Ex-Post Project Evaluation 2016:
FY 2015 PackageI-7
(Burkina Faso, Senegal, Gabon, Nigeria)
"The Project for Rural Electrification in Cross River and Akwa Ibom States"

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Federal Republic of Nigeria

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"Project for Rural Electrification in Cross River and Akwa Ibom States"

External Evaluator: Hiroshi NISHINO, Value Frontier Co., Ltd.

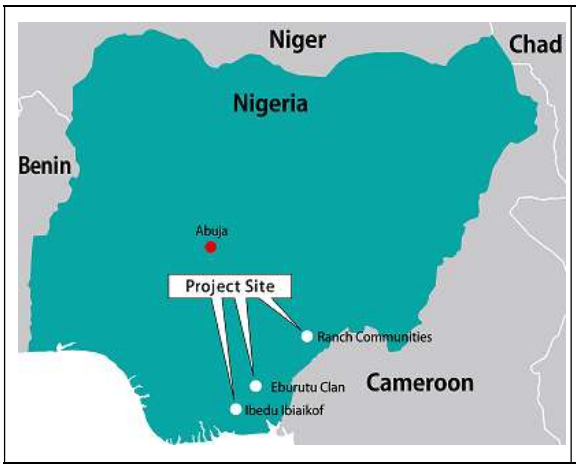
0. Summary

The aim of this project was to ensure stable power supply by procuring and installing power distribution facilities at two sites in Cross River State and one site in Akwa Ibom State located in the southern part of Nigeria, thereby contributing to the improvement in the living standard, stable management of public institutions, and stimulation of local socio-economic activities.

The relevance of this project is considered as "High," because this project is consistent with Nigeria's development policies and needs, which assigns high priority to rural electrification, and with Japan's official development assistance (ODA) policy as well. The efficiency of the project is judged as "Fair" because the actual project cost exceeds the planned amount, taking into account the change in output, though the actual project period was as planned. As for the effectiveness and impact, while the project contributed to the expansion of access to electricity, the expected impact (improvement of public services and stimulation of the local economy) was not fully achieved due to the suspension of power supply at some sites at the time of the ex-post evaluation. Thus, the effectiveness and impact of the project is evaluated as "Fair." The sustainability of the project's effect is rated as "Low" because there are concerns regarding the organizational, technical, and financial aspects of the project and its current status of operation and maintenance (O&M).

In light of the findings above, this project is evaluated as "Unsatisfactory."

1. Project Description



Project Locations

Source: Prepared by the evaluator

Booster Station and Distribution Line

Source: Taken by the evaluator

1.1 Background

The strengthening of the power sector is one of the priorities of the Nigerian government, and in particular, rural electrification is expected to play an important role in the socio-economic development of rural areas. However, rural electrification in Nigeria had been stagnant due to several reasons including the lack of financial resources, and as a result, the rural electrification rate as of 2005 was as low as 20%, far behind the national target (60%). This situation forced rural residents to use kerosene, firewood, and generators for lighting or cooking; further, public service delivery, such as education and health, was adversely affected owing to the limited access to electricity (JICA/Yachiyo Engineering 2006).

Under this circumstance, the government of Nigeria identified and prioritized electrification projects based on the Rural Electrification Program. However, external support was financially and technically indispensable to realize these projects. The Japanese government supported the efforts of the Nigerian government by providing grant aid between 2000 and 2002 (Project for Rural Electrification), and this captioned project was implemented as part of the support by the Japanese government for rural electrification in Nigeria.

1.2 Project Outline

The objective of this project was to improve power distribution capacity by procuring and installing power distribution facilities at two sites in Cross River State and one site in Akwa Ibom State located in the southern part of Nigeria, thereby contributing to the improvement in the living standard, stable management of public institutions, and stimulation of local socio-economic activities.

Table 1 Summary of the Project

E/N Grant Limit/Actual Grant Amount	1st term: 932 million yen/927 million yen 2nd term: 899 million yen/787 million yen 3rd term: 574 million yen/573 million yen
Exchange of Notes Date	1st term: June, 2006
	2nd term: August, 2007
	3rd term: July, 2008
Implementing Agency	Federal Ministry of Power (FMP) (Former Federal Ministry of Power and Steel)
Project Completion Date	November, 2009
Main Contractor	Mitsubishi Corporation
Main Consultant	Yachiyo Engineering Co., Ltd.
Basic Design	March, 2006 and March, 2008 (Detailed Design 3rd term only)
Related Projects	Project for Rural Electrification (Grant Aid): 2000–2004

2. Outline of the Evaluation Study

2.1 External Evaluator

Hiroshi NISHINO, Value Frontier. Co., Ltd.

