructure as planned. The increase target in the number of units connected from the Master Plan is 250,000 over the same period, and an increase of 2,163 by this project is equivalent to about 0.9%. If it advances as planned to 4,800 connections by 2018, the contribution rate will be about 1.9%.

Table 4 shows the changes in the electrification rate after this project in the target districts. Since the latest electrification rate statistics by districts that were available at the time of the field survey are those of the 2014 Census, using the Census data (household connection number 2014) and the number of connections realized by this project (2015-2017), a Corrected household electrification ratio 2017 was obtained taking into consideration the situation of one-meter multiple households connection in the trading centers described previously. Although the increase in the number of connections by this project was not large (2,163 at the time of evaluation), and the impact on improving the electrification rate was limited, a significant improvement (3.4%), was seen in the Namayingo district which was electrified for the first time by this project. Based on this, it is judged that the contribution by this project was high²¹. In some districts the change after this project is negative. This occurred because the electrification increase rate did not reach the population increase rate (roughly 3% per year). These districts did, however, increase the number of connections and that is recognized as a contribution none the less.

Table 4 Change of Electrification Rates in the target districts of this project

	Mayuge	Iganga	Bugiri	Namayingo	Busia
No. of Households connected 2014	9,092	17,450	6,213	2,095	7,941
Electrification rate 2014 *1	9.5%	17.0%	8.3%	4.9%	12.3%
No. of connections by this project 2015-2017 (Total in five districts; 2163)	443	171	386	835	328
No. of Households connected 2017	9,535	17,621	6,599	2,930	8,269
Electrification rate 2017 *2	9.1%	15.8%	8.1%	6.2%	11.7%
Corrected electrification rate 2017 *3	9.6%	15.9%	8.7%	8.3%	12.2%
Change after the project	0.1%	-1.1%	0.4%	3.4%	-0.1%

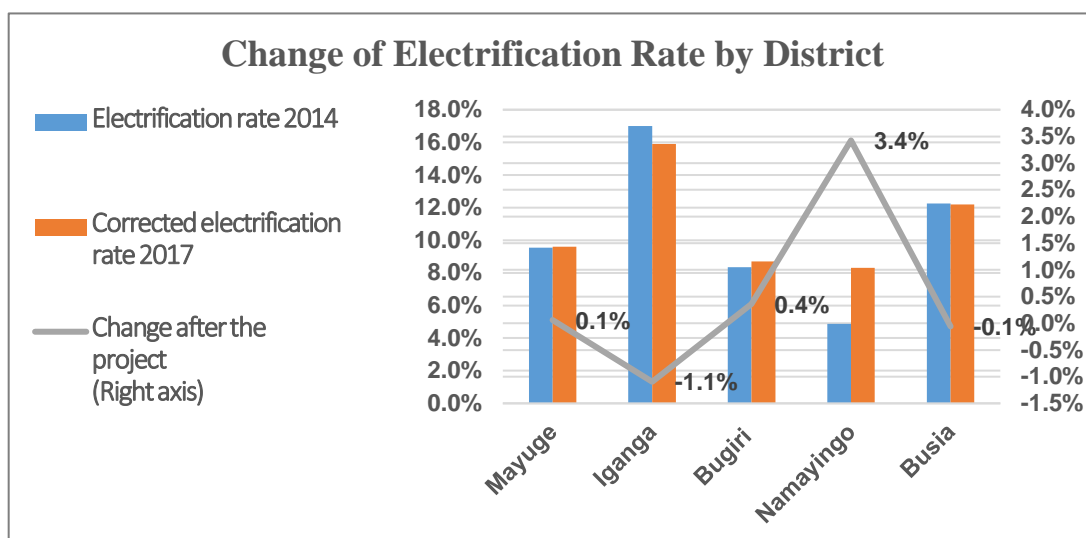
Source: Created by Evaluator from the 2014 Census data and data of connections from this project

*1: Rate of households using electricity for lighting in Census 2014

*2: Calculated using number of households (2017) developed using an average growth rate of 2002-2014

*3: Calculated assuming 2.2 end-users are connected to an electricity meter

²¹ The reason why electrification rate in Namayingo District in 2014 is not zero is because the definition of electrification is made as "households using electric lighting", the users of solar power systems are counted as electrified before electrification by grid power.



(2) Improvement in life convenience of residents and impact on regional economic improvement
 The following impact was confirmed by a field survey targeting customers.

Electric product ownership effect:

It is judged that each household has enjoyed the convenience according to its function of the electric appliances owned. Together with the residents' interview results, all the households use fluorescent light bulbs (average 3 or more depending on the size of the house in general households) and over 80% households use mobile phones. Regarding fluorescent lighting, some people were using solar panels before electrification, but due to limited battery capacity they could only use for a limited time. Due to the grid power connection many respondents stated that the lighting was far brighter and more stable. There are even more households that use local candles and kerosene lanterns (impacts related to kerosene lanterns are described later). In addition, about 30 to 50%²² of households use TV, irons and radios, and about 10% of households use Woofer (audio equipment) and refrigerators. Electric pots, electric cookers, mixers (blenders) etc. are still very few, and their popularization is still to come. In many general households, the amount of electricity used after electrification is less than 1 kWh per day²³, and although the refrigerators (150 W to 600 W) which constantly consume electricity is on the top of electric appliances to be purchased in the future, it is not widespread yet.

²² Regarding the number of households who own radios (including dry battery-type ones), in the Census 2014 for the Namayingo district it is 53%. If battery-type radios are included, ownership of a radio in electric home appliances is estimated to be the third highest following light bulbs and mobile phones.

²³ The connection fee of UEDCL includes 15,000 UGX for initial power charge. Divided by 686 UGX / kWh which is the unit electricity charge for general households as of December 2017, it is about 22 kWh. Monthly power use of many households is less than this.

Improvement of Security

The improvement of security after electrification by using grid power lighting, which is much brighter than solar panels, was also pointed out commonly from nearly all beneficiaries of local government officials, public facility personnel, commerce and industry persons, and general residents. Street lights have not been installed in the target area yet, but the shops in trading centers now have lights at night and at the entrances of houses, deterring suspicious activities. According to the Namayingo Police Station, the crime rate such as theft has decreased sharply after the electrification, 70% in the residential areas and 90% in the trading center area, of course this could be due to the initial shock factor and crime may increase again, but still a large improvement to the local security.

Extension of service provision time of administrative facilities and private stores, etc.:

Servicing time to customers of administrative facilities and private stores was greatly extended by using lighting. Prior to electrification, the government office staff came home around 5 pm and the shops were closed mostly around 8 o'clock, but after electrification, overtime at the government office increased to 10 pm, and many shops operated until midnight. Also, high-level health facilities such as Buinja Health Center (Level IV) had been accepting emergency illnesses at night, but the use of electricity by the solar system was limited to lighting equipment and the waiting room was also dark, so patient acceptance during night hours was limited. Pregnant women were asked to bring lights such as lanterns or flashlights when they delivered at night. But now these problems have been eliminated, and the health center can operate 24 hours a day. As a result, the number of visiting patients has more than doubled in many electrified health centers.

Police officers at the Namayingo Police Station (overseeing 18 political stations) had an operation system of 24 hours (two 12-hour shifts) from the past, but it was difficult to mobilize outside the shifts at night because they could not be contacted. Currently, mobile phones (private ownership) are always charged, so they can be called at all times, the communication system for security maintenance activities improved, and the 24-hour system was improved. The effect of deterring crime at night is a direct result of introducing the 24-hour electric lighting of shops and surrounding residential areas.

Improvement in the quality of social services by using electrical appliances/ equipment:

As well as the extension of operating hours to administrative facilities and private stores, the use of electrical appliances/ equipment has greatly contributed to the improvement of the quality of customer service of public facilities. In regional government agencies such as the Namayingo district government, they have become able to use printers, and it has become easier to print

documents for residents on paper, post it on the wall or distribute it, and the information provision to residents has improved overall. Data management has also improved as information entered is properly maintained in the database.

At Buinja Health Center, the largest health care facility in Namayingo district, sterilization equipment (Sterilizers) has become available at all times, and surgical procedures such as cesarean sections have been made possible. Sterilization equipment was introduced in the age of solar panels, but it was not actually used because there was a risk of electricity shortage when it was in use, and the solar power system had been limited to the use of lighting mainly. In addition, an incubator for premature babies (Incubators) was able to be used with confidence and premature infants began to be rescued. Electric refrigerators are now available even in other health care facilities, and in addition to vaccines, blood for transfusions can also be preserved. The use of centrifuges and diagnostic lights became possible, making diagnosis of malaria, tuberculosis, jaundice etc. readily easy. It became possible to collect patient samples to other hospitals and cooperate to provide experimental data. As for the gas type refrigerator used before electrification, there was a necessity of migration and storage of the vaccine in cooperation with surrounding health care facilities (called “cold chain”) when gas was exhausted, but now this is unnecessary as vaccine storage is reliable and stable.

In regard to educational institutions, the principal of the Naruwire Technical Institute stated, “the age of darkness has ended with the use of personal computers”, it is recognized as contributing greatly to the acquisition of information and its provision to the students. According to the teachers in the electrified primary and secondary schools, the learning environment in mornings and evenings improved as the classroom became bright. It is expected that using personal computers for education will be introduced in the future. In addition, students in electrified households increased their opportunities to invite friends to their homes and to have opportunities to collaborate under electric lighting, resulting in improved overall student performance. Many teachers are realizing that the students are benefitting from electrification, such as the emergence of students getting "first grade" for the first time in national unified exams (academic examinations received by selected students of schools that are conducted for public schools every year). Furthermore, since welding shops were established, iron fences have been built around schools with dormitories greatly improving security for the students, the number of applicants who enrolled, especially female, increased significantly. Since students wander less around the town at night than before, they spend more time reviewing, doing homework and watching TV.

Increase of new business

Many regional officials, such as that of the Namayingo district government, cited revitalization of businesses as the most important impact of electrification. More specifically, many services and stores that had not existed prior to electrification increased as follows; welding processors (production of metal products involving welding such as fences, doors, window frames etc. used in brick houses), miller (grain milling such as maize, rice etc.), furniture manufacturing (use of electric tools to make beds, chairs, desks), salons (hairdressers or barbershops using hair clippers, hairdryers etc.), bar/coffee shops (place of recreation equipped with TV, audio equipment, beer etc.), cold drink trader (selling chilled soft drinks at shops) etc. However, there were some new business founders who mentioned that 1 to two months after opening they have not yet realized any growth in business from electrification. There is a possibility that growth is lagged or shop owners misunderstood the needs for some of these new businesses, but regardless, we assume these are impact of this project on business. On the other hand, for businesses that existed before the electrification, many of the shopkeepers (gas station, welding processor, and shops) realized that, in less than three years after electrification, sales increased by about 30% to 70% and that energy costs such as kerosene declined.



New Business Sample 1:
Welders and iron doors



New Business Sample 2:
Meter of Milling Shop



New Business Sample 3:
A retail store with many bulbs

Increase of population

There are population increases from emigration to newly electrified areas that have the convenience of electrification. In particular, Namayingo Town Council (located in the center of Namayingo district) which was not electrified until the implementation of this project, recorded an increase of approximately 72% from 15,740 in the 2014 Census to about 27,000 at the time of the field evaluation. The government gathers the population statistics of the administrative areas nationwide every ten years by the Census. According to this, the ratio of the inhabitants living in the urban area of the Namayingo district before this project was 7%. It is considerably lower than other districts and there are many residents who moved in after electrification. People pointing

out the population increase were commonly in the electrified areas other than Namayingo as well. But there are also places where such a large population increase has yet to be realized, such as fishermen's villages Bumeru A and Bumeru B located at the end of the distribution route. Along with the population increase, some people said that not only the construction of houses increased, but also the buildings are being erected with more attractive designs than before.

Eliminate the need to visit neighboring towns for services

According to the resident interviews, electrification made it possible to use new services in the trading center where they live. They no longer need to go to neighboring towns because they can utilize services for milling maize or rice, making furniture/ door manufacturing, coping, typing, or sending electronic mail etc., in their own town. Also, they no longer need to go to the TC to charge mobile phones, as mobile phones can be constantly charged at home, so you can contact business partners anytime.

Reduction in fuel costs:

There was sufficient feedback from the beneficiaries (general households, commerce and industry) who have used kerosene and propane gas daily that the electricity fee after electrification is much cheaper than the sum of the costs of alternative fuel for power (candles, kerosene lanterns, gas refrigerators, mobile phone charging). However, as a fixed service charge²⁴ is taken every month regardless of electricity usage, there are more people pointing out that the electricity bill is high.

Reduction of health risks due to stoppage of use of kerosene lamps, etc.

Local candles/ kerosene lamps which use kerosene are harmful to the health of surrounding children and adults, such as causing respiratory troubles. Also, it has the risk of being knocked over and causing a fire, making unventilated areas black with soot. As a result, the Ugandan government has laid out a policy to eliminate the use of these by 2030. In this project area, after electrification, all households using kerosene lamps were switched to electric lighting. There were many customers who pointed out that this change has reduced health problems and the soiling of houses due to soot.

²⁴ 4,000 UGX (about 1.1 USD) is charged regardless of usage amount when paying electricity fees first time of each month. In the case of households using 3 USD/ month for electricity for example, the service charge of 1 USD occupies one third, so it may be felt expensive.



Local Candles which half of the population utilizes



Electric refrigerator to store chemicals etc. (Muterere Health Center)



Primary school library electrified from this project

Other effects

Many interviewees pointed out the capability to “drink chilled beverages at any time” as a positive change in life. The improvement in the psychological sense of security by bright electric lighting was also mentioned by many of the general households, medical staff and others.

3.3.2.2 Other Positive and Negative Impacts

(1) Impact on the Natural Environment

Since the target area of this project does not fall in an affected area such as a national park, the *Environmental Impact Assessment (EIA)* was approved in February 2012 by the Environment Agency (NEMA) after submission of the *Project Brief*. Most of the project area is located along existing roads, so it is considered that negative impacts on the natural environment is small. In some wetlands close to Lake Victoria where the inspection tour was conducted, the evaluator confirmed that environmental impact mitigation measures in the seasonal streams were properly implemented as planned in the preparatory survey for seasonal wetlands for the installation of ecosystem-conscious utility poles (such as widening the distance between utility poles and selecting the exposed areas of the wetlands without constructing access roads). Also, in other distribution network areas, tree cutting more than required was avoided and there were no environmental adverse impacts.

(2) Resettlement / Land Acquisition

According to REA, a social monitoring was conducted, and utility poles and other required equipment for this distribution network project were built mostly on existing road sites, and land acquisition and resident resettlement were not necessary. There is no need to acquire the land under electric distribution lines in Ugandan legal system, and as for the compensation for trees and crops that need logging for 33 kV LV distribution line sites, agreements were reached between REA and the owners prior to construction. However, the budget for compensation was attached in the 2017/2018 fiscal year, so it is planned to be paid by the end of 2018. Furthermore,

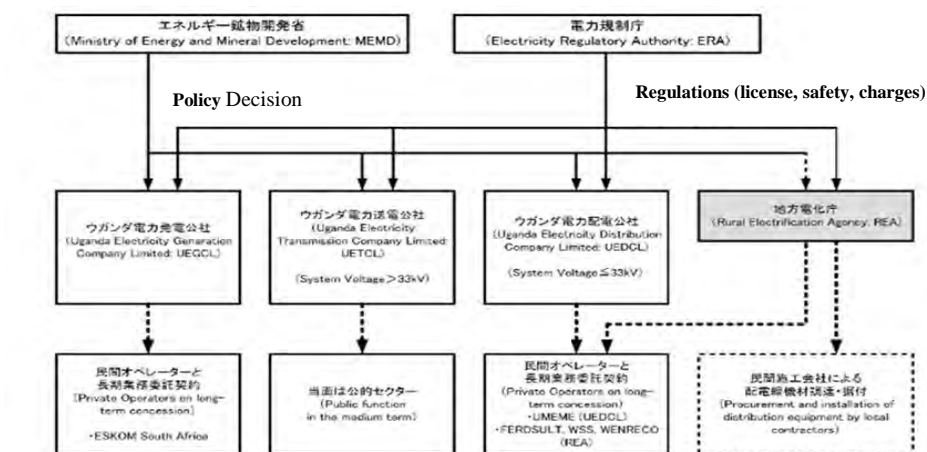
the compensation for cutting trees and crops related to laying down 415/240V LV distribution lines is also planned to be implemented during 2018. The target persons affected is calculated at 3,092 landowners of each site of MV and LV lines, and 365 million Uganda schilling that is necessary for compensation is budgeted. Early compensation should be implemented.

Based on the above, this project has largely achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional/ Organizational Aspects of Operation and Maintenance

Power grid facilities developed from this project are managed under direct control by UEDCL under the umbrella of REA, which supervises the rural electrification projects and this management system has not changed since project completion. UEDCL was born after the spin-off of the electric utility company (UEB: Uganda Electricity Board) in 2001, and still manages and operates²⁵ about 7% of the power distribution facilities nationwide even at present as privatization of power distribution service has advanced (Umeme occupies over 90%²⁶ of the total number of connections in Uganda). Therefore, UEDCL has extensive experience in maintaining and managing power distribution facilities. REA is, however, currently preparing the *Service Territory Master Plan* (scheduled to be completed in 2018) targeting 13 areas nationwide, and after completing it, REA plans to entrust the management and operation of the areas including this project to private distribution operators (including regional distribution cooperatives).



Source: Provided by JICA

Figure 3 Power Field Structure of Uganda

²⁵ UEDCL has entered into a maintenance and management agreement with REA and is operating and maintaining eight service territories including the Eastern district service territory where this project is located.

²⁶ As of 2017, there are nine companies entrusted for power distribution services including Umeme Co., Ltd. and UEDCL.

3.4.2 Technical Aspects of Operation and Maintenance

The O&M team that conducts day-to-day management of the power distribution equipment developed by this project is stationed at the Namayingo branch of UEDCL. The team consists of four staff members including a territory manager with senior electric engineering qualifications, a technician with an electrical engineering degree, and two staff with electrical construction qualifications. The equipment is still new at only 2 years from installation, the initial problems had been sorted out at the time of the routine inspection 1 year after completion, thus, it is recognized that they have established a stable and sufficient routine for daily operation checks. According to responses of a questionnaire to REA/ UEDCL, sometimes trouble occurs in the automatic reclosing device installed at Lumino. A new technician, however, has already been employed for periodic inspections since January 2018, and he is planned to address pending issues including identification of the causes of troubles. From the above, there are no problems in terms of technical aspects of O&M.

Table 5 Financial Situation of UEDCL

	UGX in million	
	2016	2015
Operating Income		
Operating Income	22,320	21,593
(Of this, power sales revenue under REA service territories)	5,982	4,321
Other operating Income	6,786	9,374
(Of this, Subsidies for REA service territories)	1,354	—
Total revenue	29,106	30,966
Operating Costs		
Cost of sales	10,782	9,563
Staff and Administrative expenses	16,366	12,077
Other operating expenses	352	246
Total expenses (without Depreciation)	27,500	21,885
Surplus before tax and asset amortization	1,606	9,081
Depreciation	18,207	18,365
Taxation	(1)	
Total expenses	45,707	40,250
Profit /Loss after Depreciation	(16,601)	(9,284)

Source: UEDCL Annual Report 2016

3.4.3 Financial Aspects of Operation and Maintenance

Table 5 shows the financial situation of UEDCL²⁷. The areas operated under UEDCL are regions with low profitability, and currently, only purchase costs from the UETCL and O&M costs are directly reflected in electricity charges and collected. In 2016, Approximately 23% of income from electricity sales were obtained as subsidies. For this reason, although its records profit before depreciation in the two years, it is in the red after depreciation. Investment funds will be provided as subsidies for what the Electric Power Regulatory Authority (ERA) deems necessary. In this way, the government puts priority on the global access of electricity and the necessary funds have been compensated by the government. Therefore, there is no deficiency in maintenance and maintenance expenses.

3.4.4 Status of Operation and Maintenance

During the ex-post evaluation, the evaluator conducted a survey of 33kV distribution lines, switches, transformers, and other equipment in this project along the distribution route. The team found some loose utility-pole support wires (guy-wire) and cracks scattered. It was confirmed, however, that these are not enough to have a considerable influence on the life span of the facility, and that the facilities are generally maintained in good conditions. The function status (judged by the number of failures by UEDCL) is good for each section, the usage situation (judged by the number of connections by UEDCL) has a difference for each section, the interval between the Nankoma-Lumino as the backbone is high, and those in the terminal sections such as Mpungwe-Makutu, Namayingo-Bumeru A/ B, Hukemo-Mundindi section are relatively low. According to UEDCL, the equipment maintained in this project are transformers, switches and power cables installed along utility-poles, and the burden of periodic inspection and maintenance is not so heavy. After the completion of this project UEDCL has already upgraded a transformer to a new one with double capacity of the original (100 kVA in Muterere TC was upgraded to 200 kVA) because the electric power demand is larger than the initial estimate, it has enough technology and experience concerning the O&M of equipment. Spare parts for future breakdowns etc. are not procured within this project, but since they are not special parts, it is considered that the company can fully deal with it.

²⁷ UEDCL is commissioned by REA to conduct business around power distribution and conducts the concession management of UMEME company which entrusts about 90% of electric power distribution business nationwide, and management of electric pole antiseptic / insect repellent plant.

From the above, no major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

This project was implemented with the objective of improving the infrastructure of the power grid by procuring and installing long-distance power distribution equipment and materials in the eastern five districts of Uganda where industrial revitalization could be expected, thereby contributing to the improvement of rural electrification. This project is part of Ugandan rural electrification strategy plan and is consistent with the country's development plan. Considering the rural electrification rate still as low as 10% in Uganda, the necessity of electrification is high, and it is consistent with Japan's aid policy. Therefore, the relevance of this project is high. The project cost ended up within the planned budget due to a decrease in construction quantities, and even though the project period on the Ugandan side was delayed by five months, the construction period on the Japanese side fell within about 80% of the planned schedule (four months shortened), so this project's efficiency is considered high. Connections to unelectrified public facilities has advanced at a rate faster than planned, and the number of connections to customers, who are mainly households, commerce and industry, is expected to reach about 80% of the target by the target year (2018). In addition, considering that there are instances of multiple households connected to one electricity meter, the overall household connection number is even larger than grasped. The positive impacts on living convenience for residents and the positive impacts on regional economic revitalization are widely observed, so the effectiveness and impacts of this project are high. As the target areas of electrification are located in regions with low profit margins, a part of the maintenance expenses is planned to be covered by government subsidies. The operation, maintenance and management of this project are free from problems in terms of organizational, technological, financial aspects etc. Therefore, the sustainability of this project is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- (1) Compensation for cutting trees etc. for MV distribution cables and LV distribution lines has not been completed and it is desirable for early implementation by REA.

