Ex-Post Project Evaluation 2016:

Package II-5 (Uganda, Congo, Rwanda)

January 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

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Republic of Uganda

FY2016 Ex-Post Evaluation of Technical Cooperation Project

"Technical Assistance Support to Sustainable Irrigated Agriculture Development Project in Eastern Uganda"

External Evaluator: Isao Dojun, Chuo Kaihatsu Corporation

0. Summary

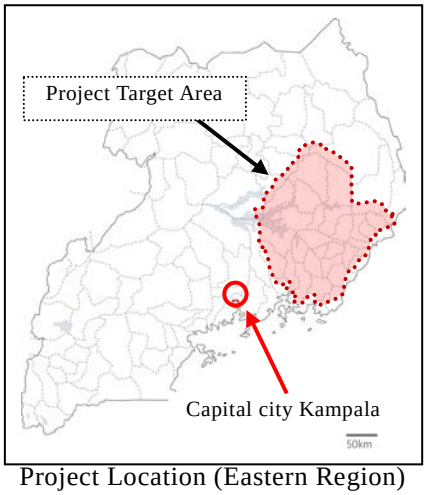
The Project has been conducted by the Ministry of Agriculture, Animal Industry and Fisheries (hereinafter referred to as "MAAIF") as the implementing agency and has been targeted at agricultural officers and smallholders in 22 districts of Eastern Region of Uganda with the aim to increase the productivity and production of rice of smallholder farmers through training and extension of irrigated rice cultivation techniques.

Specifically, the agricultural officers from the 22 districts received training on techniques of irrigated agriculture, usage of appropriate agricultural machinery, marketing and organizing farmers' groups and so on. By enhancing the capability of agricultural officers necessary for training and extending the irrigated rice cultivation techniques and also strengthening the extension system, the Project supported the training of irrigated rice cultivation techniques by trained agricultural officers to smallholder farmers.

The Project, aims to increase rice production and productivity, holds a high relevance as it is consistent with the Ugandan development policies and development needs at the times of planning and project completion and also the Japan's ODA policy at the time of planning. The Project Purpose has been achieved, while the Overall Goal is predicted to have been achieved, however it cannot be fully confirmed quantitatively and qualitatively. Therefore, the effectiveness and impact are evaluated as fair. Since the Project cost is within the plan and the Project period is as planned, the efficiency of the Project is high. As an organizational issue, there is a need to reinforce the stationing of agricultural officers. As a technical issue, there is a need to implement training on irrigated rice cultivation for the newly recruited agricultural officers, and as financial aspect, there is a need to increase the budget especially for extension activities. In other words, there are partial problems in organizational, technical and financial aspects; therefore, the sustainability of the effects manifested by the Project is evaluated as fair.

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

1. Project Description



Project Location (Eastern Region)

Irrigated Rice Cultivation
(Project Site in Nakaloke Sub-country, Mbale District)

1.1 Background

Agriculture is a key industry of Uganda. It contributes to about 20% of GDP, 48% of export earnings and employs about 73% of the labor force. The Government of Uganda (hereinafter referred to as "GoU") has been implementing poverty reduction policies based on the *Poverty Eradication Action Plan* (hereinafter referred to as "PEAP" [1])(revised versions 2004/5-2007/8). It is especially considered that the agricultural is an essential sector for attaining two subjects (economic management, and production/competitiveness/income) among five important subjects[2] described in the PEAP. GoU also prepared *Plan for Modernisation of Agriculture* (PMA[3]) as a sector program, which aims to shift over the commercial farming.

There are many wetlands, and paddy rice cultivation is popular in the Eastern Region. However, most of small-scale farmers practice extensive paddy rice cultivation (using floodplain and depending on rainwater), and they do not adopt well the basic rice cultivation techniques such as appropriate land preparation, selection of rice seeds, line planting[4], weeding, and harvest at appropriate timing etc. There were many irrigation and drainage schemes where operation and maintenance of facilities in the scheme were not appropriately carried out and there were many places where rehabilitation was necessary. Then, difficulties on securing stable irrigation water and irrigation water management during cropping season were the main obstacles for stable or increased rice production.