2.2 Duration of the Evaluation Study

Duration of the Study: January, 2016–April, 2017

Duration of the Field Study[1]: April 17–20 and September 5–8, 2016

2.3 Constraints during the Evaluation Study

Due to security reasons, the external evaluator was not allowed to conduct the field survey by himself in Nigeria. Thus, this evaluation was conducted based on the result of document reviews and field visits done by a local consultant based in Nigeria (Abuja). In addition, due to resource constraints, field visits by the local consultant were conducted in two of the three target sites of the project. For the same reason, a beneficiary survey, which targets individual beneficiaries, could not be conducted, making it impossible to examine the household-level impact (e.g., the improvement in the living standard). Moreover, the entity in charge of the O&M of the facilities installed by this project is a private company, and this hampered sufficient data collection necessary to evaluate the sustainability of the project's effect (in particular, the financial aspect).

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance to the Development Plan of Nigeria

The national development plan at the time of project planning, "National Economic Empowerment and Development Strategy" (2003–2007), positioned the power sector as one of the strategic sectors, and the strengthening of power generation capacity, transmission capacity, distribution capacity, and reduction of distribution power loss were set as objectives for the sector to be achieved by 2007 (National Planning Commission, 2004). The policy paper on the overall energy sector in Nigeria ("National Energy Plan") also aimed at distributing electricity to all major towns by 2020 (Presidency Energy Commission of Nigeria, 2003). In addition, the increase in the electrification rate from 40% to 60% was set as a goal of the "Rural Electrification Programme," which focused on rural electrification (JICA/Yachiyo Engineering, 2006).

Likewise, the national development paper at the time of the ex-post evaluation, "Nigeria Vision 20: 2020," assigns importance to the strengthening of infrastructure including power infrastructure (National Planning Commission, 2009). The "National Energy Plan" has been

[1] This field study refers to the meetings with the local consultant in a third country (Senegal).
[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ③: High, ②: Fair, ①: Low

revised, and a draft version as of 2013 set a goal of electrification for all major towns by 2020. The target value of the rural electrification rate is 75% by 2020 and 90% by 2030 (Federal Ministry of Power, 2015).

As shown above, the strengthening of the power sector and the increase in the electrification rate have been regarded as priority issues, and thus, this project was judged in line with the development policy of Nigeria.

3.1.2 Relevance to the Development Needs of Nigeria

Figure 1 shows the electrification rate[4] in Nigeria between 1999 and 2013 (urban and rural)[5]. As clearly shown in the figure, electrification in rural areas was strikingly low and showed negligible improvement between 1999 and 2013. Considering the potential benefits from access to electricity (economic activities, education, health, etc.) (ADB, 2010; IEG, 2008; Peters and Sievert, 2016), the low electrification rate has hindered socio-economic development of rural areas. In this regard, this project, which aimed at extending access to electricity in rural areas, has continuously matched the development needs of Nigeria since before the commencement of the project.

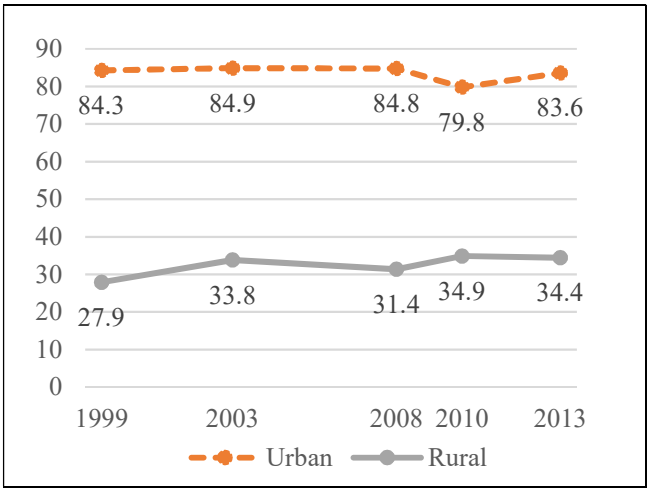


Figure 1 Proportion of households with electricity (National level: %)

Source: National Population Commission and ICF International (2014)

Note: Blanks show that data are not available.