- (2) In order to achieve the target number of connections, it is highly recommended to reduce the costs of connection which is becoming a bottleneck and burdened by households. Consideration should be given to support measures to facilitate setup costs such as indoor wiring costs and additional financing and installment payment options related to laying utility-poles in addition to subsidies relating to a fixed connection fee to be paid to UEDCL.

4.2.2 Recommendations to JICA

Compensation for cutting trees etc. relating to MV and LV distribution line installments has been delayed, and the monitoring for facilitating early implementation is important.

4.3 Lessons Learned

Points to keep in mind when improving electrification rates is set as the overall goal / project purpose

- (1) In this project, multiple households may be electrified per connection (electricity meter), and the number of connections grasped by the executing agency was recognized to be considerably lower than the actual number of electrified households. In addition, because of the high household number growth rate (or population growth rate), it was shown that in some targeted districts the electrification rate may not increase as the number of connections increases, if it does not exceed the household growth rate. As for the improvement of the electrification rate, it is necessary to set a target after fully grasping the actual circumstances.
- (2) In this project, there was a bottleneck in promoting electrification that the cost burden put on the customer for connection (including not only the connection fee but also the indoor wiring fee and utility-pole laying fee) was high. Therefore, it is desirable to consider the possibility of reducing the burden, if necessary, after analyzing not only the burden amount of the recipient country government, but also the total amount of expenses to be borne by customers.

END

Democratic Republic of the Congo

FY 2017 Ex-Post Evaluation of Grant Aid Project

“Project for Expansion of INPP Kinshasa Provincial Direction”

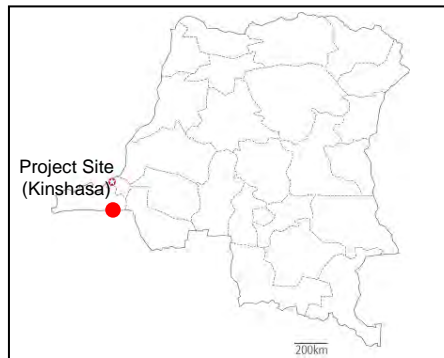
External Evaluator: Hajime Sonoda, Global Group 21 Japan, Inc.

0. Summary

The Project for Expansion of INPP Kinshasa Provincial Direction (hereinafter referred to as “the Project”), a grant aid project, was implemented to improve vocational training functions through constructing training facilities and installing equipment at Kinshasa Provincial Direction of the National Institute of Professional Preparation (hereinafter referred to as INPP Kinshasa). The objective was to develop skilled human resources in response to the market needs and contribute to supply them in the labor market of the Democratic Republic of the Congo (hereinafter referred to as “the DRC”). Vocational training has been an important area in terms of policy and development needs in the DRC at both the time of planning and the time of ex-post evaluation; moreover, the Project was highly consistent with Japan’s ODA policy at the time of planning. Accordingly, the relevance of the Project is high. The Project cost was within budget, however, because the Project period was longer than planned, the efficiency of the Project was fair. Thanks to the construction of facilities and installation of equipment by the Project, such results have been obtained as; expansion and improvement of training, improvement of training environment, increase in efficiency of training, and physical improvements in offices for administration staff and instructors. Although there were some departments where the annual number of trainees did not reach the planned levels, improvements were realized in terms of the efficiency and effectiveness of practical training, and the trainees are satisfied with the facilities and equipment. Hence, it is deemed that training functions have improved at INPP Kinshasa. Moreover, most enterprises have high regard for the knowledge and skill levels of INPP trainees and think that their competence is relevant to their needs. Many enterprises also think that the INPP training has improved compared to five years ago. Therefore, the effectiveness and impact of the Project are high. Concerning the operation and maintenance of the Project, apart from some minor financial issues, there have been no problems regarding institutional and technical aspects as well as the operation and maintenance status. Therefore, the sustainability of the Project is high.

To sum up, the Project is evaluated as being highly satisfactory.

1. Project Description



Project Location



INPP Kinshasa (front entrance)

1.1 Background

Passing through a period of confusion and civil war after 1991, the DRC has experienced progress towards reconstruction and development following establishment of a provisional administration in 2004. The Kabila administration, which came to power in 2007, raised “improvement of employment and labor” as a priority issue and made it a key policy for economic development. In line with this policy, it regarded the training of human resources for industry as important. Based in the capital of Kinshasa, INPP was established with the objective of reinforcing the capacity for vocational training of citizens, and it has become the largest vocational training agency of the DRC having numerous centers all around the country. The Government of Japan implemented assistance comprising dispatch of experts and supply of equipment to INPP in the 1980s. However, since the end of the civil strife, INPP was confronted by numerous issues including insufficient capacity and aging of instructors, deterioration of equipment and facilities, limited capacity of facilities.

Against this background, the Government of the DRC issued a request to the Government of Japan asking for assistance aimed at strengthening the capacity of INPP to implement training. Consenting to this, the Government of Japan consigned JICA to implement the “Preparatory Study for Cooperation on Vocational Training Program in the DRC” (2009-2010), and the decision was made to implement the Vocational Training Program comprising 1) a technical cooperation project aimed at strengthening the pedagogical capacity of instructors, 2) grant aid aimed at construction of facilities and installing equipment at INPP Kinshasa, and 3) dispatch of a Technical and Vocational Education and Training (hereinafter referred to as “TVET”) Advisor (individual expert) with an aim of strengthening capacity at INPP headquarters. As the grant aid component of this program, the Project’s preparatory study was implemented from September 2010 to June 2011; the loan agreement was signed in June 2012; and the Project was commenced thereafter.

1.2 Project Outline

To improve the training functions of INPP Kinshasa by constructing training facilities and installing equipment, thereby contributing to development of skilled human resources in response to market needs and supply to the labor market.

G/A Grant Limit / Disbursed Amount		1,829 million yen/ 1,634 million yen
Exchange of Notes Date / Grant Agreement Date		June 2012 / June 2012
Executing Agency		Institut National de Préparation Professionnelle (INPP)
Project completion		November 2014
Project proponents	Main component	Dai Nippon Construction (civil works), Ogawa Seiki Co., Ltd. (equipment procurement)
	Consultant	Joint venture comprising Oriental Consultants Co., Ltd and the Overseas Vocational Training Association
Preparatory Study		August 2010 - June 2011
Related Projects		TVET Advisor (individual expert, dispatched intermittently during January 2010 - December 2014), “Project on Development of Capacity of Instructors at INPP” (technical cooperation, January 2011 - October 2014), “Project on Strengthening the Capacity of National Institute of Professional Preparation” (technical cooperation, 2015 - 2020)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

2.2 Duration of the Evaluation Study

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

Duration of the Study: August 2017 – December 2018

Duration of the Field Survey: January 25 - March 6, 2018, June 12 - June 21, 2018

The external evaluator for the Project also conducted the ex-post evaluation for “The Project on Development of Capacity of Instructors at INPP” (2011-2014, hereinafter referred to as the “Technical Cooperation Project”) – the technical cooperation project that was implemented in tandem with the Project. Because the implementing agency and related agencies for both projects overlapped, the evaluation was conducted together, however, separate ex-post evaluation reports have been made for each project. This report targets the Project (grant aid assistance).

3. Results of Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance to the Development Plan of the DRC

At the time of planning (2010-2011), the importance of vocational training for stabilizing the macro economy, building growth, improving access to social services, and supporting vulnerable members of society was stressed in *the Growth and Poverty Reduction Strategy Document* (DSCR 2006), which was the national development plan of the DRC. Moreover, “improvement of employment and labor” was included among “five priority issues” that the government had earmarked as important policies for growth of the economy.

In the DRC’s “*National Development Strategy 2017-2021*” (draft version at the time of ex-post evaluation), “human resources, employment, and social welfare” is raised as one of four development axes, and it is intended to endow people with the knowledge, technology, and capacity required to participate in a creative and dignified labor market and society. Moreover, concerning Sustainable Development Goal (SDG) 4: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”, the DRC aims to “greatly increase the ratio of young people and adults who are endowed with technical and vocational skills and the other capacity required for employment, fulfilling and humane work and entrepreneurship” and to “achieve total and productive employment and fulfilling and humane work for all men and women including young and disabled persons, and realize equal pay for equal work” by 2030³.

Meanwhile, in 2014 the government enacted the *Basic Education Act* in which it prescribed the framework of the education system including general education and vocational training. According to INPP, numerous government ministries and offices are involved with vocational training and it has taken time to review vocational training policies and strategy and review the practical demarcation of roles of each relevant agency. While, in 2018, a bill to establish a national vocational certification committee (Commission Nationale de Certification Professionnelle) was proposed at the suggestion of INPP. Positioned under the direct jurisdiction of the Presidential Office and participated in by more than 10 government ministries and offices, this commission is responsible for establishing standard curriculums for vocational training, prescribing standards for instructors, facilities and equipment and so on. It seems likely that establishment of the commission will be approved sometime in 2018.

As such, relevancy of the Project to the development policies of the DRC was high both at the time of planning and ex-post evaluation.

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

² ③: High; ②: Fair; ①: Low

³ SGDs National Report (Ministry of Planning, 2016)

3.1.2 Relevance to the Development Needs of the Democratic Republic of the Congo

At the time of planning, the unemployment rate in the DRC was in excess of 50% and was especially high among young people. The extreme levels of unemployment in cities with a high population growth rate were a factor behind deteriorating public order in the cities. Moreover, an important issue for the government was to help large numbers of internally displaced people and discharged soldiers produced by the civil strife in the country to return to society through vocational training. Therefore, it was indispensable to promote capacity building through vocational training to enable such people to participate in social and economic activities. INPP provided vocational training at institutes in the capital Kinshasa and regional areas. However, because it had been unable to recruit instructors during the age of civil strife, it faced a shortage of mid-career instructors. Moreover, training equipment was deteriorated, and the capacity of buildings was limited. These and other factors meant that it was unable to conduct high-quality vocational training, making it urgently necessary to address the capacity building of INPP. Since then, unemployment rates have continued to rise in urban areas, meaning that the importance of vocational training has been sustained through to the time of ex-post evaluation⁴. Accordingly, relevance of the Project to the development needs of the DRC has remained high both at the time of planning and at the time of ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

At the time of planning, the Project was treated as a vocational training program within the priority sector of "Economic development" and the development issue of "Employment promotion" in the Government of Japan's Rolling Plans for the DRC. In the Yokohama Action Plan that was adopted at the 4th Tokyo International Conference on African Development in 2008⁵, it was stated that "training of human resources to support industrial sectors will be promoted through the expansion of technical education and vocational training institutions" within the "post basic education and advance education/research" field, so this project is consistent with this plan.

To sum up, this project was highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

⁴ According to the National Development Strategy 2017-2021 (draft at the time of ex-post evaluation), the unemployment rate in urban areas has increased from 28.4% in 2005 to 30.9% in 2012 and 46.8% in 2017.

⁵ The Tokyo International Conference on African Development (TICAD) is a regularly staged initiative for African development co-hosted by the Government of Japan, the United Nations, the African Union, and the World Bank. TICAD I was staged in 1993, and conferences have been regularly held ever since.

3.2 Efficiency (Rating: ②)

3.2.1 Outputs

In the Project, new training facilities for training departments and administration departments were constructed and training equipment was supplied for six departments, i.e. mechanical, automobile, electricity, electronics, welding / plating, and building / civil engineering, at INPP Kinshasa. The Project assistance targeted seven departments, which were these six departments plus the refrigeration / air conditioning department which was housed in the new training building. The planned and actual outputs of the Project are as shown in Table 1.

Table 1 Comparison of Planned and Actual Outputs

Plan	Actual
<p><Items by the Japanese side> 【Facilities】 Total floor area: 5,172.6m² Training building: 3 floors (lecture room, refrigeration / air conditioning practical training room, electricity practical training room, electronics practical training room, common computer room, information space, multipurpose room, study and document room, etc.) Administration building: (principal's office, secretariat, educational affairs, orientation, selection and placement service, pedagogy service, meeting room, budget and control service, inspectors' bureau, etc.) Auxiliary building: 1 floor (electricity room, guard room) 【Equipment】 Equipment for the machinery, automobile, electricity, electronics, welding / plating, and building / civil engineering departments, common equipment, etc. 【Consulting service】 Detailed design and supervision of procurement and construction/installation of facilities and equipment</p>	<p><Items by the Japanese side> 【Facilities】 Almost as planned (Partial changes to utilities and exterior finishing materials) 【Equipment】 Almost as planned (Partial changes to equipment specifications) 【Consulting service】 As planned</p>
<p><Items by the DRC side></p> <ul style="list-style-type: none"> • Acquisition of construction permit for implementation of the Project • Dismantling and removal of existing structures and leveling of site for construction of new facilities • Interior renovation of existing facilities, and temporary transfer of functions • Securing of installation locations for equipment scheduled for installation in existing facilities 	<p><Items borne by the DRC side> As planned (Only minor changes, for example increase of concrete paved area, etc.)</p>

Sources: Materials provided by JICA and INPP

The three-floor training building and two-floor administration building were constructed on the soccer pitch inside the grounds of INPP Kinshasa. At this time, the existing building that contained part of the administration departments was removed. Roughly 80% of the Project cost was spent on the facilities construction. According to onsite observations and materials provided by JICA, there have been some minor changes to the utilities and exterior finishing materials (change from natural stone masonry to tile masonry, etc.)⁶ of the buildings as well as to some of the equipment specifications. According to INPP, the quality of equipment and facilities was outstanding, and the types and quantities of equipment were also more or less appropriate⁷. On the other hand, concerning the facilities plan, inconveniences have been pointed out: specifically, the technical director's office and principal's office have no dedicated toilets, and the toilets in the training building are divided between men's toilets and women's toilets alternately on each floor (even though almost all trainees who use the training building are men). Improvements to these points were requested following the start of construction, however, it was not possible to make the changes at this time.

Meanwhile, in tandem with the Project (but outside the scope of the Project), INPP rebuilt existing facilities (financial affairs section, dormitory facilities, etc.) at its Kinshasa institute as a four-floor training building, which also contains the financial affairs section, beauty / sewing department, computer department and so on.



Administration building (front), Training building (rear)

Inside the training building

⁶ This change was implemented according to the wishes on INPP because it had seen natural stone masonry on exterior walls at another project in the city naturally fell off after completion and it was concerned the same thing may happen again. Also, it wanted to save on future maintenance costs.

⁷ However, because the number of trainees has declined, some equipment was not being fully utilized at the time of ex-post evaluation. For details, see section “3.2.1.1 (3) Annual number of trainees”.

3.2.2 Inputs

3.2.2.1 Project Cost

The total Project cost was planned as 1,858 million yen, comprising 1,829 million yen (including contingency cost of 156 million yen) on the Japanese side and 29 million yen on the DRC side. The actual total cost was 1,665 million yen (91% of the planned amount), comprising 1,634 million yen on the Japanese side and 31 million yen on the DRC side. Compared to the planned amount of 1,702 million yen leaving aside the contingency cost, the actual cost was 98%, which means that the Project cost was roughly as planned. The cost on the Japanese side was reduced as a result of competitive tender and even allowing for increase in the contract amount arising from the plan changes, it was still only 94% of the planned amount not including contingency cost. The cost on the DRC side was approximately 6% higher than the planned amount due to the addition of concrete paving inside the site grounds.

3.2.2.2 Project Period

The Project including the detailed design and procurement was scheduled to last for approximately 26 months from signing of the grant agreement in September 2012 through to October 2014. In reality, the grant agreement was signed three months ahead of schedule in June 2012, but the Project was completed one month behind schedule in November 2014. Due to the impact of the aforementioned plan changes, the actual project period increased by two months and was 28 months in total (108% compared to the plan).

In the refrigeration / air conditioning department's practical training room that was included in the training building constructed in the Project, it had been planned to install training equipment supplied under the accompanying Technical Cooperation Project. In the Technical Cooperation Project, it had been planned to implement training for instructors using this training equipment. However, because the start of the Project was postponed due to the effects of the Great East Japan Earthquake⁸, installation of the equipment supplied in the Technical Cooperation Project was delayed and the training of instructors was implemented using only the existing training equipment.

To sum up, although the project cost was kept within the plan, the project period exceeded the plan. Therefore, efficiency of the Project is fair.

⁸ The preparatory study for the Project was completed in June 2011. However, due to the Great East Japan Earthquake that occurred in March that year, the grant agreement wasn't signed until June 2012, one year after completion of the preparatory study.

3.3 Effectiveness and Impacts⁹ (Rating: :③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effectiveness Indicators)

The objective of the Project was to improve the training functions of INPP Kinshasa, and the quantitative indicators of this were set as: 1) the number of available courses, 2) the maximum number of people who can be trained at a time, and 3) the annual number of trainees. The situation regarding achievement of these indicators is described in the following paragraphs.

(1) Number of training courses that can be implemented

It was anticipated that training courses which could not be conducted due to shortages of equipment, etc. would become available using the facilities and equipment provided in the Project. It was anticipated that seven training courses (auto electrics, generators, central air conditioning, auto air conditioning, milling machine, industrial design drawing, and grinding) would be made possible as a result of the Project, and all seven were realized. In addition, a structural calculation course and GIS (geographic information system) course making use of computers were newly opened in the building / civil engineering department. Accordingly, the number of available training courses was higher than planned.

However, at the time of ex-post evaluation, the auto air conditioning course has not been commenced because training of instructors under the “Project on Strengthening the Capacity of National Institute of Professional Preparation” (2015-2020) (hereinafter referred to as “the Follow-up Technical Cooperation Project”) has not been completed. Similarly, the industrial design drawing course has not been implemented due to a lack of applicants. Moreover, the total number of courses in the targeted departments at INPP Kinshasa has only increased from 34 in 2010 to 36 in 2018, not sufficient to reach the target of 41 courses that was projected at the time of planning. This has been due to the fact that some training courses have been consolidated due to a shortage of prospective trainees in certain fields.

(2) Maximum number of people who can be trained at a time

Before the Project, INPP Kinshasa had no multipurpose assembly facilities. The multipurpose hall with sufficient capacity to conduct training for 120 persons at once was constructed in the Project. This hall can also be partitioned into two parts. According to INPP, this hall is used not only for training but also for various ceremonies implemented by INPP headquarters and INPP Kinshasa and it sometimes accommodates more people than the given capacity. Accordingly, the said indicator has been achieved as planned.

⁹ Sub-rating for Effectiveness is to be put with consideration of Impact.

(3) Annual number of trainees

The Project facilities and equipment were planned based on forecast numbers of trainees in each of the targeted departments. It was projected that the annual number of trainees in the seven targeted departments would increase from 3,048 in 2010 to 4,380 in 2017. In reality, immediately following completion of the Project in 2015, the number of trainees reached 4,288, more than planned. However, it dropped to 3,016 in 2016, rising once more to 3,320 (76% of the planned number) in 2017 (see Figure 1 and Table 2). Out of the trainees enrolled in 2017, 69% (2,306) received job seeker training, 23% (769) received in-service training (employees dispatched by companies), and 7% (245) were received as practical trainees from other educational institutions (high schools, technical colleges, universities, etc. conducting TVET).

Changes in the number of trainees differed among training departments: numbers increased more than planned in the electricity department and electronics department, while numbers were far below the planned levels in the machinery department, building / civil engineering department, welding / plating department, and refrigeration / air conditioning department in 2017. The number of trainees in the machinery department in 2017 fell to approximately one third of the number in 2009. According to hearings with INPP and companies¹⁰, the following were given as reasons why the number of trainees in 2017 was less than planned.

- It is possible that demand and job offers fluctuated according to economic trends in Kinshasa. In particular, it is thought that the economic slowdown in the DRC from 2015 onwards was linked to the decline in the number of trainees toward 2016¹¹. Moreover, it is thought that job seekers who were sensitive to such changes in the labor market concentrated in the sectors that were thought to offer higher employment opportunities (leading to the decline in the machinery field and increases in the electric and electronics fields, etc.).¹²
- The target number of trainees at the time of the preparatory survey was simply surmised by extrapolating from changes in the number of trainees from previous years. Hence, there was room for improvement regarding the technique used to forecast demand.

¹⁰ Hearings were implemented targeting Federation of Enterprises of Congo (FEC), National Federation of Craftsmen, Small and Medium Enterprises of Congo (FENAPEC), 6 enterprises (including one governmental organization) that utilize ongoing training at INPP, and 8 other enterprises.

¹¹ The GDP growth rate of DRC in 2013-2014 reached almost 9%. However, due to decline in the international prices of mineral resources, which account for the country's main exports, and sluggish investment brought about by political instability, the GDP growth rate fell to 6.9% in 2015 and 2.4% in 2016. Moreover, some of the enterprises interviewed were cutting back on new recruits, while others were cutting staff numbers.

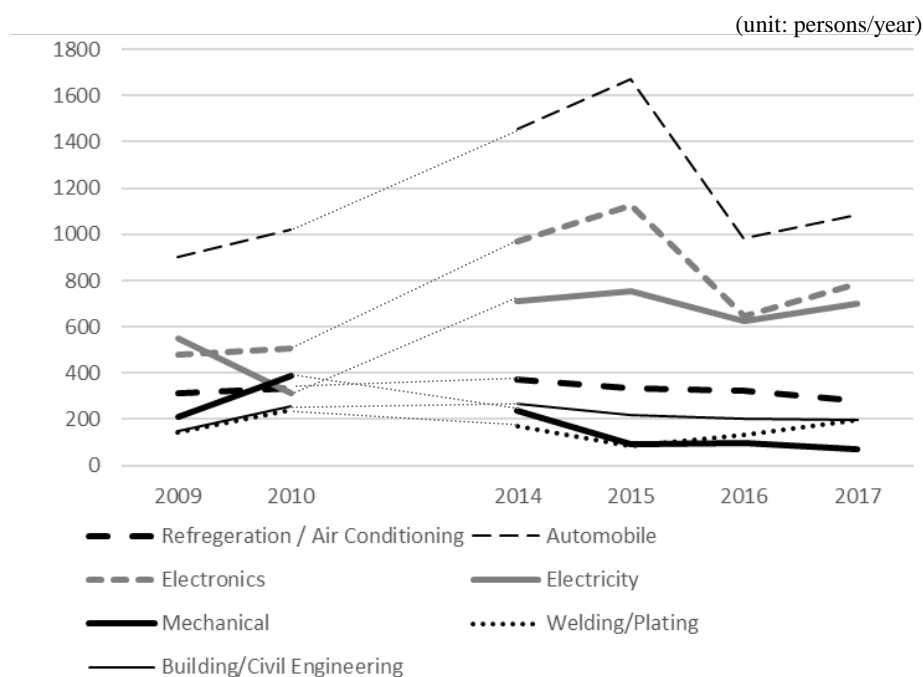
¹² Machinery department, where the actual number of trainees has fallen significantly below the target, has the lowest ratio of job seekers training being about 25% (2015 to 2017), and it is deemed that the decrease in new jobs in the labor market has been remarkably reduced. While, in the mechanical and the refrigeration / air conditioning departments, the number of job seekers in training has been constantly decreasing since 2014.