In this circumstance, GoU requested the Government of Japan (hereinafter

[1] The first edition was established in 1997.
[2] 1) economic management, 2) production/competitiveness/incomes, 3) human resources development, 4) security, conflict resolution and disaster management, 5) governance
[3] Issued in 2000
[4] The method in which the young rice plant is planted in one line in paddy field.

referred to as “GoJ”) to conduct a study necessary for developing irrigated agriculture which targets paddy rice cultivation in the Eastern Region of Uganda. Thereafter, Japan International Cooperation Agency (hereinafter referred to as “JICA”) supported implementation of the “Study on Poverty Eradication through Sustainable Irrigation Project in Eastern Uganda” from November 2003 to March 2007. During this study, a verification study on simple paddy rice cultivation techniques which are adaptable on conditions in the Eastern Region (where paddy rice cultivation is widely practiced) and paddy rice production skills were transferred to the Ugandan counterpart personnel.

After the completion of the study, GoU evaluated the results of the study and GoU requested to GoJ implementation of a technical cooperation project for improving irrigated rice cultivation techniques and extension system in the 22 districts in the Eastern Region. This three-year technical cooperation project started June 2008 and ended in June 2011.

1.2 Project Outline

Overall Goal		Rice production is increased in the districts in the Eastern Region of Uganda
Project Purpose		Production and productivity of rice are increased through introduction of sustainable irrigated agriculture techniques in the Project Sites[5].
Output(s)	Output 1	Capacities necessary to provide training and extension on irrigated rice production techniques to the smallholders are developed among the District Agricultural Officers (DAOs) in the target area.
	Output 2	Irrigated rice cultivation techniques are promoted among smallholders in the Project Sites.
Total cost (Japanese Side)		328 million yen
Period of Cooperation		June 2008 – June 2011
Implementing Agency		Ministry of Agriculture, Animal Industry and Fisheries
Other Relevant Agencies/		1) National Agricultural Research Organization (NARO), 2) National Crops Resources Research Institute (NaCRRI)

[5] These are sites where training and demonstration plots are prepared for irrigated rice cultivation. This is where the training for farmers was conducted. During the Project period, a total of 59 Project Sites were set up in 21 districts out of 22 in the Eastern Region. (Partly the upland sites and wetland verification sites are included.) In one (1) district (Amuria District), the district environmental officer worried that if the paddy rice cultivation spreads farmers may exploit wetlands illegally and did not approve of establishing the Site, so the Project Site was not set up.

Organizations	3) National Agricultural Advisory Services (NAADS) 4) District agricultural offices and offices of sub-county in the Eastern Region
Supporting Agency/ Organization in Japan	None
Related Projects	[Technical Cooperation] - Study on Poverty Eradication through Sustainable Irrigation Project in Eastern Uganda (2003-2007) - NERICA Rice Promotion Project in Uganda (2008-2011) - Promotion of Rice Development Project (2011-2018) - Project on Irrigation Scheme Development in Central and Eastern Uganda (2014-2017) [Grant Aid] - The Project for Construction of Rice Research and Training Centre (March 2009)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

While the national average rice yield per unit area in Uganda was 2.4 t/ha in 2008, the achievement in the Project Sites was 1.5 times as much, that is, 3.6 t/ha (2009 or 2010[6]) reaching the target value. Not only the increase of yield per unit, but also the expansion of the area under rice cultivation (approx. 63.5 ha) by the farmers who received training, and the increase of production area by promoting the techniques to other farmers (112 ha) have been reported. Also, preparation of the final version of Group Training program[7] was completed and the Field Training program[8] was also in the finalizing stage. From the above, it was evaluated that there was a high probability for the Project Purpose to be achieved.