Meanwhile, the rural electrification rates in Cross River State and Akwa Ibom State, the target states for this project, were 22.9% and 40.0%, respectively, as of 2003, and 59.3% and 41.4%, respectively, as of 2013. Although the rates are higher than the national average, nearly 40% and 60% of the rural population from the two areas, respectively, has been forced to live without electricity (National Population Commission and ICF International, 2014).

3.1.3 Relevance to Japan's ODA Policy

According to Japan's ODA data book (International Cooperation Bureau, Ministry of Foreign Affairs, 2005), rural electrification was one of the prioritized issues in the aid strategy for Nigeria. The Japanese government also had a policy to implement grant aid projects to promote rural electrification and technical cooperation projects for solar power generation. Therefore, at

[4] Electrification, in this section, is defined as "the proportion of households with electricity among households surveyed."

[5] The data as of 2013 are the latest available data at the time of the ex-post evaluation.

the time of project planning, the project was also consistent with Japan's ODA policy.

In sum, this project has been highly relevant to the country's development plan and needs as well as Japan's ODA policy. Therefore, its relevance is "High."

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

In this project, power distribution facilities were procured and installed at three sites, Ranch Communities and Eburutu Communities in Cross River State and Ibedu Ibiaikot Clan in Akwa Ibom State in the southern part of Nigeria (hereafter referred to as "RC, EC, and IIC," respectively). The detailed outputs for each site are shown in Table 2.

As shown in the table, the output achieved by the Japanese side was largely as planned. Major deviations from the original plan include the shorter length of the distribution line in EC. This change is considered to be inevitable because a temporary road to be used for the construction work was not actually built due to heavy rain, and thus, it was judged impossible to install a

Table 2 Output in Each Site (Planned and Actual Input)

Output	Planned	Actual
[Ranch Communities]		
(1) Installation of new 33 kV booster station	1	1
(2) Installation of new 33 kV capacitor station	1	1
(3) 33 kV distribution line	59 km	59 km
(4) 33 kV/415–240 V distribution transformers (200 kVA, 300 kVA, 500 kVA)	Total 15	Total 15
(5) Spare parts and maintenance tools for the 33 kV distribution line and booster station	1 set	1 set
[Eburutu Communities]		
(1) 33 kV distribution line	85 km	71 km
(2) 33 kV/415–240 V distribution transformer (200 kVA, 300 kVA, 500 kVA)	Total 28	Total 25
(3) Spare parts and maintenance tools for the 33 kV distribution line	1 set	1 set
[Ibedu Ibiaikot Clan]		
(1) Installation of new 33 kV booster station	1	1
(2) 33 kV distribution line	20 km	20 km
(3) 33 kV/415–200 V distribution transformer (200 kVA, 300 kVA)	Total 9	Total 9
(4) Spare parts and maintenance tools for the 33 kV distribution line and booster station	1 set	1 set
(5) 33 kV/415–240 V distribution transformers (200 kVA, 500 kV)	Total 4	Total 4

Source: Basic Design report (Planned), internal documents provided by JICA (Actual), Answers to the questionnaires by the implementing agencies (Planned and Actual)

distribution line in that section during the project period[6]. The reason for the smaller number of distribution transformers seems to stem from the change in the length of the distribution line mentioned above, although exact information was not available.

3.2.2 Project Inputs

3.2.2.1 Project Cost

As shown in Table 3, the project cost was 2,672 million yen, which was less than the original plan of 2,811 million yen (95% of the original amount). The reason for the cost being less in the first and third terms was that the contracts were signed with a smaller amount than estimated due to competitive bidding. As for the second term, the amount was less because of the change in the length of the distribution line discussed above[7]. Even if this reduction in output is taken into account, the project cost borne by the Japanese side was lower than in the original plan.

The cost borne by the Nigerian side was as planned, that is, US$3,574,000, according to the implementing agency. However, in consideration of the cancellation of construction of the temporary road[8], the project cost is virtually considered higher than in the original plan.

The total actual cost (borne by the Japanese and Nigerian sides) of this project was 2,672 million yen, and it is slightly higher than the virtual planned amount considering the decrease in the output (112 million yen on the Japanese side and 81 million yen on the Nigerian side), which was 2,618 million yen (102% of the virtual plan).