- Even if potential demand did exist, it was still necessary to try to stimulate demand through informing a wide range of job seekers about the detailed contents of training offered.
- In the automobile department, instructors were busy with the trainers' training under the Follow-up Technical Cooperation Project for some time. In addition, existing equipment was placed outdoors to allow for the renovation of the practical training room in preparation of installation of new equipment by the Follow-up Technical Cooperation Project. As a result, there were limitations in the number of sessions and capacity of training courses, and such fact was one of the factors for the decline of trainees during 2016 - 2017.

To sum up, leaving aside the case of the automobile department in which the Follow-up Technical Cooperation Project was implemented, the reason why the number of trainees did not reach the planned number in 2017 was because the number of applicants in each department did not grow as expected. Therefore, it was not because of constraints on the side of the Project facilities and equipment. However, this has meant that the Project facilities and equipment have not been adequately utilized in some training departments¹³.

The overall number of trainees at INPP Kinshasa increased by a factor of 2.5 in eight years from 3,030 in 2009 to 7,471 in 2017. There were large increases in departments not targeted in the Project, namely, the computer department, sewing / beauty department, hotel / cooking department, language department. According to INPP, there are so many applications that some prospective trainees have to be put on a waiting list in the electronics, computers, and sewing / beauty departments, and the auto electrics course in the automobile department. However, the number of applicants for other training departments and courses are within the available capacity and all applicants are able to receive training. Incidentally, the new training building that was constructed by INPP simultaneously with the Project is utilized for training in the computers and sewing / beauty departments.

¹³ Concerning the machinery department in which the number of trainees was far lower than planned, INPP is working to increase the number of trainees through receiving many ongoing trainees from Congo National Railways and so on.



Source: Prepared based on INPP materials

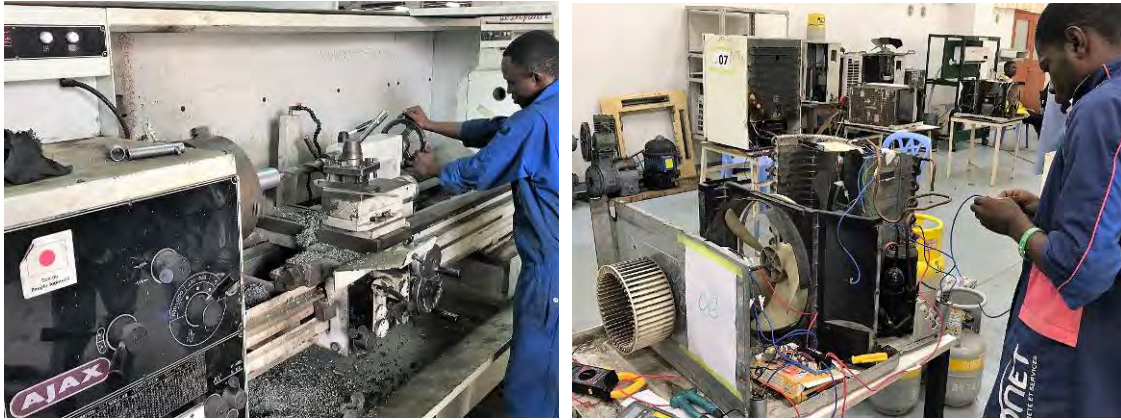
Figure 1 Changes in the Annual Number of Trainees in the Project Target Departments

Table 2 Changes in the Annual Number of Trainees at INPP Kinshasa

Unit: persons/year

	2009	2010	...	2014	2015	2016	2017	2017 Target	Real / Target
Refrigeration / Air Conditioning	315	334	...	374	336	326	283	480	59%
Automobile	900	1018	...	1458	1673	981	1085	1140	95%
Electronics	478	504	...	971	1128	648	789	660	120%
Electricity	548	312	...	710	752	627	698	420	166%
Mechanical	213	386	...	240	94	98	69	600	12%
Welding/Plating	145	238	...	172	86	131	197	420	47%
Building/Civil Engineering	149	256	...	268	219	205	199	660	30%
Sub-Total	2748	3048	...	4193	4288	3016	3320	4380	76%
Others	282	-	...	2889	3741	3210	3716	-	-
Total	3030	-	...	7082	8029	6226	7036	-	-

Source: Prepared based on INPP materials



Practical training in the mechanical department (left) and the refrigeration / air conditioning department (right, doing examination)



Practical training equipment in the automobile department (left)
Practical training equipment in the electronics department (right)

3.3.1.2 Qualitative Effects (Other Effects)

According to hearing with INPP Kinshasa, the following effects contributing to improved training functions have been identified.

- Improvement of the training environment: The departments targeted in the Project had been faced with various problems, for example, shortages in the number of classrooms and classroom area, lack of practical training space, insufficient lighting and ventilation, noise and vibrations from practical training equipment in adjacent departments. Following the Project, these problems were entirely resolved in the refrigeration / air conditioning department, electricity department, and electronics department thanks to their accommodation in the new training building. Meanwhile, the automobile, welding / plating, and building / civil engineering departments have benefited from additional classrooms and practical training space freed up by relocation of the said three

departments and administration department to the new building.

- Improvement of training contents through installation of training equipment: The departments targeted in the Project previously used old equipment that was limited in variety and quantities, which meant that some practical training was restricted to explanations using models and audiovisual materials or study tour at external enterprises. Thanks to the installation of training equipment in the target departments by the Project, the practical training was improved in terms of efficiency and effectiveness. The following effects have been reported by each department¹⁴.
 - ✧ Mechanical department: Because the variety and quantities of equipment were increased, it is possible to conduct practical training using various types of equipment with small groups working on each piece of equipment. Training periods have thus been shortened.
 - ✧ Automobile department: It has become possible to conduct practical training in engine disassembly and assembly, which was previously limited to explanations based on photographs. With the provision of ample tools, it has become possible to conduct efficient practical training.
 - ✧ Electricity department: Thanks to the increased quantity of equipment, the time spent by trainees waiting to do practical training has been greatly shortened.
 - ✧ Electronics department: It has become possible to conduct practical training using state-of-the-art equipment and high-quality equipment that is compatible with the latest technological trends.
 - ✧ Welding / plating department: Thanks to a major increase in quantities of equipment, the practical training has become more efficient. With increased types of equipment made available, it has become possible to conduct practical training in technologies that were previously taught only as theory.
 - ✧ Building / civil engineering department: It is no longer necessary to borrow surveying equipment from outside companies, and it has become possible to efficiently conduct practical training.
 - ✧ Refrigeration / air conditioning department: Previously, only equipment in actual use was used, however, thanks to the introduction of training equipment, it has

¹⁴ The training equipment in the refrigeration / air conditioning department was procured in the technical cooperation project and installed in the training building that was constructed in the Project, but it is given as a synergistic effect here. In the automobile department, equipment has been provided through the Project and through the technical cooperation project, but the effects of that are not included here. Moreover, since it was still scheduled for additional equipment to be supplied to the automobile department under the follow-up technical cooperation project, it was pointed out that equipment is still inadequate at the time of ex-post evaluation.

become possible for trainees to acquire deeper understanding of theory while conducting simulations. Concerning industrial air conditioning, it has become possible to conduct appropriate training over a short period without having to consign practical training to outside companies.

- Enhanced efficiency of training in small groups: Because the number of classrooms has increased, the number of trainees per class has decreased in all the target departments. The new training building was planned assuming 30 trainees per class, however, following the Project, the number of trainees per class has been lower than 30 in all the target departments except for the crowded automobile department. As a result, it has become easier to conduct practical training, more time is available to perform practical training, and there are greater opportunities to offer individual guidance to trainees.
- Improvement of the administration department and instructors' rooms: Whereas rooms in the administration departments were very cramped before the Project, they now have adequate size. The instructors' rooms for the refrigeration / air conditioning department, electricity department, and electronics department, which have entered the new training building, have become larger. Generally, sufficient space to accommodate increased instructors has been secured, and counseling services of educational affairs office for prospective applicants, trainees and job seekers have been improved. On the other hand, new issues have emerged for example, the financial affairs section of the administration department is inconveniently situated in a separated building¹⁵, the educational affairs office has no space for conducting individual counselling.
- Satisfaction of trainees: According to a telephone survey with ex-trainees¹⁶, 90% responded that the training was "very appropriate" or "appropriate"; 87% said that the physical environment was "very good" or "good"; and 86% responded that the training equipment was "very good" or "good", indicating a high level of satisfaction. Moreover, according to hearing with the current trainees of INPP, satisfaction of trainees with the facilities and equipment was high. INPP Kinshasa is regarded as the only vocational training institution in the city that can conduct proper practical training, and it attracts a lot of trainees who are considering advancing to colleges that cannot offer sufficient practical training, and graduates of such colleges who seek better practical training.

¹⁵ The financial affairs section of the administration department is located in the new training building that INPP constructed separately from the Project.

¹⁶ The telephone survey with 590 ex-trainees (between 6-14 months following completion) of the automobile department, refrigeration / air conditioning department, mechanical department, electricity department, electronics department, welding / plating department, and building / civil engineering department. The targets were randomly selected from each training department based on lists at INPP Kinshasa.

Moreover, instructors at INPP Kinshasa have a reputation for carefully teaching trainees until they can acquire skills. On the other hand, some respondents said that the training fee is high and that it is troublesome having to pay monthly fees by bank transfer.



Training in a lecture room



Instructors' room
(refrigeration / air conditioning department)

3.3.2 Impacts

3.3.2.1 Intended Impacts

As the main impact, the Project was expected to “develop skilled human resources in response to market needs and contribute to supply them in the labor market of the DRC”.

As was described in section “3.3.1.1 (3) Annual number of trainees”, the number of trainees in the target departments of INPP Kinshasa increased from 2,748 in 2010 to 3,320 in 2017. As was mentioned before, it is thought that the number of trainees is greatly impacted by trends in the economy and labor market in Kinshasa, so it is not always possible to discern a consistent trend of increase, while, the number reached a peak of 4,288 in 2015. Accordingly, it is thought that the Project has contributed to increasing the number of skilled human resources trained by INPP Kinshasa.

Meanwhile, as is described below, enterprises generally hold the skilled human resources supplied by INPP in high regard and think that the INPP training is consistent with market needs.

- According to hearings with INPP and related enterprises, the enterprises on the whole have a high regard for and are satisfied with INPP. INPP Kinshasa’s reputation for good quality training has even reached small enterprises that have never utilized INPP (and do not pay contribution)¹⁷, and it is recognized as the only vocational training institution in Kinshasa that offers sound practical training. Moreover, it is widely known that JICA cooperates with INPP Kinshasa, and this further boosts its reputation for reliability.

¹⁷ INPP is operated primarily on contributions from enterprises that are levied under legislation.

- According to a telephone survey with enterprises¹⁸, 91% of the enterprises responded that recruited INPP trainees had appropriate knowledge and skills, while 91% answered that “the INPP training is relevant to the needs of the enterprise”. 57% of the enterprises responded that the INPP training had improved a lot compared to five years ago, while 35% said that it had improved slightly, and 12% said that it had remained the same. Accordingly, the majority of the enterprises answered that the INPP training had improved following implementation of the Project.

In this way, it is deemed that the quality of training at INPP Kinshasa has improved, that it has become more relevant to market needs, and that the quality of skilled human resources graduating from the institute has been enhanced. It is thought that these improvements are synergistic effects realized as a result of the Project, which resulted in the construction of facilities and installation of equipment, the Technical Cooperation Project that strengthened the capacity of instructors at the same time as the Project, and the dispatch of an individual expert (TVET advisor) to support capacity building and promote links with industry primarily at the INPP headquarters, which supervises the local INPP institutes throughout the country and administers the entire organization.

On the other hand, numerous respondents in the hearings with enterprises voiced needs for training in new technologies that are gradually spreading through industry, for example, multiple packaged air conditioning systems in buildings, automatic control of industrial air conditioning systems, common rail fuel injection systems in diesel engines. Though the INPP side is also aware of such needs, it cannot respond immediately because doing so entails the introduction of cutting-edge practical training equipment and continuous capacity building of instructors.¹⁹ INPP grasps training needs through listening to requests from individual enterprises and monitoring the numbers of applicants for courses. However, it only partially grasps market needs, since it has no systems for directly gauging training needs among companies that do not pay contributions (mostly small and medium enterprises), self-employed persons and new job seekers and reflect them on the training plan.

3.3.2.2 Other Positive and Negative Impacts

According to the interviews with INPP, enterprises, current trainees, and ex-trainees, the fact that INPP’s capacity has been strengthened in hard and soft terms through JICA’s Vocational

¹⁸ In the telephone survey with enterprises, a total of 150 enterprises were randomly sampled. These comprised 50 enterprises selected from a list of enterprises that had utilized in-service training of INPP in the automobile department and refrigeration / air conditioning department and another 100 enterprises selected from the register of FEC.

¹⁹ INPP, which is supposed to provide wide-ranging training to workers all over the country, seems to have no clear criteria for determining how far it needs to respond to high-level demands from small numbers of enterprises. It seems to be responding to each situation on a case-by-case basis.

Training Program is widely recognized not only in industrial circles but also among the general public in the DRC, and this has contributed to INPP receiving a good reputation and the improved trust of enterprises. In particular, the new training facilities and equipment provided in the Project are attracting attention. According to INPP, these improvements have led to increased number of in-service training and greater financial contributions from companies.²⁰ Moreover, the latent capacity of INPP to act as a receptacle for assistance is noticed, and it is possible that it has led to the formation of new aid undertakings by JICA and other donors.²¹ The Director of INPP has expressed deep satisfaction at the JICA's Vocational Training Program including the Project for the role it has played in driving INPP's major progress since 2011.²²

The Project entailed no resettlement of residents or land acquisition, and no negative environmental impacts have been observed.²³

To sum up, as a result of the construction of facilities and installation of equipment by the Project, the contents of training have been expanded and enhanced, the training environment has been improved, efficiency has been increased, and improvements have been made to the administration department and instructors' rooms. Therefore, the project purpose of improving training functions at INPP Kinshasa has been almost achieved. The trainees, too, have a high level of satisfaction with the facilities and equipment. However, there have been some departments where the annual number of trainees has not reached planned targets. Most enterprises highly regard the knowledge and skills of INPP trainees and feel that they are relevant to their needs. Many enterprises think that the training at INPP has improved compared to five years ago. Judging

²⁰ Between 2014-2016, revenue from the contributions by enterprises increased by more than 30% (see section 3.4.3. Financial Aspects of Operation and Maintenance).

²¹ JICA has assisted the construction of facilities and installation of equipment at INPP Lubumbashi in the grant aid project "Project for Expansion of INPP Katanga Provincial Direction in Lubumbashi" (2015). Also, the Government of Japan is aiding three local institutes utilizing the Grant Assistance for Grassroots Human Security Projects (rehabilitation of the training building at Kisangani Institute, 2011, approximately 9,100,000 yen) and utilization of counterpart funds (construction of the training building at Goma Institute, 2012, approximately \$460,000, construction of the training building at Mbuji-Mayi Institute, 2015, approximately \$2,000,000). In addition, at the time of ex-post evaluation, France is building facilities and implementing training at INPP headquarters and local institutes; China is building facilities; Egypt and the African Development Bank are constructing facilities; and the World Bank is examining the formation of new aid programs including the supply of equipment. It is anticipated that such construction and installation of facilities and equipment can generate synergy with the capacity building of instructors in the Project at local institutes.

²² According to ADIAC (Agence d'Information d'Afrique Centrale), which is a private media agency based in DRC, in a survey targeting 1,000 persons including 300 company representatives between January - June 2018, INPP received the highest rating of any public corporation in DRC. This is largely thanks to the management skill of INPP Director Mr. Chikuya, who has advanced the construction and installation of facilities and equipment and capacity building of instructors at INPP Kinshasa and local institutes while accepting assistance from JICA and other donors. (<http://www.adiac-congo.com/content/sondage-les-points-premier-semester-2018-ces-mandataires-publics-qui-ont-marque-lopinion>)

²³ Concerning gender, only 2% of trainees at the target departments in the Project are women, however, there are more women in other departments such as beauty / sewing, hotels / cooking, and computers, and women account for 30% of trainees overall. INPP is considering measures to increase women's participation in courses on technical subjects including the courses held by the target departments of the Project.

overall, effectiveness and impacts of the Project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional Aspect of Operation and Maintenance

As of December 2016, INPP has 36 training centers and 1,406 employees (of which 906 are technical staff such as instructors or practical training assistants) throughout the country. These figures represent major increases compared to 11 centers and approximately 300 employees in 2009.

The number of employees at INPP Kinshasa increased from 198 in October 2010 to 302 at the time of ex-post evaluation (January 2018), with the number of technical employees increasing from 150 to 240. Moreover, in 2018, it newly established a photovoltaics department and greatly strengthened its personnel setup in the trainee counseling office while receiving support under the follow-up technical cooperation project.²⁴ The setup for capacity building of instructors, whereby core-trainers train the instructors, has remained unchanged since the time of planning, while, INPP intends to advance the assignment of core-trainers to nucleus local institutes in line with the construction and installation of facilities and equipment at those centers. Moreover, to enhance the effectiveness of training and improve the efficiency of training administration at INPP Kinshasa, it is setting capacity levels (reducing class sizes) and advancing the standardization of training periods and timetables. The cleaning of facilities, which had been conducted by the cleaning and maintenance section of the protocol department of INPP Kinshasa, is now outsourced. The instructors and practical training assistants implement operation and maintenance of the equipment including the training equipment. All of the Project equipment is controlled based on the equipment ledger kept in the inventory control section, and support for the strengthening of equipment control is conducted in the Follow-up Technical Cooperation Project.

Summing up, sustainability of the Project is high in terms of institutional aspects.

3.4.2 Technical Aspect of Operation and Maintenance

The retention rate of INPP employees is high and almost all of the instructors of target departments are in continuous service. In the background to this, INPP salary levels are set higher than at other vocational training institutions, while it offers generous welfare and benefits as a government agency.

Equipment operation and maintenance is implemented by instructors and practical training assistants. There is no technical problem because the instructors are in the position to teach

²⁴ The advisory bureau (Bureau de Conseillers) functions as an education affairs section offering careers and study advice to trainees and prospective trainees, as well as supporting employment and entrepreneurship through arranging company visits and conducting seminars, and conducting follow-up of ex-trainees through telephone surveys and company visits (obtaining feedback information from ex-trainees and companies).

equipment operation and maintenance. The capacity building of instructors was advanced through the Technical Cooperation Project implemented in tandem with the Project and the Follow-up Technical Cooperation Project. In particular, training of instructors in “basic and common skills” has contributed greatly to the capacity building of instructors, and it is reported that instructors have become able to conduct simple repairs of equipment outside of their specialist fields.

In summary, sustainability is high in terms of technical aspects.

3.4.3 Financial Aspect of Operation and Maintenance

INPP kept positive financial balance during 2014-2016 and its financial scale has increased by 31% during this period (Table 3). INPP is operated primarily on contributions from enterprises that are levied under legislation. Enterprise contributions account for 90% of INPP’s revenue, while revenue from the government budget accounts for less than 0.5%. According to INPP, the number of enterprises that pay contributions is increasing because they now place greater trust in INPP and appeals for finance have been strengthened. Revenue from contributions increased by more than 30% between 2014 and 2016. According to INPP, JICA’s support including the Project and the new buildings of INPP Kinshasa have been widely known to enterprises, and the resulting increased trust among enterprises has contributed to the increased revenue.

Around 80% of INPP expenditure is spent on personnel expenses and other expenditure including welfare expenses, although there is also a high need for investment into construction and installation of facilities and equipment at local institutes. The amount of investment during 2015-2016 accounted for 12% of overall expenditure. Accordingly, INPP is striving to obtain donor support as a source of external finance (see Note 21). Training of instructors is implemented based on the budget of INPP headquarters. While bringing instructors from regional institutes to Kinshasa for training incurs major costs, it is being implemented a little at a time.

Table 3 INPP Financial Results

(Unit:1,000,000 Congo Francs)

	2014	2015	2016
Revenue	30,652	33,973	39,617
Enterprise contributions	27,236	30,992	36,307
Training charges, state budget, others	3,416	2,981	3,311
Expenditure	30,559	33,525	39,381
Personnel expenses	10,402	13,064	15,908
Maintenance costs	1,193	1,354	1,369
Investment	3,343	4,019	5,557
Others (including welfare)	15,621	15,089	16,546
Balance	92	448	236

Source: Prepared by the evaluator based on materials provided by INPP

Note: 1,000 Congo francs is approximately 71 yen (July 2018).

Because of rounding off, the total value may not agree with the sum of the values of each item.

The scale of finances at INPP Kinshasa increased to 135% between 2013 and 2016. Since this institute is not in a position to directly levy contributions from enterprises, roughly half of its revenue comes from allocations from the headquarters largely obtained from enterprises contributions, while the remainder is obtained from training charges and others. INPP Kinshasa is striving to boost revenue through selling products made by trainees in practical training at low prices and leasing in the open time some of the facilities (multipurpose hall, etc.) that were constructed under the Project. Maintenance costs at INPP Kinshasa increased to 158% between 2013 and 2016. No major financial constraints can be observed regarding the operation and maintenance of facilities and equipment. However, according to the director of INPP Kinshasa, there are lingering financial constraints that are impacting the implementation of instructor training and stocking of spare parts.

Summing up, there are some minor issues regarding sustainability in terms of the financial aspects.

3.4.4 Current Status of Operation and Maintenance

According to site inspection, the facilities constructed in the Project are in good condition. Since “5S” has become established after being introduced in the technical cooperation project²⁵, all facilities at INPP Kinshasa, not just the Project facilities, are used in good condition. In the training building, users had been asked to remove shoes when entering the building at the suggestion of the expert, however, this practice was discontinued because shoes were being stolen.

In the mechanical department, where numerous machine tools have been procured, as a problem arose due to heating of a milling machine motor, the instructors carried out emergency repairs. It is planned to resolve the issue through changing the position of the motor so that heat does not accumulate. Also, trouble is being experienced importing some spare parts. Otherwise, equipment is in good condition and appropriately operated and no problems are reported concerning the acquisition of spare parts in the other departments.

Accordingly, the operation and maintenance situation regarding facilities and equipment is generally good.

To sum up, apart from some minor issues in regard to financial aspects of the operation and maintenance of the Project, there are no problems regarding institutional and technical aspects and the current status of the operation and maintenance system. Therefore, sustainability of the Project effects is high.

²⁵ 5S refers to five words that express behaviors and conditions that need to be thoroughly followed in workplace management. They are: Sort (Seiri), Set in Order (Seiton), Shine (Seisou), Standardize (Seiketsu) and Sustain (Shitsuke).

4. Conclusions, Recommendations and Lessons Learned

4.1 Conclusions

The Project, a grant aid project, was implemented to improve vocational training functions through constructing training facilities and installing equipment at INPP Kinshasa. The objective was to develop skilled human resources in response to the market needs and contribute to supply them in the labor market of the DRC. Vocational training has been an important area in terms of policy and development needs in the DRC at both the time of planning and the time of ex-post evaluation; moreover, the Project was highly consistent with Japan's ODA policy at the time of planning. Accordingly, the relevance of the Project is high. The Project cost was within budget, however, because the Project period was longer than planned, the efficiency of the Project was fair. Thanks to the construction of facilities and installation of equipment by the Project, such results have been obtained as; expansion and improvement of training, improvement of training environment, increase in efficiency of training, and physical improvements in offices for administration staff and instructors. Although there were some departments where the annual number of trainees did not reach the planned levels, improvements were realized in terms of the efficiency and effectiveness of practical training, and the trainees are satisfied with the facilities and equipment. Hence, it is deemed that training functions have improved at INPP Kinshasa. Moreover, most enterprises have high regard for the knowledge and skill levels of INPP trainees and think that their competence is relevant to their needs. Many enterprises also think that the INPP training has improved compared to five years ago. Therefore, the effectiveness and impact of the Project are high. Concerning the operation and maintenance of the Project, apart from some minor financial issues, there have been no problems regarding institutional and technical aspects as well as the operation and maintenance status. Therefore, the sustainability of the Project is high.

To sum up, the Project is evaluated as being highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations for the Implementing Agency

Comprehensive and systematic assessment of training needs

INPP gauges training needs through listening to wishes expressed by individual companies and analyzing trends of increase or decrease in numbers of applicants for training courses. However, as may be gathered from the fact that the number of trainees was far lower than expected in some of the target departments of the Project, it is difficult to quantitatively analyze training needs by these methods alone. In addition, concerning specific new technologies that are requested by a minority of companies, not enough examination is conducted to determine how far training needs exist and whether such training should be provided from the perspective of cost effectiveness. Furthermore, since there is no system for reflecting the training needs of companies

that do not pay contributions (mostly small and medium-sized enterprises), self-employed persons and job seekers, the current assessment of training needs remains partial.

Accordingly, it is necessary for INPP to implement a comprehensive and systematic survey on training needs among not only enterprises that pay contributions, but also enterprises that do not pay contributions, self-employed persons, general job seekers, and students of education institutions that are interested in INPP's practical training. It may also be a good idea to widen the scope of survey to include needs and cost effectiveness of training on the new technologies requested from some companies, the training costs that companies and job seekers can afford (willingness to pay), alternative training opportunities to INPP and their costs, the feasibility of inviting external lecturers to INPP. Specifically, it is suggested that survey first be conducted on specific training departments in Kinshasa and that a standard survey method be developed based on that experience.

4.2.2 Recommendations for JICA

JICA should examine support for implementing the abovementioned recommendations over the possible scope via the Follow-up Technical Cooperation Project. In addition, it should examine the necessity and feasibility of other technical cooperation for assisting implementation of the above recommendations.

4.3 Lessons Learned

Usefulness of Program Approach

JICA developed the Vocational Training Program under which the Project was implemented in tandem with dispatch of an individual expert (TVET Advisor) and the Technical Cooperation Project. First the individual expert was dispatched to plan and assist in implementation of the Project and the Technical Cooperation Project, and she played an important role in strengthening operational capacity of INPP, cooperating with industrial circles, and promoting the local deployment of the vocational training. The Technical Cooperation Project served to enhance the capacity of instructors primarily at INPP Kinshasa. It is thought that these comprehensive initiatives generated synergy that produced the Project impacts. Also, after being dispatched in 2010, the individual expert became the key figure in cooperation and coordination between the technical cooperation and grant aid, while also participated as a consultant in the program preparatory survey (2009-2010). It is thought that the high degree of continuity in the work left to beneficial results.

END

Democratic Republic of the Congo

FY 2017 Ex-Post Evaluation of Technical Cooperation Project

“Project on Development of Capacity of Instructors at the National Institute of Professional Preparation”

External Evaluator: Hajime Sonoda, Global Group 21 Japan, Inc.

0. Summary

The Project on Development of Capacity of Instructors at the National Institute of Professional Preparation (hereinafter referred to as “the Project”), a technical cooperation project, was implemented with the project purpose “teaching skills of instructors of the National Institute of Professional Preparation (Institut National de Préparation Professionnelle; hereinafter referred to as “INPP”), mainly those of the automobile department and the refrigeration / air conditioning department, are improved”, and with the overall goal “quality vocational training is offered by INPP, mainly in the automobile department and the refrigeration / air conditioning department”. The importance of vocational training within the policies and development needs of the Democratic Republic of the Congo (hereinafter referred to as “the DRC”) was high at both the time of planning and the time of completion of the Project. Moreover, from the perspective of expanding vocational training opportunities, the Project was highly relevant to Japan’s ODA policy at the time of planning. Based on the above, the relevance of the Project is high. As a result of the Project, implementation system of training for instructors was strengthened on basic and common skills¹, pedagogical skills, and specialized skills in the automobile department and refrigeration / air conditioning department, and the evaluation on the training by trainees and enterprises was improved. Therefore, it is deemed that the quality of INPP’s training was improved. Other improvements observed were establishment of the PDCA cycle at INPP², and a more favorable evaluation of INPP by industrial circles, etc. To sum up, the effectiveness and impact of the Project are deemed to be high. Against the background of delay to “the Project for Expansion of INPP Kinshasa Provincial Direction” (grant aid, 2012, hereinafter referred to as “the Grant Aid Project”) caused by the Great East Japan Earthquake, the Project period was longer than planned and the Project cost also exceeded the planned budget. Hence, the efficiency of the Project is fair. Concerning sustainability, while there were some minor financial constraints, there were no major impacts that affected sustainability of the effects that materialized on completion of the Project. Since there have been no problems regarding policy, system, institutional, and technical aspects, the sustainability of the Project is

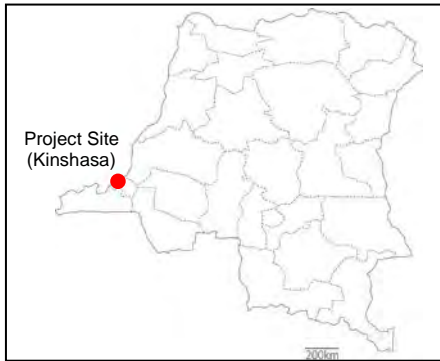
¹ The basic and common skills training entails training in basic mechanical, electrical, and electronic contents for instructors in the departments of electricity, electronics, machinery, automobiles, refrigeration and air conditioning, and welding and plating. This is intended to strengthen the capacity of instructors, however, the same training is not given to trainees.

² The “PDCA cycle” is a technique for smoothly advancing work such as production management and quality control in project activities. It entails continuously improving work through repeating the four stages of Plan→ Do→ Check → Act.

high.

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

1. Project Description



Project Location



Training at INPP Kinshasa

1.1 Background

Passing through a period of confusion and civil war after the riot in Kinshasa in 1991, the DRC has experienced progress towards reconstruction and development following establishment of a provisional administration in 2004. The Kabila administration, which came to power in 2007, raised “improvement of employment and labor” as a priority issue and made it a key policy for economic development. In line with this policy, it regarded the training of human resources for industry as important. Based in the capital of Kinshasa, INPP was established with the objective of reinforcing the vocational training capacity for citizens, and it has become the Congo’s largest vocational training agency having numerous centers all around the country. The Government of Japan implemented assistance comprising dispatch of experts and supply of equipment to INPP in the 1980s. However, since the civil strife had ended, INPP was confronted by numerous issues including insufficient capacity and aging of instructors, deterioration of equipment and facilities, limited capacity of facilities.

Against this background, the Government of the DRC issued a request to the Government of Japan asking for assistance aimed at strengthening the capacity of INPP to implement training. The Government of Japan agreed on this, and JICA implemented the “Preparatory Study for Cooperation on Vocational Training Program in the DRC” (l’etude préparatoire de la coopération pour le programmes de formation professionnelle en République Démocratique du Congo) (2009-2010), and the decision was made to implement the Vocational Training Program comprising 1) a technical cooperation project aimed at strengthening the pedagogical capacity of instructors, 2) grant aid aimed at construction and installation of facilities and equipment at INPP Kinshasa, and 3) dispatch of a Technical and Vocational Education and Training (hereinafter referred to as “TVET”) Advisor (individual expert) with an aim of strengthening

capacity at INPP headquarters. As the technical cooperation project of this program, the Project was commenced with a three-year term in January, 2011.

1.2 Project Outline

The Project was implemented with the Project Purpose of “teaching skills of instructors of INPP, mainly those of the automobile department and refrigeration / air conditioning department, are improved”, and with the Overall Goal of “quality vocational training is offered by INPP mainly in the automobile department and refrigeration / air conditioning department”.

Overall Goal	Quality vocational training is offered by INPP mainly in the automobile department and refrigeration / air conditioning department.	
Project Purpose	Teaching skills of instructors of INPP, mainly those of the automobile department and refrigeration / air conditioning department, are improved.	
Outputs	Output 1	Implementation system of the basic and common skills training is strengthened.
	Output 2	Implementation system of the specialized skills training is strengthened. (Automobile department, refrigeration / air conditioning department)
	Output 3	Implementation system of the pedagogical skills training is strengthened.
Total cost (Japanese Side)	688 million yen	
Period of Cooperation	January, 2011 - December, 2013 (3 years) Extension period: January - October, 2014 (10 months)	
Implementing Agency	Institut National de Préparation Professionnelle (INPP)	
Other Relevant Agencies / Organizations	None	
Supporting Agencies / Organizations in Japan	Joint venture comprising Oriental Consultants Co., Ltd. and the Overseas Vocational Training Association	
Related Projects	TVET Advisor (individual expert, dispatched intermittently during January 2010 - December 2014), Project on strengthening the capacity of National Institute of Professional Preparation (technical cooperation, 2015- 2020), the Project for Expansion of INPP Kinshasa Provincial Direction (grant aid, 2012-2014)	

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

Since almost all of the indicators have been achieved, it was judged that there has been a high degree of achievement of the Project Purpose. However, since it was not possible to conduct training using equipment supplied in the refrigeration / air conditioning field, further strengthening was deemed necessary in training guidance skills.

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

Since the results of trainees improved, a higher ratio of trainees felt that the INPP training was useful, and the level of satisfaction of enterprises increased, it was judged that the quality of training at INPP has been improved and there was a strong likelihood that the Overall Goal will be achieved.

1.3.3 Recommendations from the Terminal Evaluation

The following recommendations were made to INPP with a view to boosting effectiveness of the activities following completion of the Project:

- Formulation of an INPP plan for the continuous implementation of instructors' training
- Formulation of the future implementation policy for basic and common skills training and pedagogical skills training
- Improvement of the training evaluation system based on the mechanism for instructors' training evaluation
- Initiatives geared to strengthening of functions at INPP local institutes (analysis of training needs, construction and installation of facilities and equipment, and training of instructors)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

2.2 Duration of Evaluation Study

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

Duration of the Study: August, 2017 - December, 2018

Duration of the Field Survey: January 25 - March 6, 2018 and June 12 - June 21, 2018

The external evaluator for the Project also conducted the ex-post evaluation for the Grant Aid Project that was implemented in tandem with the Project. Because the implementing agency and related agencies for both projects overlapped, the evaluation was conducted together, however, separate ex-post evaluation reports have been made for each project. This report targets the Project (technical cooperation project).

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

3.1 Relevance (Rating: ③⁴)

3.1.1 Consistency with the Development Plan of the DRC

At the time of planning (2010), the importance of vocational training for stabilizing the macro economy, building growth, improving access to social services, and supporting vulnerable members of society was stressed in *the Growth and Poverty Reduction Strategy Document* (DSCR 2006), which was the national development plan of the DRC. Moreover, “improvement of employment and labor” was included among “five priority issues” that the government had earmarked as important policies for growth of the economy.

In the DRC’s *Second Poverty Reduction Strategy Document* (DSCR 2, 2011-2015), the priority issues were: strengthening of governance and peace, diversification of the economy, acceleration of growth and promotion of employment, improvement of access to basic social services, human resources development, environmental protection, and measures to address climate change. In the inaugural speech given by the President in 2011, strengthening of human resources was cited as one of the government’s main goals.

As such, relevancy of the Project to the development policies of the DRC was high both at the time of planning and the time of project completion (October 2014).

3.1.2 Consistency with the Development Needs of the DRC

At the time of planning, the unemployment rate in the DRC was in excess of 50% and was especially high among young people. The extreme levels of unemployment in cities with a high population growth rate were a factor behind deteriorating public order in the cities. Moreover, an important issue for the government was to help large numbers of internally displaced people and discharged soldiers produced by the civil strife in the country to return to society through vocational training. Hence, it was indispensable to promote capacity building through vocational training to enable such people to participate in social and economic activities. While INPP provided vocational training at institutes in the capital Kinshasa and regional areas, because it had been unable to recruit instructors during the age of civil strife, it faced a shortage of mid-career instructors. Moreover, training equipment was deteriorated, and the capacity of buildings was limited. These and other factors meant that it was unable to conduct high-quality vocational training, making it urgently necessary to address the capacity building of INPP. Since then, unemployment rates have continued to rise in urban areas, meaning that the importance of vocational training has been sustained through to the time of completion of the Project⁵. Accordingly, relevance of the Project to the development needs of the DRC has

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

⁴ ③: High; ②: Fair; ①: Low

⁵ According to the National Development Strategy 2017-2021 (draft at the time of ex-post evaluation), the unemployment rate in urban areas has increased from 28.4% in 2005 to 30.9% in 2012 and 46.8% in 2017.

remained high both at the time of planning and at the time of its completion.

3.1.3 Consistency with Japan's ODA Policy

At the time of planning, the Project was part of the vocational training program within the priority sector of "Economic development" and the development issue of "Employment promotion" in the Government of Japan's Rolling Plan for the DRC. In the Yokohama Action Plan that was adopted at the 4th Tokyo International Conference on African Development in 2008⁶, it was stated that "training of human resources to support industrial sectors will be promoted through the expansion of technical education and vocational training institutions" within the "post basic education and advanced education/research" field, so this project is consistent with this plan.

To sum up, this project was 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 Effectiveness and Impacts ⁷ (Rating:③)

3.2.1 Effectiveness

3.2.1.1 Achievement of Outputs and the Process⁸

(1) Basic and common skills training (Output 1)

In the Project, the targets of specialized skill training were limited to the automobile department and refrigeration / air conditioning department. However, considering the desire of INPP to broadly strengthen capacity also in other departments, training for the instructors concerning basic subjects in the machinery, electric and electronic fields was implemented as the basic and common skills training in the six departments of electricity, electronics, machinery, automobile, refrigeration / air conditioning, and welding / plating⁹. Through this training, instructors are able to acquire basic knowledge in multiple fields. For example, instructors in the machinery department learn how to repair simple electronic circuits, conduct welding. Technical and Vocational Training Center Senegal-Japan that was established in 1984 under JICA assistance cooperated in conducting third-country training and dispatching third-country experts, and 16 core trainers were prepared using training equipment that was supplied to INPP Kinshasa. These core trainers subsequently conducted basic and common skills training for 160 instructors (79 from INPP Kinshasa and 81 from local institutes). As instruction plans and teaching

⁶ The Tokyo International Conference on African Development (TICAD) is a regularly staged initiative for African development co-hosted by the Government of Japan, the United Nations, the African Union, and the World Bank. TICAD I was staged in 1993, and conferences have been regularly held ever since.

⁷ Sub-rating for Effectiveness is to be put with consideration of Impact.

⁸ The degree of achievement of each output is attached at the end of the report.

⁹ These ideas for training emerged in discussions between INPP and the TVET Advisor who was dispatched prior to the Project.

materials underwent evaluation and revision four times and the instructors that received training expressed a high degree of satisfaction, it is deemed that the output concerning “strengthening of the implementation system for basic and common skills training” was sufficiently achieved.

According to interviews with INPP instructors¹⁰, the basic and common skills training had the following merits and made an important contribution towards achieving the Project Purpose.

- Instructors can promptly make simple repairs of equipment without having to ask other departments.
- Instructors can respond to diverse questions from trainees with confidence.
- Because instructors can use PCs, they can perform efficient lessons using multimedia.
- Since a single instructor can address numerous fields, dispatch training in enterprises can be implemented efficiently with small numbers.
- The above merits contributed to enhance the confidence and desire for betterment among instructors, boosted trust among enterprises and trainees, and consequently resulted in more training requests from enterprises.
- It became easier for instructors to switch department in charge as necessary according to changes in demand for training.

(2) Specialized skills training (Output 2)

① Automobile department

In the automobile department, nine core trainers were prepared through training in Japan and expert dispatches. Instructors’ training was implemented for 41 instructors (19 in INPP Kinshasa, and 22 in local institutes). However, due to cancellation of the first year’s training in Japan because of the Great East Japan Earthquake, and a one-year delay in the expert dispatch because a suitable expert couldn’t be found, the scope of technical transfer was mainly limited to electronically controlled gasoline engines, and it wasn’t possible to cover the entire technical scope that needs to be covered by the automobile department including diesel engines, chassis and other aspects. For this reason, in the “Project on Strengthening the Capacity of INPP” (hereinafter referred to as “the Follow-up Technical Cooperation Project”), which was started in 2015, additional support was needed in the automobile department¹¹. According to the core trainers in the automobile department, the expert mainly provided theoretical instruction but could not conduct sufficient practical training. Moreover, although it was scheduled for much of the training equipment in the automobile department to be procured through the Grant Aid Project, its implementation was delayed due to the Great East Japan Earthquake. Part of the

¹⁰ In the ex-post evaluation, interviews were conducted with the heads of target departments (electricity, electronics, machinery, automobile, refrigeration and air conditioning, welding and plating) at INPP Kinshasa, and interviews (personal or telephone) were conducted with the department heads and instructors at nine local institutes (19 persons in the automobile, refrigeration and air conditioning, and machinery departments).

¹¹ According to the report by the automobile expert in the Project, out of 55 technical transfer items, only 31 items were completed in the training for core trainers.

training equipment was supplied behind schedule in the Project, and it was not possible to sufficiently implement practical training using the equipment.

All of the PDM indicators in the automobile department (implementation of training, degree of satisfaction of instructors that received training, preparation and revision of instruction plans and teaching materials) were achieved¹². However, it is difficult to consider that the achievement of indicators immediately means attainment of output at the automobile department, as there are no descriptions or indicators in the PDM that define the planned scope of technical transfer. Accordingly, it is deemed that the output concerning “strengthening of the implementation system for specialized skills training in the automobile department” was partially achieved.

② Refrigeration / air conditioning department

Since no expert could be found available for dispatch to the refrigeration / air conditioning department, five core trainers were trained via training in Japan over three years, and instructors’ training was implemented for 12 instructors (four from INPP Kinshasa and eight from local institutes). According to the core trainers, the training in Japan was on the whole good, although it was not possible to conduct sufficient practical training in part of the necessary technical scope, for example; automatic control of industrial air-conditioning systems, multiple packaged air-conditioning systems in buildings, etc. Moreover, due to delays in the construction of facilities in the Grant Aid Project, it wasn’t possible to implement the scheduled instructors’ training by core trainers using the training equipment that was planned for procurement in the final year. Accordingly, the instructors’ training was conducted using existing practical equipment (equipment for actual service rather than for training purpose), it wasn’t possible to conduct sufficient practical training for some items such as central air conditioning systems. It is thought that this is the reason why performance in the refrigeration / air conditioning department regarding the indicator ② for Project Purpose did not attain the target (described later). Moreover, following the installation of equipment in 2014, while it was planned to dispatch a short-term expert to assist with creating curriculums and give instruction on methods for utilizing equipment for industrial air conditioning systems and central air conditioning systems, it was not possible to find a suitable expert to do this.

In the refrigeration / air conditioning department, as was also the case in the automobile department, all the PDM indicators were achieved. However, as described above, since technical transfer was insufficient for some items, it cannot be said that the technical transfer in this department was sufficiently achieved. Accordingly, it is deemed that the output concerning

¹² The PDM (Project Design Matrix) is a general description of the project that states the project activities, the resulting outputs, the goals to be strived for (Project Purpose), the superior objective (Overall Goal), external risks, indicators for objectively measuring the level of achievement of the outputs and goals, and so on.

“strengthening of the implementation system for specialized skills training in the refrigeration / air conditioning department” was largely achieved.



Left: an examination in progress (refrigeration / air conditioning department)

Right: practical training (automobile department)

(3) Training in pedagogical skills (Output 3)

The expert trained seven core trainers comprising six at Kinshasa and one at a local institute. The core trainers were employees of the pedagogical departments at INPP Kinshasa and INPP Boma, and at headquarters. The core trainers implemented instructors’ training for 80 instructors (34 from INPP Kinshasa and 46 from local institutes) on topics such as; development of a training plan based on CUDBAS method¹³, preparation of instruction plans and teaching materials, approaches to advancing lessons and handling trainees, training evaluation method and so on. The instruction plans and teaching materials for the training in pedagogical skills underwent evaluation and revision two times and the instructors that received training expressed a high degree of satisfaction. Therefore, it is deemed that the output concerning “strengthening of the implementation system for training in pedagogical skills” was sufficiently achieved.

According to the instructors of INPP headquarters, INPP Kinshasa and local institutes, the training in pedagogical skills conducted in the Project had the following merits and made an important contribution towards achievement of the Project Purpose.

- It became possible to systematically and efficiently carry out development of training programs, preparation of instruction plans and teaching materials attuned to the needs of the target trainees, and evaluation of the training.
- Concerning the training for enterprises, it became possible to individually assess the needs of each enterprise and prepare training programs accordingly.