Table 3 Project Cost

	Original Plan	Planned (excluding the reduced output)	Actual
[Cost borne by Japanese side]			
Total	2,405 million yen	2,293 million yen	2,287 million yen
1st term	932 million yen	932 million yen	927 million yen
2nd term	899 million yen	787 million yen	787 million yen
3rd term	574 million yen	574 million yen	573 million yen
[Cost borne by Nigerian side]			
Total	406 million yen (US$ 3,574,000)	325 million yen (US$ 2,864,000)	385 million yen (US$ 3,574,000)
[Total cost]			
Total	2,811 million yen	2,618 million yen	2,672 million yen

Source: Planned by Nigerian side: JICA/Yachiyo Engineering (2006), Planned and actual by Japanese side: Iinternal documents provided by JICA, Actual by Nigerian side: Answer to the questionnaire by the FMP.
Note: The following exchange rates were used. Planned: US$1=113.53 yen (JICA/Yachiyo Engineering 2006), Actual: US$1=107.75 yen (the average rate of the project period from International Financial Statics)

[6] This change was made under the official agreement between the Nigerian government and JICA
[7] The difference between the planned and actual cost (112 million yen) corresponds to the decrease in the contract amount (112 million yen).
[8] The amount used for the construction of the temporary road was estimated to be approximately US$710,000 (81

Table 4 Project Period

	Planned	Actual
Total	July, 2006–October, 2009 (40 months)	July 6, 2006–November 4, 2009 (40 months)
1st term	July, 2006–July, 2007 (12.5 months)	July 6, 2006–February 29, 2008 (20 months)
2nd term	August, 2007–June, 2008 (11 months)	August 16, 2007–January 25, 2009 (17 months)
3rd term	July, 2008–September, 2009 (13 months)	July 28, 2008–November 4, 2009 (15 months)

Source: Planned: Ex-ante evaluation (at the time of the basic design). Actual: Internal documents provided by JICA.

Note: The definitions of commencement and completion of the project refer to the date of consultancy contract and the date of hand-over of the facilities, respectively.

3.2.2.2 Project Period

The actual project period was approximately 40 months, which is largely the same as the planned period as shown in Table 4 (100% of the original plan). On the other hand, the periods of each term exceeded the planned period. One of the reasons is an incident related to construction work in Cross River State. During the process of construction, it was necessary to use the land belonging to a school in Abia State, next to Cross River State, temporarily to keep the materials used for the work. However, local residents opposed to this and exhibited obstructive actions. Although this incident was settled peacefully with an agreement to distribute part of the compensation for land use to the local residents as well, it caused a delay in the construction schedule.

In summary, although the project period was mostly as planned, the project cost slightly exceeded the original plan. Therefore, the efficiency of the project is "Fair."

3.3 Effectiveness[9] (Rating: ②)

Rural electrification has a wide range of potential benefits. Based on the basic design of this project and the related literature, Figure 2 depicts a possible mechanism of project impacts[10].

In the shorter term, the output of this project (installation of power distribution facilities), by expanding the access to electricity, contributes to the increase in time spent for productive activities. It allows electric lighting, reduction of household chores by using electronic appliances, and less use of kerosene for lighting, resulting in more effective and efficient use of time and money at the household level[11]. In addition, at the community level, the project is expected to

million yen) (JICA/Yachiyo Engineering 2006).

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

[10] Figure 2 shows a simplified picture, and the impacts of rural electrification are not limited to the ones shown in this figure.

[11] In the project areas, it was common practice to use kerosene for lighting purposes, and its price was higher than