¹³ CUDBAS: A Method of Curriculum Development Based on Vocational Ability Structure. This entails writing the abilities of persons who are about to receive vocational training, structurally sorting them, and developing an effective curriculum. It can be applied to the development of short-term training curriculums as well as long-term education curriculums such as at universities.

- With the changed approach to instruction and handling of trainees, the goals of training were clarified, and careful instruction geared to the goals came to be implemented in accordance with the level of understanding and learning of each trainee.

3.2.1.2 Achievement of Project Purpose

Concerning the Project Purpose of “teaching skills of instructors of INPP, mainly those of the automobile department and refrigeration / air conditioning department, are improved”, three indicators were set as shown in Table 1. Considering that the degree of achievement of these three indicators was generally high¹⁴, and that the degree of achievement of the outputs was also generally high, it is deemed that the Project largely achieved its purpose.

Table 1 Achievement of Project Purpose

Project Purpose	Teaching skills of instructors of INPP, mainly those of the automobile department and refrigeration / air conditioning department, are improved. <Largely achieved>
Indicator	Actual
① 80% or more instructors who receive basic and common skills training obtain 3 or higher point out of 5 point for knowledge and skills on the basic and common field at the evaluation by the Project.	95% and 94% of instructors received a ranking of 3 or higher point out of 5 point in the ex-post evaluation after the training and the assessment conducted after the training by core trainers, respectively. <Achieved>
② 80% or more instructors who receive specialized skills training obtain 3 or higher point out of 5 point for knowledge and skills on the specialized fields at the evaluation by the Project.	95% and 76% of instructors in the automobile department and refrigeration / air conditioning department respectively received a ranking of 3 or higher point out of 5 point in the ex-post evaluation after the training, while 84% and 69% respectively received a ranking of 3 or higher point out of 5 point in the assessment conducted after the training by core trainers. <Largely achieved>
③ 80% or more instructors who receive pedagogic skills training obtain 3 or higher point out of 5 point for knowledge and skills on the pedagogic field at the evaluation by the Project.	98% and 100% of instructors received a ranking of 3 or higher point out of 5 point in the ex-post evaluation after the training and the assessment conducted after the training by core trainers, respectively. <Achieved>

Source: Materials provided by JICA and INPP.

Note: Performance of indicators is based on final performance values from the Project Completion Report.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

(1) Achievement of the Overall Goal

The Overall Goal of the Project was “quality vocational training is offered by INPP mainly in the automobile department and refrigeration / air conditioning department”, and the following indicators were set.

¹⁴ Indicator ② concerning the specialized skills training assesses the knowledge and skills of instructors over the scope for which training was implemented, but not the overall field of expertise.

Table 2 Achievement of the Overall Goal

Overall Goal	Quality vocational training is offered by INPP mainly in the automobile department and refrigeration / air conditioning department <Largely achieved>		
Indicator and the Actual Results			
Indicator 1: Evaluation of training by instructors who receive training in pedagogical skills improve.			
<Results> Scores out of 100 increased from 72.6 at the start of the Project to 75.8 at the time of completion. (Actual data could not be acquired at the time of the ex-post evaluation).			
Indicator 2: Final examination results (out of 100) in the target departments at INPP Kinshasa improve compared to at the start of the Project.			
<Results>			
	<u>2011</u>	<u>2013</u>	<u>2018</u>
Automobile department: gasoline engines	55.0 points	59.6 points	57.2 points
Automobile department: automotive electricity	59.7 points	62.5 points	64.2 points
Refrigeration / air conditioning department	50.0 points	58.8 points	57.4 points
Indicator 3: The degree of satisfaction of trainees who complete training in the target departments at INPP Kinshasa improves on the training.			
<Results>			
Degree of satisfaction of trainees who completed the training (ratio who responded very satisfied or satisfied)			
	<u>2011</u>	<u>2013</u>	<u>2018</u>
Training contents	95.0%	95.4%	Refrigeration / air conditioning; 86.7% Automobile; 93.5%
Training equipment	75.6%	75.3%	Refrigeration / air conditioning; 83.3% Automobile; 92.3%
Usefulness for finding employment	84.4%	90.2%	Refrigeration / air conditioning; 100.0% Automobile; 100.0%
Indicator 4: The employment rate (entrepreneurship and employment) of trainees who have completed training at INPP Kinshasa increases compared to at the start of the Project.			
<Results>			
Employment rate of graduates between 6-14 months after training			
	<u>2011</u>	<u>2013</u>	<u>2018</u>
Automobile department	9.7%	13.7%	14.5%
Refrigeration / air conditioning department	22.3%	21.0%	7.3%
Indicator 5: The degree of satisfaction regarding the training contents among enterprises that receive graduates from the target departments at INPP Kinshasa improves.			
<Results>			
Ratio of enterprises that answered that the “INPP training complies with needs in enterprises”			
	<u>2011</u>	<u>2013</u>	<u>2018</u>
	90%	93.7%	90%

Source: Materials provided by JICA and INPP, and telephone survey in the ex-post evaluation.

Note: In the Project, a baseline survey (2011) and end-line survey (2013), which entailed telephone interviews of trainees who had completed the training and related enterprises, were implemented. At the time of the ex-post evaluation, a telephone survey using the same questionnaire form was implemented in February and March, 2018.¹⁵ The performance figures for Indicators ③-⑤ are based on the results.

¹⁵ In the telephone survey of training graduates, ex-trainees between 6 and 14 months following the completion of training were randomly selected based on the list at INPP Kinshasa from the automobile department (220 persons) and refrigeration / air conditioning department (150 persons). In addition to the questions from previous surveys, the former trainees were asked about their level of satisfaction regarding the various aspects of the training at INPP (facilities, equipment, instructors, services of education affaires, etc.). In the telephone survey of enterprises, a total of 150 enterprises were randomly sampled. These comprised 50 enterprises selected from a list of enterprises that had utilized INPP in-service training of the automobile department and refrigeration / air conditioning department and another 100 enterprises selected from the register of the Federation of Enterprises of Congo (FEC). In addition to the questions from previous surveys, the enterprises were asked to give their opinions on changes in training at INPP over the past five years.

The results of evaluation of training by instructors who received training in pedagogical skills (Indicator ①) increased between the start and completion of the Project, while, no data was obtained at the time of the ex-post evaluation. Final examination results in the target departments at INPP Kinshasa (Indicator ②) improved slightly. However, because the method of marking changed after examiners selected from private company employees were introduced after the completion of the Project in response to advice given by the TVET Advisor, the results at the time of ex-post evaluation cannot be simply compared to those from 2013.

The degree of satisfaction of trainees who have completed the training (Indicator ③) is generally high. As the background as to why the degree of satisfaction with equipment increased from 2013 onwards, progress has been made in the installation of training equipment following construction of a training building in the Grant Aid Project in 2014. According to interviews with trainees who have completed the training and current trainees¹⁶, there is a high degree of satisfaction with facilities and equipment, and instructors' knowledge and teaching methods are rated extremely highly. INPP Kinshasa is regarded as almost the only vocational training institution in the city that can conduct proper practical training, and it attracts a lot of trainees who are considering advancing to colleges that cannot offer sufficient practical training, and graduates of such colleges who seek better practical training. Moreover, numerous respondents said that instructors at INPP Kinshasa have a reputation for carefully teaching trainees until they can acquire skills. On the other hand, some respondents said that the training costs are high and that it is troublesome having to pay monthly fees by bank transfer.

The employment rate of trainees who have completed the training (Indicator ④) in the automobile department displayed gentle improvement between project completion and the time of ex-post evaluation. Meanwhile, in the refrigeration / air conditioning department, the employment rate declined following project completion. The reasons for this could not be identified. In any case, since employment rate is largely determined by business conditions, it is deemed to be something that doesn't directly reflect the "quality of INPP training" that is the Overall Goal¹⁷. INPP Kinshasa is reinforcing the support it offers for placement and entrepreneurship among trainees who have completed the training¹⁸. In both departments, one

¹⁶ 12 group interviews targeting in total approximately 70 current trainees and 30 former trainees from the six related departments were implemented.

¹⁷ The GDP growth rate of the DRC in 2013-2014 reached almost 9%. However, due to decline in the international prices of mineral resources, which account for the country's main exports, and sluggish investment brought about by political instability, the GDP growth rate fell to 6.9% in 2015 and 2.4% in 2016. Moreover, according to INPP and the Association of Refrigeration and Air Conditioning Engineers of the DRC (private group), since refrigeration and air conditioning devices are luxury items and have a lot of corporate users, compared to automobiles, it is possible that they have felt the impact of the recent business decline more keenly.

¹⁸ The advisory bureau (Bureau de Conseillers) functions as an education affairs section offering careers and study advice to trainees and prospective trainees. In addition, at the suggestion of the TVET Advisor, the advisory bureau at INPP Kinshasa started follow-up activities such as conducting career surveys of ex-trainees and acquiring feedback information from enterprises that recruit ex-trainees and so on from 2014. Manpower in the advisory bureau was greatly increased from 9 persons before the Project to 26 persons at the time of ex-post evaluation, and with receiving support of the Follow-up Technical Cooperation Project, in order to support employment and

out of 10 trainees who find employment start their own businesses. Moreover, 60% of former trainees practiced some repair works out of the institution, charged or not charged, following the completion of training.

The degree of satisfaction of enterprises that receive graduates from the target departments (Indicator ⑤) regarding the training contents declined slightly following project completion. However, it is being sustained at a high level at the time of the ex-post evaluation. According to telephone interviews with enterprises, 98% of enterprises responded that recruited INPP trainees have appropriate knowledge and skills. Moreover, 50% of enterprises said that the INPP training had improved greatly compared to five years ago, with another 32% saying that it had improved slightly (the remaining 18% said that it had not changed).

According to INPP and the interviews with enterprises in Kinshasa¹⁹, the perception that INPP Kinshasa conducts good training is widespread even among small enterprises that do not utilize INPP services (enterprises that do not pay contributions)²⁰. Many people said that it is widely known that JICA cooperates with INPP and this enhances the trust placed in it. However, all of the owners of enterprises that do not pay contributions, and even some of the owners of enterprises that do pay contributions said that they have no specific information on training programs and training charges at INPP Kinshasa²¹. Numerous respondents in the company interviews voiced needs for training in new technologies that are gradually spreading through industry, for example, multiple packaged air-conditioning systems in buildings, automatic control of industrial air-conditioning systems, common rail fuel injection in diesel engines and so on.

Meanwhile, according to interviews with instructors in local institutes, improvements in pedagogical skills and the quality of training were observed in their institutes mainly in the automobile department and refrigeration / air conditioning department in the same way as at INPP Kinshasa. While, there are many new instructors who have not yet received basic and

entrepreneurship, it conducts mediation with internship receiving organizations, stages employment orientation seminars, entrepreneurship seminars, establishes department-separate alumni associations, arranges business startup funds and other activities.

¹⁹ Interviews were implemented with Federation of Enterprises of Congo (FEC), National Federation of Craftsmen, Small and Medium Enterprises of Congo (FENAPEC), six enterprises (including one government organization) that utilize ongoing training at INPP, and eight other enterprises (that have not used INPP's ongoing training).

²⁰ Based on the law concerning compulsory contributions to INPP by company owners (October 1984) and the law concerning the ratio of company contributions (February, 2006), enterprises of a certain size are required to pay contributions to INPP. In Kinshasa, the Fund Collection Department at INPP headquarters collects contributions, while local institutes conduct collections in the regions.

²¹ Concerning cooperation with enterprises in Kinshasa, the Advisory Bureau at INPP Kinshasa conducts company visits (see footnote 18), while the Fund Collection Department also regularly visits enterprises to confirm contribution payments, listens to general requests regarding training and provides information on the training. The Advisory Bureau of INPP Kinshasa holds more specific information about the institute's training programs and can directly collaborate and coordinate with instructors, while, it cannot make frequent visits to enterprises due to constraints in means of transportation. On the other hand, the burden placed on the Fund Collection Department to collect funds is being lessened in recent years following the start of automatic transfers for INPP contributions together with public insurance payments. As was mentioned earlier, since it appears that specific training information from INPP Kinshasa is not reaching enterprises, it is deemed necessary to sort the respective roles of the Advisory Bureau and the Fund Collection Department at INPP Kinshasa.

common skills training and training in pedagogical skills, and constraints still remain concerning facilities and equipment for training. Accordingly, the degree of achievement of the Overall Goal in local institutes at the time of ex-post evaluation is lower than at INPP Kinshasa²².

To sum up, it is deemed that the Overall Goal “quality vocational training is offered by INPP mainly in the automobile department and refrigeration / air conditioning department” has been largely achieved.

(2) Continuation of activities following project completion

The number of core trainers prepared in the Project was 37, comprising 29 at INPP Kinshasa and eight at the local institutes. At the time of the ex-post evaluation, as the number of core trainers conducting instruction was 30, comprising 22 at Kinshasa and eight at the local institutes, the number has generally remained steady (Table 3). Moreover, out of the 37 core trainers, all of the members except for one who passed away are still working with INPP at the time of the ex-post evaluation²³.

Table 3 Number of Core Trainers
(at project completion and ex-post evaluation)

	At project completion			At ex-post evaluation			Changes
	Kinshasa	Regions	Total	Kinshasa	Regions	Total	
Basic and common skills training	13	3	16	6	0	6	10 less
Automobile department	6	3	9	5	3	8	1 less
Refrigeration / air conditioning department	4	1	5	2	3	5	Same
Pedagogical skills training	6	1	7	9	2	11	4 more

Source: Prepared by the ex-post evaluator based on materials provided by INPP

²² JICA has assisted the construction of facilities and installation of equipment at INPP Lubumbashi (one of targets of the Project) in the grant aid project “Project for Expansion of INPP Katanga Provincial Direction in Lubumbashi” (2015). Also, the Government of Japan is aiding three local institutes (all targets of the Project) utilizing the Grant Assistance for Grassroots Human Security Projects (rehabilitation of the training building at Kisangani Institute, 2011, approximately 9,100,000 yen) and utilization of counterpart funds (construction of the training building at Goma Institute, 2012, approximately \$460,000, construction of the training building at Mbuji-Mayi Institute, 2015, approximately \$2,000,000). In addition, at the time of ex-post evaluation, France is building facilities and implementing training at INPP headquarters and local institutes; China is building facilities; Egypt and the African Development Bank are constructing facilities; and the World Bank is examining the formation of new aid programs including the supply of equipment. It is anticipated that such construction and installation of facilities and equipment can generate synergy with the capacity building of instructors in the Project at local institutes.

²³ As for the basic and common skills training, nine core trainers became unavailable due to promotions and transfers to local institutes, while they can be recalled if the need arises. All nine of the core trainers trained in the automobile department have remained in INPP, and eight of the most capable core trainers underwent ongoing capacity building in the Follow-up Technical Cooperation Project. In the refrigeration / air conditioning department, in addition to five core trainers prepared at INPP Kinshasa, another five were trained at local institutes following project completion, making 10 in total, although five of these subsequently became core trainers in other fields. The core trainers received additional training in pedagogical skills in the Follow-up Technical Cooperation Project.

The core trainers continue to implement instructors' training following project completion. The conditions regarding implementation of training are described below.

- Concerning basic and common skills training, 46 instructors of relevant fields received training following project completion. However, there are still more than 100 new instructors, mostly at local institutes, who have not yet received the training. Since basic and common skills training needs to be implemented at INPP Kinshasa which has the necessary equipment, the high costs of transport to Kinshasa and accommodation expenses has been a constraint for instructors from local institutes. To address this, INPP has plans to advance the installation of equipment and assignment of core trainers at local institutes so that it will be possible for basic and common skills training to also be implemented in the regions without too much cost.²⁴ Moreover, in interviews with core trainers, some voices called for review of the basic and common skills training contents in light of practical experience gained in recent years.
- In the automobile department, following completion of preparation of core trainers in the Follow-up Technical Cooperation Project, it is scheduled for instructors' training to be implemented, making it possible to address the fields that could not be fully covered in the Project.
- In the refrigeration / air conditioning department, due to the switching of specialties by instructors from other fields, instructors' training targeting 32 persons (eight from INPP Kinshasa and 24 from three local institutes) is being advanced based on OJT (on-the-job-training) and is scheduled to finish during 2018. The head of the department pointed out the need to utilize equipment and incorporate new technologies (mentioned earlier) requested by industry in the instructors' training from now on.
- Following project completion, 75 instructors received training in pedagogical skills over five courses. However, there are still more than 100 new instructors who have not yet received the training. Accordingly, INPP plans to continue the training in teaching methods with a view to training all instructors during 2018²⁵. Moreover, technical transfer in curriculum development techniques including creation of instruction plans and work standards has been conducted in the Follow-up Technical Cooperation Project, and it is scheduled for the manual on training in teaching methods to be revised.

²⁴ In the instructors' training in the Project, JICA bore the flight expenses for instructors participating out of local institutes, while INPP bore the other expenses (accommodation expenses, meal allowance, etc.). Domestic round-trip airfares in the DRC are quite expensive at between \$500-600. See footnote 22 concerning equipment installation at local institutes.

²⁵ Since training in pedagogical skills that does not require equipment can be implemented through dispatching core trainers to institutes, costs are lower and financial constraints are smaller than in basic and common skills training.

3.2.2.2 Other Positive and Negative Impacts

(1) Establishment of the PDCA cycle

According to INPP, through repeating the cycle of training planning, implementation, evaluation, and feedback in the fields of basic and common skills, automobiles, refrigeration / air conditioning, and pedagogical skills by the Project, mechanism for managing instructors' training based on the PDCA cycle has become established. This mechanism became institutionalized in the shape of the training improvement committee and working groups on each field, which were established in the Project, and these institutions continue to be maintained at the time of the ex-post evaluation²⁶. Moreover, at INPP Kinshasa, through conducting follow-up survey (baseline survey, end-line survey, etc.) of the ex-trainees and quantitative assessment of the instructors' training in the Project, the importance of data-based analysis was recognized, and attention came to be focused on what kind of results the training imparted for trainees, how the results of training were utilized in enterprises, how the needs of enterprises can be addressed and so on. Furthermore, under a proposal made by the experts in the Project, a 5S working group was established²⁷, and ongoing 5S activities are being advanced as extra-PDM activities. At INPP headquarters, at the suggestion of the TVET Advisor, INPP came to prepare an annual plan of activities, and responsible officers from around the country gathered each year to confirm and assess implementation and reflect their findings in the plan of activities for the following fiscal year. Moreover, since the activities of the Project and TVET Advisor were often integrated, these are deemed to be a synergistic effect with the TVET Advisor.

(2) Enhanced assessment of INPP

According to interviews with INPP, enterprises, current trainees, and ex-trainees, it has become widely known throughout industrial circles and the general population of the DRC that INPP's capacity has been reinforced in both hard and soft terms as a result of the JICA's vocational training program, and this has enhanced the reputation of INPP and its level of trust among enterprises. In particular, it is thought that the new training facilities and equipment constructed and installed under the Grant Aid Project are gaining a lot of attention. According to INPP, this has led to increased dispatches of trainees and payment of contributions from enterprises²⁸. Moreover, attention has come to be directed to INPP as a potential recipient for

²⁶ According to INPP, a "training dissemination committee", "industrial cooperation committee" and "employment and entrepreneurship support committee" have been established at the suggestion of the TVET Advisor, and operating capacity has been strengthened not only in the target departments of the Project but also INPP overall through repeating the PDCA cycle based on cooperation between the INPP departments, between INPP Kinshasa and the local institutes, and between INPP and enterprises.

²⁷ 5S refers to five words that express behaviors and conditions that need to be thoroughly followed in workplace management. They are: Sort (Seiri), Set in Order (Seiton), Shine (Seisou), Standardize (Seiketsu) and Sustain (Shitsuke).

²⁸ Revenue from company contributions between 2013 and 2016 increased by almost 80% (see section 3.4.4

assistance and it is possible that this has contributed to the formation of new aid projects by other donors, not only JICA (see footnote 22). The Director of INPP has expressed deep satisfaction at the JICA's vocational training program including the Project for the role it has played in driving INPP's major progress since 2011²⁹.

(3) Social and environmental impacts

According to interviews with ex-trainees, even though opportunities to find employment or start businesses are limited, a positive stance of utilizing the knowledge and skills acquired in the training to positively participate in society was frequently observed. Concerning gender, only 2% of trainees at the target departments in the Project are women, while, there are more women in other departments such as beauty and sewing, hotels and cuisine, and computers, and women account for 30% of trainees overall. INPP is considering measures to increase women's participation in courses on technical subjects including the courses held by the target departments of the Project. No particular impacts were confirmed on the natural environment.

To sum up, the Project Purpose "teaching skills of instructors of INPP, mainly those of the automobile department and refrigeration / air conditioning department, are improved" was largely achieved as a result of project implementation. Also, concerning the Overall Goal, since high-quality training is provided in the automobile department and refrigeration / air conditioning department, planned effects have generally materialized. Accordingly, effectiveness and impact of the Project are high.

3.3 Efficiency (Rating:②)

3.3.1 Inputs

The following table shows the planned and actual inputs in the Project by the Japanese side and the Democratic Republic of the Congo side.

Financial Aspect for the Sustainability of Project Effects).

²⁹ According to ADIAC (Agence d'Information d'Afrique Centrale), which is a private media agency based in the DRC, in a survey targeting 1,000 persons including 300 company representatives between January and June, 2018, INPP received the highest rating of any public corporation in the DRC. This is largely thanks to the management skill of INPP Director Mr. Chikuya, who has advanced the construction and installation of facilities and equipment and capacity building of instructors at INPP Kinshasa and local institutes while accepting assistance from JICA and other donors.