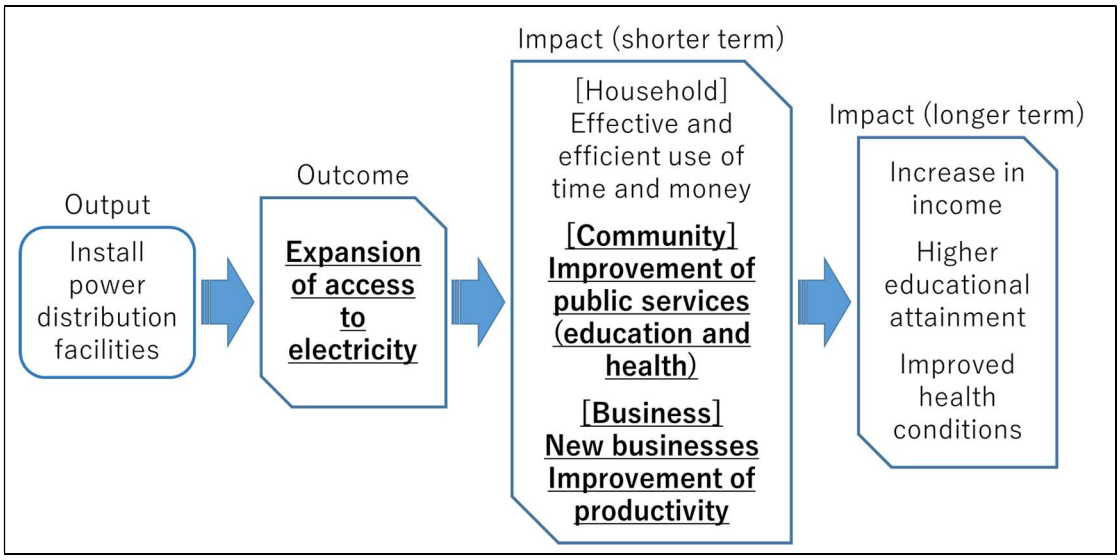


Figure 2 Mechanism of Project Impact

Source: External evaluator based on JICA/Yachiyo Engineering (2006) and Peter and Sievert (2016)
Note: The outcome/impact that is examined in this evaluation report is highlighted using bold and underlined text.

improve public services in educational institutions and health facilities, create new business opportunities, and improve the productivity of existing business by allowing the use of electronic appliances. As a result, in the longer term, electrification can lead to an overall improvement of the living standard, such as increase in household income, higher educational attainment, or improved health conditions.

Based on this understanding, this evaluation examines the project's effect on the "Expansion of access to electricity" in the section on effectiveness and its impact on the "Improvement in public service"[12] and "Stimulation of the local economy" in the section on impact, considering the initial expectation at the planning stage and the availability of data[13]。

3.3.1 Quantitative Effects (Operation and Effect Indicators)

[Expansion of access to electricity]

Table 5 shows the number of cities/towns, educational institutions, and health facilities that gained access to electricity owing to this project[14].

that of electricity (JICA/Yachiyo Engineering 2006).

[12] Although the objective of the project is expressed as "stable management of public institutions," because the basic design report emphasizes the improvement of public services by introducing electronic appliances, the following section examines if the project contributes to the "improvement of services."

[13] In this evaluation, the household-level impact (i.e., the improvement of living standard) cannot be evaluated because a beneficiary survey that focuses on individual beneficiaries was not conducted. In addition, the longer-term impacts are out of the scope of this evaluation because their indicators were not explicitly set in the project plan.

[14] The indicator set at the time of the project planning was "electrification rate in important cities/towns (proportion of important cities/towns electrified to the total number of those specified in each state)." However, it was impossible to evaluate the outcome of the project based on this indicator because there is an inconsistency between the number of cities/towns electrified at the time of project planning (2005), which should be a baseline value in the basic design report, and the ones reported by the state governments. However, "the number of cities/towns electrified by this project" can be regarded as a more appropriate indicator that directly shows the project's effect rather than the "electrification rate," which depends on the denominator.

Table 5 Number of cities/towns, educational institutions, and health facilities electrified by this project

	Cities/towns	Educational institutions	Health facilities
Cross River State (RC and EC)	40	40	5
Akwa Ibom State (IIC)	14	72	9

Source: Answer to the questionnaires by the implementing agencies

The number of cities/towns electrified by this project was 40 and 14 in Cross River State (RC and EC) and Akwa Ibom State (IIC), respectively, and this number is the same as the number of newly electrified cities/towns expected in the project plan. Thus, in terms of expansion of access to electricity, the expected result was actually achieved. The number of beneficiaries of this project (population of cities/towns electrified by this project) is estimated to be 146,000 (29,000 in RC and 117,000 in EC) in Cross River State and 28,000 in Akwa Ibom State.

As for educational institutions and health facilities, although it is impossible to explicitly judge the magnitude of the outcome given that there is no specific target value, the project contributed to the electrification of all institutions and facilities in IIC in Akwa Ibom State and approximately 60% and 10% of educational institutions and health facilities in RC and EC, respectively, in Cross River State.

3.4 Impacts

3.4.1 Intended Impacts

As stated above, this section examines the project's impact on the "improvement of public services" and "stimulation of the local economy." The analysis is based on the result of field visits in two sites (IIC, Akwa Ibom State and RC, Cross River State) conducted by the local consultant with complementary information from Port Harcourt Electricity Distribution Company (hereafter referred to as "PHED"), the entity in charge of O&M of the facilities provided by this project.

[Improvement of public services]

Educational institutions

In the largest secondary school in IIC, electricity is not actually used due to the lack of connection from an electricity grid to classrooms even though electricity has been made available at the entrance of the school, thanks to the project. Although the school staff tried to connect the grid and classrooms, they could not succeed because of the use of an inappropriate connection line. As a result, the school continued to use a generator at the time of the field visit, and thus, no clear benefit was observed. In RC, although an interview with a school was

not possible due to vacation season, because electricity has been suspended in the entire community since 2014[15], it would be difficult to expect positive effects of the project.