(<http://www.adiac-congo.com/content/sondage-les-points-premier-semester-2018-ces-mandataires-publics-qui-ont-marque-lopinion>)

Table 4 Comparison of Planned and Actual Inputs in the Project

Inputs	Plan	Actual (time of Project completion)
Inputs by the Japanese side		
(1) Expert dispatches	Long-term experts: Chief advisor / training planning and management, operational coordination Short-term experts: automobile, refrigeration and air conditioning, pedagogy, basic and common skills training (third country experts), baseline survey, etc.	Long-term experts: Chief advisor, operational coordination Short-term experts: training planning, training planning and management of training, operation and maintenance, pedagogy, baseline survey, training evaluation, automobile, basic and common skills training (three third country experts)
(2) Trainees received	(Unknown)	Training in Japan: 13 persons Third country training: 16 persons (Senegal)
(3) Equipment supply	(Unknown)	AV equipment, training equipment, etc. (85 million yen)
(4) Overseas project strengthening costs	(Unknown)	Approximately 41 million yen (travel expenses, training costs)
Japanese side Total Project cost	Total approximately 550 million yen	Total 688 million yen
Inputs by the Democratic Republic of the Congo side		
(1) Assignment of counterparts	Project director, Project manager, Project coordinator, counterparts (multiple)	INPP headquarters: 32 persons INPP Kinshasa: 37 persons INPP local institutes: 3 persons
(2) Others	Office, facilities and equipment necessary for the Project implementation, other necessary facilities, expenses up to equipment maintenance and installation, training implementation costs at INPP (travel expenses and accommodation expenses in Kinshasa, per diem allowance, etc.)	Office, facilities and equipment necessary for the Project implementation, other necessary facilities, expenses up to equipment maintenance and installation, training implementation costs at INPP (travel expenses and accommodation expenses in Kinshasa, per diem allowance, etc.)
Congo side Total Project cost	(Unknown)	Total approximately 53 million yen

Source: Prepared by the evaluator based on materials provided by JICA

3.3.1.1 Elements of Inputs

The chief advisor and other experts (in charge of areas other than basic and common skills training and specialized technical training) included in the work implementation contract were generally dispatched as planned from February 2011. According to the counterparts (staff in charge in the implementing agency), the experts had appropriate capacity. In the basic and common skills training, third-country training was conducted in Senegal, and Senegalese experts were dispatched. It is presumed that this enabled costs to be suppressed compared to the case of conducting training in Japan and dispatching Japanese experts. According to the counterparts, the Senegalese experts had appropriate capacity and efficient training using French

was implemented. From July 2012, 18 months after the start of the cooperation, the automobile expert was dispatched and two batches of training in Japan were implemented. According to the counterparts, this expert had scant experience in the vocational training field, so the technology transfer tended to be theoretical. In the refrigeration / air conditioning department, technology transfer was conducted to the core trainers via three batches of training in Japan, however, due to delay in the installation of refrigeration / air conditioning equipment, it was not possible to sufficiently use the equipment in the instructors' training. Moreover, the expert dispatch for the refrigeration / air conditioning field that had been scheduled following the equipment installation was cancelled.

There was no overlapping between equipment in the Project and the Grant Aid Project, and it is thought that the equipment was supplied in a mutually supplementary manner thanks to coordination by the team of experts and the consultants for the Grant Aid Project. Due to the delay in the Grant Aid Project, part of the equipment for the automobile department that had been planned for supply in the Grant Aid Project was supplied under the Project.

3.3.1.2 Project Cost

The total project cost of Japanese side was planned as approximately 550 million yen, but the actual cost exceeded this at 688 million yen (125% of the planned amount). Since the planned cost breakdown is unknown, the reason for the increase cannot be ascertained. One reason is considered to be the fact that due to the delay in the Grant Aid Project, part of the equipment (cost unknown) for the automobile department that was planned for supply in the Grant Aid Project had to be supplied under the Project.

3.3.1.3 Project Period

The Project was scheduled to last for 36 months from November 2010 to October 2013. The Project was started two months behind schedule in January 2011. However, because construction of the training building under the Grant Aid Project was delayed by the influence of the Great East Japan Earthquake in March 2011, installation of training equipment for the refrigeration / air conditioning department in the said building was also delayed and was not finished until October 2014. The period of cooperation was 46 months (128% compared to the planned period).

To sum up, because the project cost was higher than the planned amount and the project period was longer than the planned period, the efficiency is fair.

3.4 Sustainability (Rating:③)

3.4.1 Policy and Political Commitment for the Sustainability of Project Effects

In the Democratic Republic of the Congo's "*National Development Strategy 2017-2021*" (draft version at the time of ex-post evaluation), "Human resources, employment, and social welfare" is raised as one of four development axes, and it is intended to endow people with the knowledge, technology, and capacity required to participate in a creative and dignified labor market and society. Moreover, concerning Sustainable Development Goals (SDGs) 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", the DRC aims to "greatly increase the ratio of young people and adults who are endowed with technical and vocational skills and the other capacity required for employment, fulfilling and humane work and entrepreneurship" and to "achieve total and productive employment and fulfilling and humane work for all men and women including young and disabled persons, and realize equal pay for equal work" by 2030.³⁰

Meanwhile, in 2014 the government enacted *the Basic Education Act* in which it prescribed the framework of the education system including general education and vocational training. According to INPP, numerous government ministries and offices are involved with vocational training and it has taken time to review vocational training policies and strategy and review the practical division of roles of each relevant agency under the framework of the above mentioned Act. However, in 2018, a bill to establish a commission of national vocational certification was proposed at the suggestion of INPP. Positioned under the direct jurisdiction of the Presidential Office and participated in by more than 10 government ministries and offices, this commission is responsible for establishing standard curriculums for vocational training, prescribing standards for instructors, facilities and equipment and so on. It seems likely that establishment of the commission will be approved sometime in 2018.

To sum up, sustainability is high in terms of policy and systems, and INPP is deemed to play a central role in vocational training in the DRC.

3.4.2 Institutional / Organizational Aspect for the Sustainability of Project Effects

As of December 2016, INPP has 36 training centers and 1,406 employees (of which 906 are technical staff such as instructors or practical training assistants) throughout the country. These figures represent major increases compared to 11 centers and approximately 300 employees in 2009.

The number of employees at INPP Kinshasa increased from 198 in October 2010 to 302 at the time of ex-post evaluation (January, 2018), with the number of technical employees increasing from 150 to 240. Moreover, in 2018, it newly established a photovoltaics department and greatly strengthened its personnel setup in the advisory bureau while receiving support

³⁰ SDGs National Report (Ministry of Planning, 2016)

under the Follow-up Technical Cooperation Project. The setup for capacity building of instructors, whereby core trainers train the instructors, has remained unchanged since the time of planning, however, INPP intends to advance the assignment of core trainers to nucleus local institutes in line with the construction and installation of facilities and equipment at those centers. Moreover, to enhance the effectiveness of training and improve the efficiency of training administration at INPP Kinshasa, it is setting capacity levels (reducing class sizes) and advancing the standardization of training periods and timetables. The cleaning of facilities, which had been conducted by the cleaning and maintenance section of the protocol department of INPP Kinshasa, was outsourced following completion of the Grant Aid Project. The instructors and practical training assistants implement operation and maintenance of the equipment including the training equipment. All of the project equipment is controlled based on the equipment ledger kept in the inventory control section, and support for the strengthening of equipment control is conducted in the Follow-up Technical Cooperation Project.

Summing up, sustainability is high in terms of institutional and organizational aspects.

3.4.3 Technical Aspect for the Sustainability of Project Effects

The retention rate of INPP employees is high and almost all of the Project counterparts are in continuous service. In the background to this, INPP salary levels are set higher than at other vocational training institutions, while it offers generous welfare and benefits as a government agency. The numbers of core trainers prepared in the project fields are largely sustained (see section 3.2.2.1 (2) Continuation of activities following project completion). Out of 30 core trainers, INPP has assigned eight to local institutes in an effort to strengthen its regional hubs. Moreover, instructors' training implementation manuals, training materials, training instruction plans that were created in the Project are still being utilized at the time of the ex-post evaluation. Meanwhile, in the Follow-up Technical Cooperation Project, technical transfer related to specialized training in pedagogical skills and the automobile department is continuing through improvement of training materials, training of core trainers, improvement of training plans and assessment methods and so on³¹.

Since INPP Kinshasa trainees highly rate the knowledge, skills and teaching methods of instructors (see section 3.2.2.1 (1) Achievement of the Overall Goal), it is thought that appropriate training is being continued regarding the scope of technology transferred in the Project. The instructors and practical training assistants conduct operation and maintenance of equipment, and, since instructors are in a position to teach operation and maintenance, this is not a problem technically. Moreover, as was mentioned previously, since the PDCA cycle has been established and executed through collaboration among departments within INPP, INPP

³¹ The refrigeration and air conditioning department is not included among the targets of the Follow-up Technical Cooperation Project.

Kinshasa and the local institutes, and INPP and enterprises, the operating capacity of INPP overall has been strengthened (see footnote 26).

To sum up, sustainability is high in terms of technical aspects.

3.4.4 Financial Aspect for the Sustainability of Project Effects

INPP kept positive financial balance during 2014-2016 and its financial scale has increased by 31% during this period. (see Table 5). INPP is operated primarily on contributions from enterprises that are levied under legislation. Company contributions account for 90% of INPP's revenue, while revenue from the government budget accounts for less than 0.5%. According to INPP, the number of enterprises that pay contributions is increasing because they now place greater trust in INPP and appeals for finance have been strengthened. Revenue from contributions increased by more than 30% between 2014 and 2016. According to INPP, JICA's support including the Project and the new buildings of INPP Kinshasa have been widely known to enterprises, and the resulting increased trust among enterprises has contributed to the increased revenue.

Around 80% of INPP expenditure is spent on personnel expenses and other expenditure including welfare expenses, although there is also a high need for investment into construction and installation of facilities and equipment at local institutes. The amount of investment in 2015-2016 accounted for 12% of overall expenditure. Accordingly, INPP is striving to obtain donor support as a source of external finance (see footnote 22). Training of instructors is implemented based on the budget of INPP headquarters. While bringing instructors from local institutes to Kinshasa for training incurs major costs, it is being implemented a little at a time.

Table 5 INPP Financial Performance

(Unit:1,000,000 Congo francs)

	2014	2015	2016
Revenue	30,652	33,973	39,617
Enterprise contributions	27,236	30,992	36,307
Training charges, state budget, others	3,416	2,981	3,311
Expenditure	30,559	33,525	39,381
Personnel expenses	10,402	13,064	15,908
Maintenance costs	1,193	1,354	1,369
Investment	3,343	4,019	5,557
Others (including welfare)	15,621	15,089	16,546
Balance	92	448	236

Source: Prepared by the evaluator based on materials provided by INPP

Note: 1000 Congo francs is approximately 71 yen (July, 2018).

Because of rounding off, the total value may not agree with the sum of the values of each item.

The scale of finances at INPP Kinshasa increased to 135% between 2013 and 2016. Roughly half of its revenue comes from allocations from headquarters (largely obtained from company contributions), while the remainder is obtained from training charges and others. INPP Kinshasa is striving to boost revenue through selling products made by trainees in practical training at low prices and leasing in the open time some of the facilities (multipurpose hall, etc.) that were constructed under the Grant Aid Project. Maintenance costs at the institute increased to 158% between 2013 and 2016. No major financial constraints can be observed regarding the maintenance of facilities and equipment.

In the local institutes, company contributions and transfer from the headquarters (also derived from company contributions) account for almost 90% of revenue. Between 2013 and 2016, the scale of finances of the local institutes increased by 136%, while expenditure on maintenance increased by 125%. The local institutes have deteriorated facilities and equipment and, according to instructors at local institutes, the budget for construction, installation and maintenance of facilities and equipment is constrained.

Meanwhile, effects of the Project are sustained at a high level at the time of the ex-post evaluation (see section 3.2 Effectiveness and Impacts) and, apart from the fact that training for some newly recruited instructors still remains to be done, no financial constraints are in evidence.

To sum up, although there are some minor issues regarding sustainability in terms of the financial aspects, they are not deemed to be a problem affecting maintenance of the effects that were realized at the time of project completion.

To sum up, there are some minor financial constraints, but they impart no major impact on sustainability of the Project effects. Since there are no problems regarding policy, institutional, organizational and technical aspects, sustainability of the Project effects has been high.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

The Project, a technical cooperation project, was implemented with the project purpose “teaching skills of instructors of INPP, mainly those of the automobile department and the refrigeration / air conditioning department, are improved”, and with the overall goal “quality vocational training is offered by INPP, mainly in the automobile department and the refrigeration / air conditioning department”. The importance of vocational training within the policies and development needs of the DRC was high at both the time of planning and the time of completion of the Project. Moreover, from the perspective of expanding vocational training opportunities, the Project was highly relevant to Japan’s ODA policy at the time of planning. Based on the above, the relevance of the Project is high. As a result of the Project, implementation

system of training for instructors was strengthened on basic and common skills, pedagogical skills, and specialized skills in the automobile department and refrigeration / air conditioning department, and the evaluation on the training by trainees and enterprises was improved. Therefore, it is deemed that the quality of INPP's training was improved. Other improvements observed were establishment of the PDCA cycle at INPP, and a more favorable evaluation of INPP by industrial circles, etc. To sum up, the effectiveness and impact of the Project are deemed to be high. Against the background of delay to the Grant Aid Project caused by the Great East Japan Earthquake, the Project period was longer than planned and the Project cost also exceeded the planned budget. Hence, the efficiency of the Project is fair. Concerning sustainability, while there were some minor financial constraints, there were no major impacts that affected sustainability of the effects that materialized on completion of the Project. Since there have been no problems regarding policy, system, institutional, and technical aspects, the sustainability of the Project is high.

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

4.2 Recommendations

4.2.1 Recommendations to INPP

Continuance of instructors' training

For INPP to utilize the outputs of the Project with a view to sustaining the quality of training at a high level, it needs to identify the instructors who are targeted but have not received basic and common skills training, specialized skills training (automobile department and refrigeration / air conditioning department) and pedagogical skills training, compile the training program, secure budget, and implement the training. It needs to strive to enable all persons to receive training as quickly as possible while paying attention to the following points.

- Basic and common skills training: Concerning the training contents implemented in the Project, collect the opinions of instructors in each target department and review the training contents. Compile 3 to 5-year training programs for INPP Kinshasa and core local institutes while paying attention to the condition (current and planned) of training equipment at the local institutes.
- Specialized skills training in the automobile department: Implement core trainers' training and instructors' training with support from the Follow-up Technical Cooperation Project.
- Specialized skills training in the refrigeration / air conditioning department: Assess the results of instructors' training based on OJT that will finish during 2018. Compile additional instructors' training plans where necessary upon analyzing the validity of

adding contents such as multiple packaged air-conditioning systems in buildings and other contents that are desired by industry.

- Pedagogical skills training: Upon reviewing the training contents based on outputs in the Follow-up Technical Cooperation Project, compile a training program for all instructors who have not yet received the training.

Strengthening of dissemination of information on training courses

In Kinshasa, not enough information on training courses at INPP Kinshasa reaches enterprises, neither those that pay INPP contributions nor those that do not (small enterprises and individual business owners). Since the reputation of INPP is already well established, it is necessary to disseminate specific information on the training courses. Therefore, it is necessary for INPP to examine methods for efficiently conveying specific information on training courses to potential users, of INPP Kinshasa as a model, through methods such as a website and social networking services.

Strengthening of linkage with industries

In order for INPP to advance efficient cooperation with associated enterprises, i.e. the enterprises that pay contributions and enterprises that allow employees to participate in training, and offer training that fits with the needs of enterprises, it needs to build a database that includes the histories of training use by enterprises and contact information of staff in charge of training³². Also, to ensure more practical and closer linkage between INPP and enterprises, in Kinshasa, the demarcation of roles of Fund Collection Department of INPP headquarters and Advisory Bureau of INPP Kinshasa, which are involved with company cooperation, should be reviewed and examination conducted to ensure that INPP Kinshasa (the training place) can play an even larger role.

4.2.2 Recommendations to JICA

JICA should examine support for implementing the abovementioned recommendations over the possible scope via a Follow-up Technical Cooperation Project. In addition, it should examine the necessity and feasibility of other technical cooperation for assisting implementation of the above recommendations.

³² At the time of the ex-post evaluation, Fund Collection Department at INPP headquarters has a database of enterprises that pay contributions, while Advisory Bureau at INPP Kinshasa has a database of users from enterprises that utilize the training. However, as the two databases are not integrated and the contact information (telephone numbers, email addresses, staff in charge, etc.) is incomplete, there was difficulty conducting the telephone survey.

4.3 Lessons Learned

Setting of indicators showing the scope of technology transfer

In technical cooperation projects, where it is necessary to systematically enhance technical capacity in target fields, indicators of the scope of technology transfer are required to enable explicit judgment of whether or not the necessary technology transfer has finished. In cases where experts need to make detailed examination and the scope of technology transfer cannot be defined before the start of cooperation, indicators should be set based on expressions such as “XX% or more of the necessary technology transfer items” and finalized after the cooperation has started. In the PDM of the Project, concerning the specialized technical training in the automobile department and refrigeration / air conditioning department, the targets of judgment based on indicators were limited to the scope of actual technology transfer implementation, but there were no indicators for explicitly showing how much scope of the necessary technology was covered. As a result, in the terminal evaluation, it was deemed that the outputs in both departments had been “achieved”, even though part of the technology transfer was still incomplete. For the Project, a supplementary Follow-up Technical Cooperation Project was implemented in the automobile department, however, this does not necessarily conform with the conclusions of the terminal evaluation. As for the technology transfer to the refrigeration / air conditioning department, the finally scheduled short-term expert was not dispatched and the work was not completed, however, this was not clearly recognized until the ex-post evaluation was implemented.

Achievement of Outputs

Output	Indicators	Achievement
Output 1: Implementation system of the basic and common skills training is strengthened. (Achieved)	<p>① In each fiscal year, a basic and common skills training plan (training contents, period, and target numbers of people) is compiled, and training is implemented according to the plan.</p> <p>② More than 80% of the instructors who received basic and common skills training are satisfied with the training contents.</p> <p>③ Instruction plans and teaching materials for the basic and common skills training were prepared and reviewed at least 2 times during the Project period.</p>	<p>① Achieved: The core trainers were trained, and instructors' training was implemented according to the training plan.</p> <p>② Achieved: On average, 82% of instructors were satisfied with the training contents.</p> <p>③ Achieved: The instruction plans and teaching materials for the basic and common skills training were officially revised a total of 4 times.</p>
Output 2: Implementation system of the specialized skills training is strengthened. (partially achieved in the automobile department; largely achieved in the refrigeration / air conditioning department)	<p>① In each fiscal year, a specialized skills training plan (training contents, period, and target numbers of people) is compiled, and training is implemented according to the plan.</p> <p>② More than 80% of the instructors who received specialized skills training are satisfied with the training contents.</p> <p>③ Instruction plans and teaching materials for the specialized skills training are prepared and reviewed at least 2 times during the Project period.</p> <p>Note: Achievement of the outputs was judged in consideration of the indicators and the fact that some of the required technical scope could not be covered.</p>	<p>① Achieved: The core trainers were trained, and instructors' training was implemented according to the training plan.</p> <p>② Achieved: In the automobile department, 92% of instructors were satisfied with the training contents, while in the refrigeration / air conditioning department, the figure was 80%.</p> <p>③ Achieved: The instruction plans and teaching materials were prepared, and the training was improved according to necessity. In the automobile department, the training schedule and teaching materials were revised based on the experience of the first training. In the refrigeration / air conditioning department, appropriate equipment was installed.</p>
Output 3: Implementation system of the pedagogical skills training is strengthened. (Achieved)	<p>① In each fiscal year, the plan of pedagogical skills training (training contents, period, and target numbers of people) is compiled, and training is implemented according to the plan.</p> <p>② More than 80% of the instructors who received pedagogical skills training are satisfied with the training contents.</p> <p>③ Instruction plans and teaching materials for pedagogical skills training are prepared and reviewed at least 2 times during the Project period.</p>	<p>① Achieved: The plan of training in teaching methods was compiled, and instructors' training was implemented according to the plan.</p> <p>② Achieved: 97% of instructors who received training in teaching methods were satisfied with the training contents.</p> <p>③ Achieved: The instruction plans and teaching materials for the training in teaching methods were officially revised 2 times to reflect the results of assessment.</p>

Source: Prepared by the ex-post evaluator based on materials provided by JICA

Republic of Rwanda

FY2017 Ex-Post Evaluation of Japanese Grand Aid Project
“The Project of Improvement of Substations and Distribution Network”

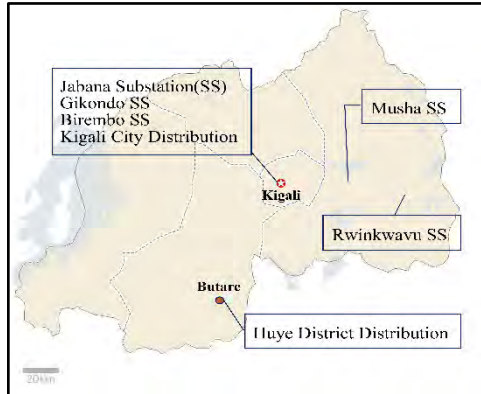
External Evaluator: Ryutaro Koga, Global Group 21 Japan, Inc.

0. Summary

“The Project of Improvement of Substations and Distribution Network” (hereinafter referred to as “this project”) was implemented to refurbish/ renew substations at focal points in the power grid based in regions centered in Kigali city and local areas, and to refurbish/ expand distribution networks in order to stabilize the power supply and increase the electrification rates, thereby improving social services and industrial development. This project is part of the Rwandan government's nationwide electrification plan, consistent with its development policy and Japan's aid policy. The necessity of the project was high considering the power situation of the country, and thus the relevance is high. The project cost was about 90% of the planned amount, but the implementation period greatly exceeded the planned amount due to the revisions of overall designs and a re-tendering process that became necessary as part of the work was carried out in advance with the government's own funds. Also, there were some mandatory changes of standards for power equipment which forced design revisions. Therefore, the project's efficiency is considered fair. The power transmission output quantity of the substations has increased significantly beyond the planned amount, and the household electrification rate reached about 90% of the planned coverage. Due to these improvements, the project reduced the risk of large-scale blackouts and stabilized electricity supply to general households, industries etc. It also increased the quality that various social services can provide through the electrification of general households/ local governments/ schools/ health care facilities. Therefore, the project's effectiveness and impact are high. There are no problems in operation and maintenance from the viewpoints of institution, technology and finance. However, the repair of the control buttons at the control room for some of the substations has been delayed. Furthermore, there is some machinery which is not being fully utilized in the Huye District Distribution Network. So, the sustainability of this project is fair.

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

1. Project Description



Project Location



Jabana Substation Refurbished by this project

1.1 Background

At the time of project planning (2009), Rwanda's nationwide electrification rate was estimated to be about 5%, with electrification rates in urban areas including Kigali City, to be about 25%. Low electrification rates were an impediment to improving people's living standards, social services and industrial development. Furthermore, many of the substations and power distribution facilities were built in the 1970s and 1980s, and as the equipment aged, it became impossible to replace old parts, making the risk of large-scale blackouts at times of parts-troubles a concern. In Kigali, urbanization progressed as the population grew from 600 thousand as of 2000 to about 1 million in 2009, further increasing demand and making a stable power supply difficult. This project was planned in response to these urgent issues in the power sector, and based on Rwanda's national electrification plan, *Electric Access Rollout Program (EARP)* - one of the central programs for achieving the targets of the national development plan *Rwanda Vision 2020*.

1.2 Project Outline

This project was implemented to refurbish/ renew substations at focal points on the power grid based in regions centered in Kigali city and local areas, and refurbish/ expand distribution networks in order to stabilize the power supply and increase electrification rates, thereby improving social services and industrial development. Regarding the refurbishment/ extension of the distribution networks, the procurement and installation of low-voltage distribution lines and lead-in lines to each customer were the responsibility of the Rwandan side (excluding the Kigali City distribution network).

E/N Grant Limit/ Actual Grant Amount	2,454 million yen/ 2,287million yen
Exchange of Notes Date/ Grant Agreement Date	March 2011/ March 2011
Executing Agency	Ministry of Infrastructure (MININFRA: competent authority) Energy Development Corporation Limited (EDCL) Energy Utility Corporation Limited (EUCL) (At the time of Grant Agreement, “Energy, Water and Sanitation Authority” (EWSA))
Project Completion	March 2014
Main Contractor	The Consortium of Nishizawa limited and Takaoka Engineering Co., Ltd.
Main Consultant	Nippon Koei Co., Ltd
Cooperation Preparation Survey	October 2009 - January 2011 (The Preparatory Survey on the Project for Upgrading and Expansion of Substations and Distribution Network in the Republic of Rwanda)
Related Projects	“Capacity Building for Efficient Power System Development in Rwanda” (JICA technical cooperation, 2011-2014) “The Project of Improvement of Substations and Distribution Network Phase II” (JICA grant aid, 2016-2018)

2. Outline of the Evaluation Study

2.1 External Evaluator

Ryutaro KOGA (Global Group 21 Japan, Inc.)

2.2 Duration of the Evaluation Study

This ex-post evaluation survey was conducted as follows;

Duration of the Study: August 2017- December 2018

Duration of the Field Study: December 28, 2017-January 30, 2018, April 19-30, 2018

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

3.1 Relevance (Rating: ③²)

3.1.1 Consistency with the Development Plan of Rwanda

The Government of Rwanda set a goal for the household electrification rate to reach 35% by 2020 as part of the *National Development Plan Vision 2020* created in 2000. This electrification policy has been implemented based on a medium-term plan (*Economic Development and Poverty Reduction Strategy: EDPRS 2008-2012*) which is formulated based on the NDP and the

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

² ③: “High” ②: “Fair”, ①: “Low”

nationwide electrification plan (*Electricity Access Rollout Program: EARP*). At the time of planning, this project was highly consistent with these policies. Under the latest Medium-Term Plan II (2013- 2018) and one of its core programs, *EARP II*, the government realigned its goal for the household electrification rate to 70% by 2018. Furthermore, the *National Strategy for Transformation (2017-2024)* set a higher goal of 100% electrification by 2024, including on- and off-grid power. Therefore, this project is sufficiently consistent with the development policies at the time of planning and ex-post evaluation.

3.1.2 Consistency with Development Needs of Rwanda

At the time of planning for this project, the Jabana substation (which is the main substation in the Kigali metropolitan area), the Gikondo substation (which accommodates the National Electricity Control Center (NECC) and controls loads to substations nationwide), and the Musha and Rwinkwavu substations (which are located on the backbone power transmission lines of eastern Rwanda) had aged significantly over time. Replacement of parts such as transformers, breakers, and disconnectors were not possible. Thus, once a failure occurred, the risk of a large-scale blackout would be high. In addition, both the expansion of the distribution network to surrounding areas accompanying the growth of Kigali City, and the refurbishment/ expansion of the aging underground distribution network in Huye District (the second largest city) were necessary. As shown in the table below, the household electrification rate at the time of this ex-post evaluation was about 30% for on-grid, and 41% including off-grid (such as solar power, mini hydropower etc.). Although it has greatly increased since the start of this project, it still lags behind the above-mentioned targets.

Table 1 Household Electrification Rate of Rwanda

Electrification Rate (As of August 2017)	
Nationwide	40.7%
on-grid	29.7%
off-grid	11.0%
Rural Electrification Rate	16.0%

Source: *World Bank Energy Sector Development Policy Finance Report*

At the time of the ex-post evaluation, the equipment installed by this project continues to play an important role in supplying electricity to Rwanda against a backdrop of increased demand. On the other hand, as described in "Effectiveness" (see page 7) below, the load factor of the Jabana and the Gikondo substations is still high, and there is a continuous need to keep them at an appropriate level. From the above, this project is highly consistent with the development needs both at the time of planning and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

This project was consistent with "Economic infrastructure development/ industrial development" which was the priority area of Japan's *Rwanda Country Assistance Policy (April 2012)* aimed at revitalizing economic activity through economic infrastructure development. It was formulated to establish part of "infrastructure development/ business promotion program" As per the support policies at the TICAD IV³, the maintenance and management support was introduced to facilitate transmission and distribution networks to improve access to and promote efficient use of electric power. Therefore, this project was highly consistent with Japan's ODA policy at the time of planning.

From the above, the implementation of this project is well-aligned with the development policies, development needs of Rwandan electric power sector, development assistance policy of Japan. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

This project was divided between six facilities/ sites (seven including Birembo SS) as shown in the table below and was all carried out as planned, except for a portion of the Kigali City electricity distribution network. Regarding this exception, the Rwandan side worked on prioritized target areas in advance with domestic government funds, so construction areas were reduced to 1/3 the original agreement. Specifically, out of the four planned project areas, only two areas (Mbandazi and Muyumbu) were implemented in this project. The extension distance of medium- and low-voltage distribution lines was reduced by 38 km (68% of planned length), and the total number of distribution transformers on the distribution network also decreased by 13 units (62% of planned numbers). One of the works the Rwandan side was responsible for, "removal of the former substations in the adjoining sites of renewed Musha and Rwinkwavu substations," has not been completed, but there have been no problems with the operation of these substations. For the Birembo substation, a disconnecter necessary for switching the transmission voltage from 70 kV to 110 kV east of Musha was added.

³ The fourth Tokyo International Conference on African Development: TICAD is an international conference for African development led by the Japanese government and held together with the United Nations, United Nations Development Program (UNDP), African Union Committee (AUC) and World Bank since 1993.

Table 2-1 Outputs of this project Plan and Actual (Substations Refurbishment and Renewal)

Item	Specification/ Standard	Plan	Actual
Jabana Substation (Refurbishment)			
Main transformer	10MVA, 110kV/15V	2	No change
Outdoor switchgear	Breaker, Disconnecter, Instrument Current Transformer, Instrument Transformer	One set	No change
Indoor equipment	15 kV switchgear, Console type control panel etc.	One set	No change
Miscellaneous material for substation equipment	Equipment cradle, Power cable, Control cable	One set	No change
Gikondo Substation (Refurbishment)			
Outdoor switchgear	110 kV Switchgear, Circuit-Breaker, Disconnecter, Instrument Current transformer, Instrument transformer, Lightning arrester, etc.	One set	No change
Miscellaneous material for substation equipment	Outdoor iron structure, Equipment cradle, Power cable, Control cable etc.	One set	No change
Musha Substation (Renewal)			
Main transformer	10MVA, 110kV/15kV	1	No change
Outdoor switchgear	Breaker, Disconnecter, Instrument current transformer, Instrument transformer, Lightning arrester, etc.	One set	No change
Indoor equipment	15kV switchgear, Control panel	One set	No change
Miscellaneous material for substation equipment	Outdoor iron structure, Equipment cradle, Power cable, Control cable etc.	One set	No change
Building	—	One set	No change
Rwinkwavu Substation (Renewal)			
Main transformer	6MVA, 110kV/15kV	1	No change
Outdoor switchgear	Breaker, Disconnecter, Instrument current transformer, Instrument transformer, Lightning arrester, etc.	One set	No change
Indoor equipment	15kV switchgear, Control panel	One set	No change
Miscellaneous material for substation equipment	Outdoor iron structure, Equipment cradle, Power cable, Control cable etc.	One set	No change
Building	—	1	No change
Birembo Substation (Addition)			
Outdoor switchgear	Disconnecter	1	No change

**Table 2-2 Output of this project Plan and Actual
(Distribution Network Refurbishment and Expansion)**

Item	Specification/ Standard	Plan	Actual
Huye District Distribution Network (Refurbishment)			
Ring Main unit	30kV	21	No change
Distribution Transformer	30kV/0.4kV	20	No change
Concrete pillar, Steel pipe	Cables, Terminals, etc.	One set	No change
Building	—	20	No change
30 kV medium voltage distribution line	Underground type	About 16km	No change
400 V low voltage distribution line	Relocate existing facilities	—	No change
Miscellaneous materials for power distribution equipment	—	One set	No change
Kigali City Distribution Network (Expansion)			
15 kV medium voltage distribution line	ACSR	24.9km	7.59km
400 V low voltage distribution line	ABC	30.8km	10.08km
Pillar transformer	15kV/0.4kV	18	5
Concrete pillar	Low Voltage (9m) Medium Voltage (12m)	Total 944	Total 308
Outdoor low voltage distribution board	—	One set	No change
Miscellaneous materials for power distribution equipment	—	One set	No change

Rwandan side works

Plan (As of Cooperation Preparation Survey)	Actual (As of Ex-post evaluation)
(1) Installation and connection of lead-in from low-voltage distribution line to customer (2) Relocation/ refurbishment of SCADA system, Preparation of access road to substations (3) Removal of existing substation equipment (Musa and Rwinkwavu substation) etc.	(1), (2) were completed. (3) was not finished.



Outdoor switchgear
(Gikondo Substation)



Main Transformer
(Musha Substation)



Substation Building
(Rwinkwavu)

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost (the portion borne by the Japanese side) was planned to be 2,454 million yen, but the actual cost ended up at 2,286 million yen (93%)⁴. As stated in the section on Project Output, the reason for this decrease in project cost is that the Rwanda government implemented part of the construction of the Kigali City distribution network with their own funds. Including these components conducted by Rwandan side, the initial project scope of this project has been completed.

3.2.2.2 Project Period

The planned project period was from March 2011 to February 2013 (24 months) but was prolonged from March 2011 (G / A) to March 2014 (37 months) (compared to plan 154%⁵). There are two main reasons for this delay. First, a design revision and re-bidding process became necessary as part of the Kigali City distribution network was implemented by the Rwandan government using self-funding, which was not conveyed until the middle of the bidding process. (The first bidding failed due to budget being exceeded, the contracted scope was divided into 2 lots (Kigali city distribution network and others), so in total three biddings were conducted). Second, as there was a partial amendment to the electrical equipment standards in April 2013, the roof structures of the Musha and Rwinkwavu substation buildings had to be changed to the RC structure. Also, for the newly added medium-voltage distribution lines of the Kigali City network, it became necessary to install disconnectors at the end of the section as a safety measure, necessitating additional procurement⁶. Regarding re-bidding, while it is possible that information sharing with the executing agency after starting the project was insufficient, the amendment of the electric facility standards was unavoidable as it is a change that contributes to improve safety.

From the above, although the project cost decreased with the decrease in construction volume, the project period was much longer than planned. Therefore, the efficiency of this project is fair.

⁴ Taking into consideration the decrease in the construction volume of the Kigali City distribution network, the comparison between planned and actual cost would be about 105%, but this amount includes some additional equipment for responding to the correction of the power facility standards, so it was evaluated in comparison with the initial construction cost.

⁵ Including 5 months extended for the design change and the procurement of additional equipment such as disconnectors in order to comply with the standard change for the power equipment. Excluding these periods, then it is 133%.

⁶ Regarding the installation of disconnectors, this project conducted up to the delivery, and EUCL took over the installation work.

3.3 Effectiveness and Impacts⁷ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative effects⁸

In this project, the facilities were refurbished and renewed at four substations, and the distribution facilities were refurbished and expanded in Kigali City and Huye District. With regard to substations, we analyze the effect of this project based on indicators of power transmission output, operation rate and load factor; and for electricity distribution equipment, based on electricity supply quantity and the electrification rates.

(1) Power transmission output (Substations)

Table 3 shows the transition of the power transmission output from 2013 to 2017 of the four substations, which are the main targets of this project. In the Jabana substation and the Musha substation, which had their transformer capacity increased, the power transmission output was estimated to increase by about 15% in six years from 2010 to 2016 (three years after completion of the project). (There were no target values for the other two substations). However, the power transmission output capacity at the Jabana substation and Musha substation has increased by 74% and 81% respectively during the five years from 2013 to 2017. This increase rate greatly exceeded the plan. Although this reflects a drastic increase in electricity demand for both substations, it is judged that the enhancement of both substations by this project made this possible. The power transmission output capacity of the Gikondo Substation (which did not upgrade a transformer) increased by 10% by 2017 (three years after completion of the project). On the other hand, although the transformer capacity was increased at the Rwinkwavu substation, the electricity growth remained at 6%. Because the main customers of the substation are tourism related facilities, such as hotels in Akagera National Park, the increase of other customers has been limited. According to the Rwamagana office of EUCL, the blackouts due to the insufficient transformer capacity and aging of the substation were the major issue, and it is recognized that this project has resolved this issue, which is a different effect from the increase of the power transmission output.

⁷ Sub-rating for “Effectiveness” is to be considered with “Impact”.

⁸ Indicators of the quantitative effects in the ex-ante evaluation table and the preparation survey differ from each other, and there are gaps between the numerical values of the ex-ante evaluation table and the numerical values obtained during the ex-post evaluation. As the basis for the ex-ante evaluation target value is unknown, this evaluation was conducted with the data obtained in the ex-post evaluation. The indicator of Load Factor was added as the operational conditions of substations (which relates to the project objective of avoiding the risk of large scale blackout) can be understood well by analyzing it together with the Operation Rates. The indicator of Power Sales of the Huye District power distribution network was not able to be obtained and replaced by the Power Supply Amount.

Table 3 Change of Transmission End Electricity Amounts (kWh)

Substation		2017	2016	2015	2014	2013
Gikondo	Transmission end electricity (kWh)	143,391,160	123,422,160	115,995,236	130,628,995	130,464,060
	% Compared with 2013	110%	95%	89%	100%	100%
Jabana	Transmission end electricity (kWh)	87,488,288	86,126,630	75,959,420	74,143,236	50,285,170
	% Compared with 2013	174%	171%	151%	147%	100%
Musha	Transmission end electricity (kWh)	40,075,340	28,708,430	38,366,680	27,464,471	22,161,400
	% Compared with 2013	181%	130%	173%	124%	100%
Rwinkwavu	Transmission end electricity (kWh)	2,282,370	3,368,170	1,892,230	2,029,614	2,153,400
	% Compared with 2013	106%	156%	88%	94%	100%

Source: Executing Agency

(2) Equipment operation rate (Substation)

Table 4 shows the equipment operation rates⁹ of the targeted substations for this project, which is one of the operational indicators for power supply stability. Although available data were only for 2016 and 2017, these data indicate that the operation rate of each substation is more than 99.7%. This is due to the circuit breakers installed by the Rwandan side which prevent blackouts caused by the feeder side (distribution line side) from affecting the entire substation operation. Thus, it is recognized that these substations have been stably operating without large scale blackouts.

Table 4 Equipment operation rate of substations

Substation	2017			2016		
	Stop time (minutes)	Operation time (minutes)	Operation rate (%)	Stop time (minutes)	Operation time (minutes)	Operation rate (%)
Gikondo	1,403	524,197	99.73	1,520	524,080	99.71
Jabana	122	525,478	99.98	128	525,472	99.98
Musha	38	525,562	99.99	52	525,548	99.99
Rwinkwavu	161	525,439	99.97	130	525,470	99.98

Source: Executing Agency

⁹ Equipment Operation Rate (%) = Annual operation time (minutes) / Annual total time (= 525,600 minutes) x 100%

(3) Load Factor (Substations)¹⁰

Table 5 shows the transition of the load factor of the targeted four substations from 2013 to 2017. The load factor of each substation is controlled by NECC located at the Gikondo substation. Reflecting the strong growth in electricity demand, the load factor of Gikondo and Jabana substations, which supply electricity to Kigali City, increased from 60.6% to 67.3% at Gikondo, and 38.3% to 71.2% at Jabana from 2013 to 2017. The high load factor indicates that the facilities refurbished by this project have been stably operated and contributed to the electricity supply of Kigali City. However, it also indicates that further expansion will be required in the near future.

On the other hand, the load factor of Musha substation remains at 48.7%, 1.5% decrease from 2014. Although the load factor of the Rwinkwavu substation is said to be affected by the demand of tourism facilities (hotels etc.) of and around the Akagera National Park, it is as low as 37.2%. This means the difference between the maximum and the average electric power demand is high, indicating that there is a high margin for enlarging the electric consumption as well.

According to the Rwamagana office EUCL, the electricity demand of Musha substation is expected to expand, indicating that further upgrade for the transformer capacity will be needed in the near future, as this area accommodates the industrial park development plan of Rwamagana with many development projects. In addition, the project for electrifying 8,000 households is currently underway, and the number of connections has been increasing at around 3,000 connections/year recently. As for the Rwinkwavu substation, an installed 6 MVA transformer here is deemed more than enough with the current demand. However, considering that this area is a latecomer for electrification, there is a high possibility for the demand to grow significantly in a mid and long time.

Table 5 Change of Substation's Load factor

Substation		2017	2016	2015	2014	2013
Gikondo	Load Factor (%)	67.3%	53.3%	70.3%	67.6%	60.6%
	% Compared with 2013	111%	88%	116%	112%	100%
Jabana	Load Factor (%)	71.2%	64.1%	53.4%	65.4%	38.3%
	% Compared with 2013	186%	168%	140%	171%	100%
Musha	Load Factor (%)	48.7%	35.8%	48.6%	50.2%	57.2%
	% Compared with 2013	85%	63%	85%	88%	100%
Rwinkwavu	Load Factor (%)	37.2%	55.7%	31.7%	33.9%	37.2%
	% Compared with 2013	100%	150%	85%	91%	100%

Source: Executing Agency

¹⁰ The load factor of a substation shows the ratio of the average electric consumption and the maximum electric consumption in a period, and the higher the load factor, the more stable the target equipment operation is with less fluctuation in the load. When it is too high, however, it shows there is little room for responding to rapid demand spikes. The annual load factor in Japan varies from about 55 to 65%, and usually around 60 to 65% in many countries.

(4) Electricity Supply (Huye District Distribution Network)

Table 6 shows the changes in the electricity supplied to the Huye distribution network which has been refurbished and expanded by this project. From 2014 to 2017, the power supply increased 185% in the district, much higher than the target value (15% increase from 2010 to 2016). This increase in electricity supply is due to not only this project, but also the increase in the supply source and capacity. Before this project, the electricity supply to Huye came from the Kigoma substation. However, this substation had frequently caused power transmission halts (power failure) due to the shortage of capacity, and thus the establishment of Lukarara substation was necessitated. Since this new substation started to transmit electricity to the Huye network, the electricity supply has been increased. Compared with the electrification rate of about 80% in Kigali City, that rate in Huye District is only about 31% (on-grid rates as of December 2017). Therefore, it is considered that development demand in this district will continue to be large.

Table 6 Change of Electricity Supply to Huye District

Substation		2017	2016	2015	2014
Kigoma (Butare Feeder)	Transmission end electricity (kWh)	9,546,710	27,341,702	29,196,736	12,205,730
Rukarara	Transmission end electricity (kWh)	25,202,431	484,380	0	0
Total	Transmission end electricity (kWh)	34,749,141	27,826,082	29,196,736	12,205,730
Growth rate	%	285	228	239	100

Source: Executing Agency

(5) Electrification Rate (Kigali City Distribution Network)

Table 7 shows the transition of the electrification rate in the Kigali City Distribution Network Area, which was expanded/ updated during this project. At the time of ex-post evaluation, the electrification rate of Mbandazi was 70% and Muyumbu was 75% (both 2017 values), which was about 90% of the target value of 80%. Therefore, the target values were generally achieved.

Table 7 Change of Electrification Rate in the Kigali City Distribution Network

Unit: %

	Plan (3 years after completion)	2017 Actual (Achieved %)	2013	2010
Nationwide	—	42.3	23.5	10.3
Kigali City	—	80	48	25.9
Mbandazi	80	70 (88)	0	0
Eastern District	—	37		14.1
Muyumbu	80	75 (94)	51	26

Source: JICA, Rwanda Government, Executing Agency

Note: Muyumbu is part of the Kigali City Distribution Network, but belongs to the Eastern District as an administrative district

3.3.1.2 Qualitative Effects (Other effects)

The qualitative effect expected from this project was to avoid the risk of large-scale blackouts. According to the executing agency, the stability of the power supply has greatly improved due to this project, including the reduction of the risk of large-scale blackouts. Outdated equipment that no longer has repair parts such as transformers, in the substations of Jabana, Gikondo, Musha and Rwinkwavu were renewed. The transmission voltage to the east of Musha was boosted from 70 kV to 110 kV, and the 6.6 kV medium voltage distribution lines in Huye District were replaced with the 30 kV distribution lines used in many areas of Rwanda, thereby it now becomes easier to get replacement parts. Furthermore, Rwanda's power generating capacity increased by 2.3 times¹¹ from 93.5 MW in 2010 to 216 MW in 2017. It is judged that this project contributed to the stabilization of the power supply by smoothly connecting this increase of power generation to consumers through the improvement of substations and distribution equipment.

Based on the above, the implementation of this project improved power supply conditions more than expected, and therefore, the degree of achievement of the project purpose is high.

3.3.2 Impacts

3.3.2.1 Intended Impacts

This project intended to contribute to improving the quality of social services and industrial development by stabilizing the electricity supply and increasing the electrification rate through refurbishing/ renewing the main substations and upgrading/ expanding the electricity distribution networks.

¹¹ Source: Answers from the executing agency via questionnaire

(1) Impact due to stabilization of electricity supply

It is recognized that this project played a fundamental role for the stable expansion of electricity supply and contributed to prevent the risk of large-scale blackouts (which were likely to occur in the project area without this project), therefore to the sustainable growth and revitalization of economic activities. (see Effectiveness: Qualitative Effect).

(2) Impact from the increase of the electrification rate

With respect to the enhancement of the above-mentioned social services, the improvement of living conditions by strengthening the services of local health care facilities, educational facilities, administrative facilities through electrification were expected. This project has expanded and rehabilitated the distribution networks (Kigali City, Huye District), and also contributed indirectly to the electrification of surrounding areas around major substations by refurbishing/ renewing them. Here we analyze the impact from the improvement of the electrification rate; based on the changes in the electrification rate of general households/ social service facilities and the results of field surveys in electrified areas¹².