Health Facilities

Electricity was made available in the largest hospital in IIC. However, because electronic appliances possessed by the hospital were limited, the hospital staff reported that there were no significant changes from the situation before electrification. As for the facility in RC, because electricity has been unavailable since 2014 at this site as stated above, no positive effect of the project was observed.

[Stimulation of the local economy]

As shown in Table 6, it was confirmed that electrification promoted various small-scale businesses. In addition, the project brought about a positive impact on women because small businesses such as the sale of beverages, restaurants, and the production of palm oil tend to be run by women. However, although there was positive impact in RC post electrification, the impact at the time of the ex-post evaluation was limited due to the suspension of electricity since 2014.

As for the EC where the field visit was not conducted, an interview with PHED shows that PHED suspended electricity supply to EC because the residents had not made bill payments. Thus, the impact of the project in EC is suspected to be negligible.

Table 6 Impact on small-scale businesses

Business	Detail
[IIC]	
Welding business	Before the project, welding which needed a large amount of electricity had to be done in a neighboring city (Uyo), 40–50 km away from IIC. Thus, the transport fee affected the cost of welding services, and business opportunities were missed. Post electrification, because it was no longer necessary to go to Uyo, the cost was lower, which increased the number of customers.
Bars, drink sales	Electrification allowed the use of refrigerators/freezers and the existence of night businesses, which led to an increase in new bar businesses. In addition, there was an increase in the number of drink sale businesses owing to the installation of refrigerators in front of houses.
Palm oil production	Post electrification, it became possible to oil press using machines, which was done manually before electrification. As a result, the production volume and efficiency improved, which, in turn, led to higher income.
Restaurants	Electrification allowed the use of refrigerators and thus, the storage of food. Thus, it became possible to buy materials in bulk, resulting in higher efficiency.

[15] Although detailed information on the direct causes was not available, insufficient electricity supply from the grid and low power voltage due to the long distance between the transformer station and RC are pointed out as the main reasons of the problem in the interview with PHED.

[RC]	
Pharmacy	Post electrification, the introduction of refrigerators allowed the sale of medicines that should be stored at low temperatures. However, at the time of the ex-post evaluation, this pharmacy could sell only those medicines that could be stored at room temperature owing to the suspension of electricity.
Kiosk	Before electrification, generators were used, and profit was negligible due to the cost of fuel for operating the generators. Post electrification, because there was no need to use generators and additional refrigerators were installed, the profit was higher. However, since 2014, it has been inevitable to use generators again due to the suspension of electricity.
Drink sales	Electrification allowed the use of refrigerators/freezers and lights for night businesses, resulting in higher profit. However, at the time of the ex-post evaluation, the profit reduced because people in RC were forced to use generators.

Source: Result of the field visits

3.4.2 Other Impacts

The questionnaires returned by the central and regional governments show no negative impact on the natural environment[16]. As for land acquisition, one case (approximately one hector) in Cross River State and four cases (no information on land size was available) in Akwa Ibom State were reported. Each case was handled in accordance with relevant legal procedures, and no problem was reported. In addition, there was no case of resettlement.

On the other hand, apart from the land acquisition mentioned above, there was an incident regarding land use for material stock related to construction work in Cross River State as discussed in 3.2.2.2. Although this incident was appropriately settled, it lengthened the project period.

As discussed, this project contributes to the expansion of access to electricity and stimulation of the local economy in IIC. However, because its impact is limited at sites other than IIC due to the suspension of power supply, the effectiveness and impact of the project are assessed as “Fair.”

3.5 Sustainability (Rating:①)

3.5.1 Institutional Aspects of Operation and Maintenance

The roles of each entity related to the O&M of the facilities involved in the project, including the FMP at the central level and the rural electrification agency at the state level, are shown in Table 7. At the time of project planning, it was expected that the facilities would be operated and maintained by the Power Holding Company of Nigeria. However, the generation and distribution departments of the company were privatized and spun off into six power generation

[16] An environmental review was conducted in accordance with the law and guidelines in Nigeria prior to project implementation. Based on the review, it was confirmed that the (negative) environmental impact was negligible and thus, an environment impact assessment (EIA) was unnecessary (JICA/Yachiyo Engineering 2006).