Unfortunately, the number of customers and electrification rate by each substation were unknown. Table 8 shows the trend of general household connections and nationwide electrification rates of social service facilities that helps to understand the contribution effects of this project to the improvement of social services. At the time of planning, the number of general customers in the target area of this project was expected to increase 65% three years after the project completion compared to the base year (2010). For school and medical/ health facilities, the growth rate for the electrification were expected to be 64% and 13% respectively. Whereas, as shown in Table 8, the number of general customers has increased more than four times in the seven years from 2010 to 2017 nationwide, and the electrification rate of school facilities has more than doubled. For hospitals and medical facilities which already had a comparatively high electrification rate before this project, had achieved a 100% electrification rate by 2017. Judging comprehensively from the above, it is highly likely that the intended positive impact was achieved in the target area of this project.

¹² In total 106 people were interviewed including focal group discussions from households (7 groups, 87 people), and individual interviews (local government 3, school facilities 2, medical health facilities 2, commercial and industrial owners 10) from 17 different sites.

Table 8 Electrification rates of general households, medical facilities, governmental offices, schools (nationwide)

Target	Category	2017	2014	2010
General Households	(Number of connection)	776,097	473,003	187,624
	(Growth rate %)	414%	252%	100%
Medical/ Health Facilities (Electrification rate %)	Hospitals	100*		90*2
	Health Centers	91*		
Government Offices (Electrification rate %)	Province Office	100*		90*2
	District Office	100*		
	Sector Office	94*		
	Cell Office	56*		
School (Electrification rate %)	Primary Schools	94*		26*2
	Secondary Schools	56*		

Source: Executing Agency

*: As of Feb 2018

*2: As of 2011

(3) Major impacts on the improvement of living conditions and industrial development (see Column)

General households enjoy the convenience of using electric appliances (mobile phones, radio, TV, video, etc.). Switching from kerosene lamps (which cause damage to health) to electric lighting, improvement of access to information, and availability of cold beverages, etc. provide a higher standard of living, and changes in the attitude of life are seen. Meanwhile, local government offices have been able to issue certificates more quickly with the introduction of personal computers. At medical health facilities, medical treatment at night with electric lighting has become possible, and medical services improved with the use of various medical equipment such as sterilizers, diagnostic lights, etc. In educational facilities, supplement classes early in the morning and/or after school for the preparation and review of classes have been increased. Furthermore, classes using personal computers have also started at some schools, and thus the quality of education has improved. Many commercial and industrial owners are also aware of the improvement in the quality of electricity such as a reduction in blackouts after the project. The number of new businesses that use electric products such as the welding industry, timber processing industry, barber shop etc. were increased in the new power distribution area. Thus, the effects on business is recognized.

Column: Benefits of electrification obtained from field survey at the ex-post evaluation

Field survey results by group interviews with residents (7 groups from the new electrified areas - Kigali district 3, Rwamagana area 1, Kayonza area 1, Huye area 2--- Total 89 people¹³):

Changes in community after electrification

Changes at the local government of cell level (which bundles multiple villages)

- ◇ Due to the installation of personal computers and printers at local governments, the quality of reports at those offices has improved with spending less time.
- ◇ Local governments can access to the central government databases. For example, it is now possible to issue some certificates for social stratum data that are necessary for paying health insurance premiums, the burden of residents having to visit a far-away central office has been eliminated.
- ◇ Residents are able to communicate with each other at any time with a mobile phone.
- ◇ Government offices now have bright workspaces (even in twilight hours) which improves work efficiency.
- ◇ Electric lighting aided in the recognition of suspicious persons at night, reducing theft and improving public order.

Impacts to economic activities

- ◇ With the increase in lighting and new services, store opening hours were extended until midnight, and customers increased.
- ◇ Number of new businesses using electric products such as welding, barber/ hairdresser, restaurants, copy service etc. have increased.
- ◇ Land prices and rents rose as new businesses and population increased.

¹³ (Reference)

Home electric appliances owned by residents

- (1) Households that own electric bulbs was 100%, mobile phones over 90%. Radio over 50%, TV about 30%, the spread of other electric devices is lower. Benefits of electrification thus majorly surrounds the use of electric lighting and mobile phones.
- (2) Most common items residents prefer to buy next; TV, Fridge, Iron, DVD and Electric pot.

Electricity Charge / Connection Charge situation

- (1) Average Electricity charge of households is 2.2\$ / month. Payment is made by pre-paid method.
- (2) "Connection charge" and "wiring cost" in households (total about 80\$) are required for connection. Pole fees (if the house is more than 37m away from nearest distribution pole) of 100\$ or more per pole are also required. Group residents of Mubare (Rwamagana district) interviewed were not electrified at the beginning because they were spread out from poles, but 99 people in the community jointly requested the electricity company to electrify their area and achieved electrification by paying connection costs jointly (including a 1.8 km stretch, 33 poles).
- (3) Rwanda's electrification rate has been increasing rapidly in recent years. One of the keys has been a connection fee installment payment system to reduce the connection cost burden. From the interview results, payment of about 40% or more of the connection fee is made before connection, and the remaining amount is repaid in about one year. If you select split repayment, you pay half of the payment for repayment each time you pay the electricity fee. For this reason, only half of the payment is paid for electricity charges until payment is complete, and there is sentiment that the electricity charge is high for many residents.

Impacts to school facilities

- ◇ A vocational training school using electric tools and machine tools for vocations such as woodworking, sewing and welding was established.
- ◇ The motivation of students and faculty members improved after electric lights became available. Morning and evening supplement classes were bolstered. Some of the schools started using personal computers in class.
- ◇ Students are now able to spend more time at school for study than before due to the electric lighting, and student grades have increased as a result.

Impact on general households

- ◇ The use of mobile phones, radios, TVs, and videos improved the ability to access to the information for the residents, e.g. the price information of agricultural products or purchased goods, weather information useful for cultivation etc. became available. Disseminating videos for educational purposes such as hygiene management and contraceptive methods to patients/ residents became possible.
- ◇ Switching from a kerosene lamp (which is harmful to health) to electric lighting stopped the chronic coughing in children, the worry of fire breakouts, and due to the brighter lighting, quality of lifestyle in the night had improved. In addition, services such as mills, copiers, internet cafes which were not available nearby before, were established, and people can now even enjoy cold beverages.
- ◇ “Electrification” has also led to the creation of some kind of pride towards “My Village”. A grocery shop owner pointed out that after electrification the guests began to arrange their appearance when they go out. Many parents pointed out that children have stopped playing outside in the night and time to see TV and learn at homes has increased.

Impact on health facilities

- ◇ By using medical examination equipment such as centrifuges, the immediate test result became available. Furthermore, specimens can now be preserved by using refrigerator. This makes biopsy services possible to the higher-level medical facilities.
- ◇ The educational effect of family planning by using TV/ Video was improved, there was a health facility where the number of pregnant patients drastically declined.
- ◇ Thanks to the refrigerator/ freezer, it became possible to implement a stable vaccination schedule.
- ◇ It became possible to use a sterilizer necessary for surgical instruments, refrigerators for preservation of drugs and specimens etc., incubator used for premature babies, and a diagnostic light and the like.

3.3.2.2 Other Positive and Negative Impacts

(1) Impact to the Environment

This project did not fall under the large-scale transmission/ distribution sector, and thus negative impacts on the environment was judged as limited. As a result of the screening by the Rwanda Development Agency, only the extension of the Kigali City distribution network was required for an environmental impact assessment (EIA), and EIA was approved in March 2011. According to the executing agency, based on the environmental action plan of the EIA, measures for mitigating soil runoff were appropriately implemented for the construction of the Kigali City distribution network. Regarding the refurbishment/ renewal of substations, and refurbishment/ expansion of Huye District distribution network, it was notified in the official document that an EIA was unnecessary. Regarding the construction of these substations, environmental mitigation measures such as enclosing the sites by fences and avoiding works at night were taken. With regards to Musha and Rwinkwavu substations, removal of the former substations has not been completed, but there has been no adverse environmental impact.

(2) Resettlement / Land purchase

Resettlement of residents has not occurred in this project. In the renewal of the Musha substation and refurbishment of Huye District distribution network, land acquisition (about 230 square meters) occurred at the site of transformer installations etc., and some tree cutting was required. Part of the site at the Musha substation was purchased from a private company and three of the four places in the Huye District distribution were city owned land. One of those located at the Huye center place (Telecom Distribution Post) was initially privately-owned land, but the land owner did not agree. Therefore, it was settled by shifting the location and using the city land. The remaining one was the property owned by the Rwanda Energy Group (the parent company of the executing agency). It was confirmed from the executing agency that compensation has been appropriately made in each case including those for cutting trees in line with the compensation plan.

From the above, the implementation of this project generally went as planned, making the effectiveness and impact considered high

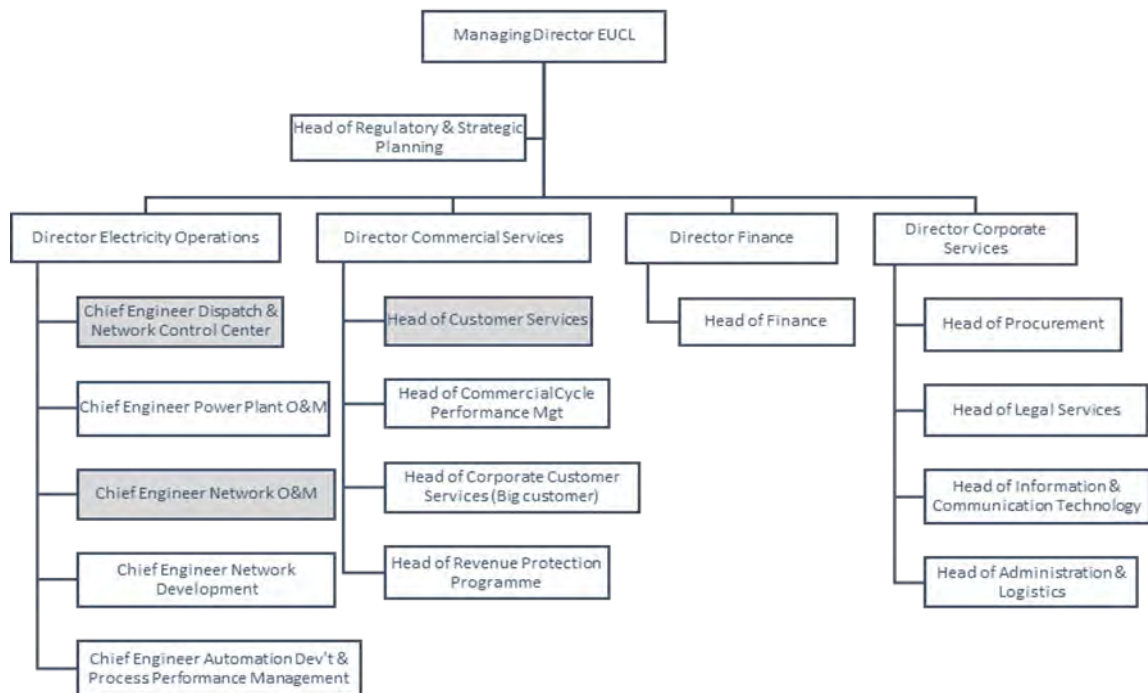
3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspects of Operation and Maintenance

Organizational reforms of the executing agency have been taking place in Rwanda with the aim of creating a more efficient and clear responsibility system for development and operation of

the electric power sector. The executing agency of this project was the Energy and Water Sanitation Authority (EWSA) at the time of the grant aid contract, which changed from the Rwanda Electricity Authority (RECO) at the time of the preparatory survey. Soon after the completion of the project, in August 2014, the Energy Development Corporation Limited (EDCL) and the Energy Utility Corporation Limited (EUCL) were reorganized as subsidiaries of the Rwanda Energy Group (REG), a 100% government-owned public corporation.

EDCL oversees electric power development, and EUCL handles operation and maintenance of the electric power facilities after completion of new facility construction. For this reason, the executing agency for this project is both EDCL and EUCL, but the operation and maintenance of the substations and distribution network after this project completion have been carried out by EUCL. According to the EDCL, there are already 14 IPPs (Independent Private Power Generators) for power generation, but there are no plans to privatize the operation and maintenance of the power transmission and distribution facilities. This newly established organizational structure is still under development, and according to persons concerned with the Ministry of Infrastructure, collaboration is not smooth yet regarding the implementation of operations across organizations. The organization chart of EUCL is shown below.



Source: Executing Agency

Note: Painted boxes show division in charge of operation and maintenance of this project

Figure 1 Organizational Chart of EUCL

The maintenance of substations is carried out by the *Dispatch & Network Control Center* (DNCC) at the *Director Electricity Operations* of EUCL, and for the electricity distribution network, the *Network Operations & Maintenance Units* are in charge of large-scale repairs, etc. Daily inspection and management centering on the electricity distribution network is handled by a regional office under the umbrella of the *Director Commercial Services*. As stated in the "Operation and Maintenance Technology" (p. 18), the substations are managed nationwide by the chief engineers of DNCC from the Gikondo substation in a remote and centralized manner on a 24-hour basis with the SCADA system. As for the distribution networks (both Huye District and Kigali City), there are sufficient staff members as shown in the following table. Thus, there are no particular problems in the operation and maintenance system.

Table 9 Operation and Maintenance Staff

Facility	(Operation staff) + Maintenance staff
Jabana Substation	(2 people x 2 shifts) + 2 people
Gikondo Substation	(3 people x 4 shifts) + 5 people
Musha Substation	(2 people x 2 shifts) + 1 people
Rwinkwavu Substation	(2 people x 2 shifts) + 1 people
Huye District Distribution Network	7 staff (technicians)
Kigali City Distribution Network	40 staff

Source: Executing Agency

3.4.2 Technical Aspects of Operation and Maintenance

In addition to the above-mentioned operation staff, three senior engineers are placed as chief engineers at the Gikondo substation, and they are centrally managing remote substations nationwide 24 hours a day. No particular technical problems in management have been identified. In the Huye District distribution network, EUCL staff by themselves were able to appropriately change the settings and/or replace some equipment parts (transformer, breakers, etc.) necessitated by the increased demand. This indicates that they possess sufficient management skills and knowledge. In the Kigali City distribution network as well, EUCL installed disconnectors by this project at the connection points of the newly added distribution network without any troubles.

In addition, a technical cooperation project, *Capacity Building for Efficient Power System Development in Rwanda*, which aimed to strengthen the Electricity Training Center by training chief engineers/ technicians for distribution, transmission, and generation was conducted in

parallel with this project. Through this project, inspection of transmission lines was conducted between Musha and Rwinkwavu substations before boosting the transmission voltage from 70 kV to 110 kV by the end of the project, and replacement of damaged insulators were proposed. Furthermore, core engineers who received trainings from the technical cooperation project supervised the construction sites for the substations and transmission lines. It is recognized that these concrete collaborations contributed to the improvement of the expertise required for the operation and maintenance of these facilities.

3.4.3 Financial Aspects of Operation and Maintenance

Table 10 shows the financial situation (a profit and loss statement) of EUCL. EUCL has contracted with the government to operate and maintain the government-owned thermal power plants, and has been accepting some grants and subsidies for fuel import tariffs for those thermal power plants, etc. In both 2014/15, 2015/2016 fiscal years, it showed profits even if depreciation expenses are posted. The subsidy is on a downward trend, and it is planned to be eliminated in the future when the financial condition is stabilized. The revenues from power sale have been increasing. The budgets for maintenance are allocated to the enhancement of the electric power facilities, and it was confirmed at the time of the ex-post evaluation in a hearing with EUCL engineers that the necessary capital has been secured. The financial situation in terms of operation and maintenance are not a concern.

Table 10 Income Statement of EUCL

	RwF Million	
	2015/16	2014/15
Revenue	78,104	58,786
Cost of sales	(67,665)	(60,546)
Gross profit/(loss)	<u>10,439</u>	<u>(1,760)</u>
Grants and subsidies	21,104	28,800
Other income	3,706	1,105
Distribution costs	(9,484)	(9,880)
(Out of above: Repairs and maintenance-distribution)	(3,511)	(2,421)
Administrative expenses	(10,433)	(8,147)
Operating profit before depreciation and amortisation	<u>15,332</u>	<u>10,118</u>
Depreciation and amortisation	(10,447)	(10,087)
Operating profit after depreciation and amortisation	<u>4,885</u>	<u>31</u>
Financial income	98	5
Finance costs	(1,224)	(763)
Profit before income tax	<u>3,759</u>	<u>(727)</u>
Income tax(expense)/credit	(1,889)	1,445
Profit of the year	<u>1,870</u>	<u>718</u>
Other comprehensive income	-	-
Total comprehensive profit for the year, net of tax	<u>1,870</u>	<u>718</u>

Source: Executing Agency
1USD = 862 RwF(April 2018)

Fiscal Year: July 1 to June 30th

3.4.4 Status of Operation and Maintenance

The SCADA¹⁴ system (installed in 2010) operated at DNCC in the Gikondo substation is synchronized with the four substations of this project. And using the newly upgraded 110kV transmission line (boosted from 70kV by this project), they are able to remotely control the substations in a centralized manner. In the defect inspection report for this project, it was pointed out that there were no particular problems in the basic performance of substations and distribution equipment, and overall condition was good. This was confirmed from EUCL even at the time of the ex-post evaluation.

In addition, at the time of defect inspection, following points were reported, and the situation afterwards was checked at the ex-post evaluation.

- (1) Damage of the operating buttons of the control consoles in Jabana, Musha and Rwinkwavu substation control rooms: It has been handled by sticking labels under the damaged buttons with the words which were unreadable.¹⁵ The damage has worsened, and the exchange parts have been ordered. Everyday operation is done remotely using the SCADA system, and there are no problems with the function. But since the button that switches to local operation at times of an accident etc. is included as one of the damaged ones, it is recognized that urgent replacement is necessary before any malfunction occurs.



Damaged control buttons of substation control console
(Musha Substation)

- (2) As for the Huye District distribution network, it was confirmed that the theft and loss of grounding wires at four of the 21 distribution posts reported at the time of the defect inspection, have already been fully repaired.

¹⁴ Supervisory Control And Data Acquisition

¹⁵ According to EUCL, replacement of the damaged console buttons was requested before, but could not be replaced as the guarantee period had ended.

In the Huye District distribution network, it is required to respond to the sudden increases in demand (replacement of transformers, circuit breakers, etc.) and damages to the underground distribution cables due to road construction. Also, regarding the distribution posts equipped in this project, replacement, repair, and adjustment of breakers and transformers are necessary, and some parts are outdated. Concerning these, however, it was confirmed that the executing agency responded appropriately and continuously using the equipment.

In the Kigali distribution network, damage to a part of the iron fences protecting the outdoor transformer, and loose or unfixd guy- wires (wire for supporting the utility poles) were observed. Damage to iron fence seems to be a problem in general security, but it is necessary to strengthen security measures such as reinforcement of patrolling.

From the above, overall there are no major problems concerning the operation and maintenance regarding institutional, technical and financial aspects. However, regarding the maintenance situation, the repair of the control room console buttons of the substations is delayed. There is equipment in the Huye District distribution network that can't be used. And in the Kigali City distribution network, there are many unfixd/ loose guy-wires. Therefore, the sustainability of this project is considered fair.



Ngoma Distribution Post
(Huye distribution network)



Ring Main Unit
(Huye distribution network)



Medium / Low-voltage distribution
line joining pole (Kigali City
distribution network)

4. Conclusion, Recommendations and Lessons learned

4.1 Conclusion

This project was implemented to refurbish/ renew substations at focal points in the power grid based in regions centered in Kigali city and local areas, and to refurbish/ expand distribution networks in order to stabilize the power supply and increase the electrification rates, thereby improving social services and industrial development. This project is part of the Rwandan government's nationwide electrification plan, consistent with its development policy and Japan's aid policy. The necessity of the project was high considering the power situation of the country, and thus the relevancy is high. The project cost was about 90% of the planned amount, but the implementation period greatly exceeded the planned amount due to the revisions of overall

designs and a re-tendering process that became necessary as part of the work was carried out in advance with the government's own funds. Also, there were some mandatory changes of standards for power equipment which forced design revisions. Therefore, the project's efficiency is considered fair. The power transmission output quantity of the substations has increased significantly beyond the planned amount, and the household electrification rate reached about 90% of the planned coverage. Due to these improvements, the project reduced the risk of large-scale blackouts and stabilized electricity supply to general households, industries etc. It also increased the quality that various social services can provide through the electrification of general households/ local governments/ schools/ health care facilities. Therefore, the project's effectiveness and impact are high. There are no problems in operation and maintenance from the viewpoints of institution, technology and finance. However, the repair of the control buttons at the control room for some of the substations has been delayed. Furthermore, there is some machinery which is not being fully utilized in the Huye District Distribution Network. So, the sustainability of this project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Some of the operation buttons of the control desk in Jabana, Musha and Rwinkwavu substations were damaged. Although replacement parts have already been ordered and there is no obstacle to the current operation, the possibility of malfunctioning in the future cannot be excluded and thus quick repair is desired.

4.2.2 Recommendations to JICA

Nothing.

4.3 Lessons learned

Information sharing of project scope change

In a support project where the construction sites and conditions may change based on the trend of the target district needs (such as a distribution network), it is important for JICA/ Project management consultant to thoroughly grasp the needs of the recipient government/ executing agency and what changes are foreseen through regular consultations etc. so as not to affect (delay) the implementation of the overall plan of the support project.

Although the original sites for the expansion of the Kigali City distribution network (which

was part of this project) was four areas, the Rwandan side had constructed two of the high priority areas with their own funds. The Japanese side recognized this change right after the start of the bidding process for all four areas. As a result, revising the project design and dividing the bidding lot became necessary, and this caused significant delay of the overall construction period. Major reason for this delay is thought to be the insufficient information sharing with the executing agency after commencement of the project. Therefore, it is important to implement some measures for sufficient information sharing from the beginning so that there will be no delays due to such lack of cooperation.

Implementation time and follow-up of defect inspection

It is advisable to conduct the defect inspection within the warranty period, and it is important for JICA to adequately follow up on the issues pointed out in the report.

Damage to the operation buttons of the control desk of Jabana, Musha and Rwinkwavu substations was pointed out in the defect inspection report and countermeasures were taken. However, since the defect inspection was conducted after the warranty period, it was highly possible that the measure taken was not a fundamental one and insufficient. In addition, it is hoped that JICA should confirm the appropriateness of countermeasures with respect to the issues pointed out at the time of the defect inspection, and also to follow up on the content of the problem sufficiently.

END