Table 7 O&M structure

Entity	Responsibility
FMP	Elaboration of policies and programs of the overall power sector, management of power infrastructure, coordination with government and semi-government agencies under its jurisdiction, coordination with donors, etc.
Rural electrification agency	Implementation of electrification projects, monitoring of projects, O&M by the distribution company, etc.
Distribution company (PHED)	O&M of facilities, retail sales of electricity, collection of bills, etc.

Source: Answer to the questionnaires by the implementing agencies, JICA/Yachiyo Engineering (2015).

companies and 11 distribution companies[17]. As a result, the ownership of the facilities provided by this project was taken over by PHED, and PHED is now in charge of the O&M of the facilities[18].

However, in IIC in Akwa Ibom State, miscommunication among PHED, the rural electrification agency, and community members hampered proper O&M[19]. The division of roles shown in Table 7 has not functioned as expected, which raises concerns about the institutional aspect of O&M.

3.5.2 Technical Aspects of Operation and Maintenance

There are 15 and three technical staff members in the business units covering EC and RC, respectively (Information on IIC was not available.). Although there is no clear information on their technical competence, according to PHED, the number of technical staff members is not sufficient to cover their respective jurisdictional areas.

During the installation work and test operation period of this project, technicians in each site were given on-the-job training. However, in the two sites where field visits were conducted in this evaluation, there was no evidence that these technicians were continuously involved with the O&M of the facilities at the time of the ex-post evaluation. According to PHED, two technicians were assigned in RC since before privatization. However, the record of maintenance was not confirmed in the field visit, and there was no sign that anyone had recently entered the facilities.

Although the facilities and equipment do not require regular maintenance, at least in the short term and no major problem was observed at the time of the ex-post evaluation, the risk with respect to the technical aspect seemed high because it would be difficult to take the necessary measures in the event of breakdown or if the need to replace equipment parts arose in the future.

[17] The transmission department is run by the Transmission Company of Nigeria owned 100% by the central government.

[18] PHED is a 100% private company that covers four states including Cross River and Akwa Ibom States (KPMG Nigeria, 2013).

[19] The facilities are locked by the community members, and thus, PHED staff cannot enter the facilities. Because the facilities are working, electricity is available in IIC.

3.5.3 Financial Aspects of Operation and Maintenance

The price scheme of electricity is determined by the central government[20]. The price varies based on classifications, such as residences and business offices, and the volume of electricity used. Each region has its own price scheme, and in the region where this project was implemented (the jurisdictional area of PHED), electricity price for residences is 4–30 Naira/kWh[21]. The electricity bill is charged in two ways: one is based on the actual amount of electricity used and the other is based on the estimated amount of electricity use[22]; the latter was employed at three sites of this project. Because the amount of electricity bill charged to users was not necessarily consistent with the actual amount of electricity used, there were some complaints from the residents[23] (according to the field visit by the local consultant).

Quantitative information on the financial status of PHED was not available. According to PHED, though there was no problem in the price structure, the low collection rate of electricity bills caused financial challenges. The constraints included theft of electricity, poor understanding on the necessity of bill payment, and the small number of staff members in charge of bill collection compared to its vast jurisdictional area especially in the business unit that covers EC.

3.5.4 Current Status of Operation and Maintenance

The field visit to IIC shows that although there are concerns in the institutional and technical aspects, the facilities were being operated without major problems at the time of the ex-post evaluation. According to the community leader in IIC, while community members are not capable of technical O&M, they take care of the facilities with respect to various aspects, such as the restriction of access (protection against thief). However, it seems that regular inspection of the facilities was not carried out because overgrown bushes were found around the facilities, and it was difficult to approach the facilities without cutting them at the time of the field visit. In addition, any records of maintenance or repair were not confirmed by the field visit. Although the risk at the time of the ex-post evaluation was not obvious because the facilities do not necessarily require regular maintenance, at least in the short term, it is not clear whether necessary measures were taken when repairs or replacement of parts was necessary.

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[20] The price has been periodically revised in consideration of the generation cost, balance of demand and supply, etc.

[21] Although it is difficult to make a direct comparison owing to the differences in classification, the maximum price for residences in 2005 was 8.5 Naira/kWh, implying an increase in the price of electricity. One Naira is equivalent to 0.34 Japanese yen as of August 2016.

[22] In the former way, the amount of bill is determined based on the actual amount of electricity used. On the other hand, in the latter, the amount of bill is estimated based on the size of building, the number of rooms, electronic appliances owned by users, etc.

[23] In fact, the conflict between residents and PHED stemming from dissatisfaction with billing led to the suspension of electricity supply to EC (however, according to PHED, electricity supply is planned to restart because residents in EC have made bill payments). Further, according to PHED, billing based on the estimated amount of electricity used was chosen by the residents themselves.

As for EC and RC, as was pointed out earlier, electricity supply has been suspended and thus, electricity is not available at these sites. In such a situation, problems in the current status of the facilities and equipment, such as the deterioration of unused equipment, were reported in EC.

Thus, there is a serious concern in terms of the current status of O&M.

From the above discussion regarding the O&M of the facilities and equipment involved in this project, several challenges were observed with respect to institutional, technical, and financial aspects and current practices, and thus, there is a serious risk in the sustainability of the project. Hence, the sustainability is assessed as "Low."

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The aim of this project was to ensure stable power supply by procuring and installing power distribution facilities at two sites in Cross River State and one site in Akwa Ibom State located in the southern part of Nigeria, thereby contributing to the improvement of the living standard, stable management of public institutions, and stimulation of local socio-economic activities.

The relevance of this project is considered as "High," because this project is consistent with Nigeria's development policies and needs, which assign high priority to rural electrification, and with Japan's ODA policy as well. The efficiency of the project is assessed as "Fair" because the actual project cost exceeded the planned amount, taking into account the change in output, though the actual project period was as planned. As for the effectiveness and impact, while the project contributed to the expansion of access to electricity, the expected impact (improvement of public services and stimulation of the local economy) was not fully achieved due to the suspension of power supply in some sites at the time of the ex-post evaluation. Thus, the effectiveness and impact of the project is evaluated as "Fair." The sustainability of the project's effect is rated as "Low" because there are concerns regarding the organizational, technical, and financial aspects and current status O&M of the facilities.

In light of the above findings, this project is evaluated as "Unsatisfactory."

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

As pointed out, there are serious problems in the O&M of the facilities at all three sites of this project. It is recommended that the FMP monitor the current status of O&M at each site and examine the current situation (both problems and their causes). Further, it is recommended that the FMP lead a discussion about concrete and realistic remedies among the state governments, PHED, and local communities. More specifically, in cases where there are conflicts between PHED and local communities, the FMP should intervene in collaboration with state

governments and reach out to them to ensure an appropriate O&M structure.

4.2.2 Recommendations to JICA

It is recommended for JICA to reach out to the FMP for actual implementation of the above recommendations.

4.3 Lessons Learned

Confirmation of the necessary conditions for greater project impact

This project aimed at improving public services at educational and health facilities through the expansion of electricity access. However, the field visit in IIC shows that very limited benefits of electrification have been achieved in both educational and health facilities due to the inadequate connection between the grid and classrooms and the lack of electronic medical appliances. For the expected impact to materialize, the necessary conditions (in this case, the connection to classrooms and availability of electronic medical equipment) should be satisfied. At the planning stage, it is indispensable to examine such necessary conditions and reach out to relevant entities so that these conditions are satisfied. If it is found that they are difficult to satisfy, it is necessary to avoid assuming that the necessary conditions have been met and to set realistic objectives.

Confirmation of the prospects of O&M structure after project completion

As already discussed, there are several concerns regarding O&M at each site. Although this project might be exceptional because the changes caused by privatization after project completion were unforeseeable, in general, the O&M structure after project completion should be carefully examined at the planning stage and the project should call on the implementing agencies to ensure appropriate an O&M structure. Because sector reforms, such as privatization and the spin-off of generation, transmission, and distribution, are relatively common in the power sector, particular attention is required for similar projects implemented in countries where public sector reform is in progress.

Consideration for bill collection

The supply of electricity was suspended in EC due to non-payment at the time of the ex-post evaluation. The collection of electricity bills is indispensable for the proper O&M of the facilities. Although the entity in charge of O&M has the primary responsibility for the collection of bills, the project should examine appropriate price setting and ways of charging and collecting bills at the planning and/or implementation stage based on realistic projections to ensure proper O&M after the completion of the project. More specifically, if the willingness of the potential users to pay is low, one option would be to incorporate soft component activities, such as raising

awareness and support, to make an agreement between the O&M entity and residents about the manner in which electricity bills are charged and collected[24].

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[24] For example, in rural water supply projects supported by the grant aid scheme, it is common to incorporate soft component activities in the project design, which facilitate understanding on the importance of covering the cost of O&M and supporting appropriate price setting or ways of fee collection.