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

The example cases of extension among farmers had already been reported, including the presence of agricultural officers who have acquired the irrigated rice

[6] Since the training period using training/demonstration plots differed among Project Sites, it is mentioned as the year 2009 or 2010.
[7] A four-day training course with a program on irrigated rice cultivation mainly targeted at agricultural officers and key-farmers was undertaken. The venue of training was NaCRRI.
[8] The training program for farmers which uses training/demonstration plots at the Project Sites. A total of four times (about half a day each) according to the growth stages (plot preparation, rice nursery and seeding, transplanting, and harvesting) were carried out.

cultivation techniques in almost all of the districts in the Eastern Region, and the fact that the farmers who have participated in the Project were offering technical instruction to other farmers. Therefore, an increase of rice production after the cooperation period had been predicted. Also, 260 promising water sources were identified as a result of investigating a little over 400 water sources in 14 districts out of 22 districts. From this, it was evaluated that the achievement of the Overall Goal was strongly expected even after the period of cooperation if the stakeholders continue to make efforts for further expansion of the outcomes of the Project.

Other impacts were also seen such as income increase and improvement of the livelihood of farmers due to the increase of rice production (rebuilding their houses, earning education fees for children and medical expenses for families and buying bicycles, motorbikes and other durable consumer goods) and some organizational activities by farmers (joint work of irrigated rice cultivation and product sales by mutual aid).

1.3.3 Recommendations from the Terminal Evaluation

(1) Items to be completed before the end of the Project

A workshop is to be held for the agricultural officers and farmers who have participated in the activities to share their experiences. An investigation of the yield of the rice harvested at the Project Sites after the Terminal evaluation is to be carried out. Overall wrap-up of the outputs of the Project would take place.

(2) Items to be implemented after the end of the Project

a. Efforts for continuing the training and exhibition activities targeted at farmers (Sufficient budgetary measure for rice cultivating technique instruction and extension activities)
b. Promotion of consultation by related organizations on the productive usage of wetlands (The future maintenance and management of wetlands and their sustainable usage are to be discussed further among related organizations including working-level personnel.)

2. Outline of the Evaluation Study

2.1 External Evaluator

Isao Dojun, Chuo Kaihatsu Corporation

2.2 Duration of Evaluation Study

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

Duration of the Study: September 2016 – January 2018

Duration of the Field Study: January 15, 2017 – March 3, 2017 and May 1, 2017 – May 14, 2017

2.3 Constraints during the Evaluation Study

In order to evaluate the achievement of the Overall Goal with numerical data, rice production data in each district is necessary. There are statistical data of at the national annual rice production level; however, data at the district level does not exist. (The production data by district are collected only at the time of agricultural census. The most recent census was conducted in 2008, and before that, in 1990.) Also, according to the hearing surveys from rice-related officials at MAAIF and rice cultivation researchers at NaCRRI, the credibility of the national annual rice production data was not regarded as high. Therefore, it was difficult to judge and evaluate based on reliable rice production data.

3. Results of the Evaluation (Overall Rating: B[9])

3.1 Relevance (Rating: ③[10])

3.1.1 Consistency with the Development Plan of Uganda

At the time of the planning, PEAP (revised versions 2004/5-2007/8) had presented national strategies for agricultural modernisation and employment creation and also the poverty eradication action plan. In the PMA based on PEAP, the rice cultivation was identified as an effective means to improve the income and the living standards of poor farmers and to better secure food security. At the time of project completion, agriculture was recognized as one of the most important sectors in the *National Development Plan (2010-2014)*. Furthermore, the *Development Strategy and Investment Plan* (DSIP: 2010/11-2014/15) placed high importance on rice production increase and productivity improvement, reinforcement of extension capability and extension system. Also, the *Uganda National Rice Development Strategy 2009-2018* (hereinafter referred to as "UNRDS") had held up the target of increasing the rice production by 3.8 times in ten (10) years. Therefore, the Project holds a high consistency with the national development policies and agriculture-related policies at the time of planning and project completion.

3.1.2 Consistency with the Development Needs of Uganda

At the time of planning, rice was starting to establish itself as the staple food in Uganda. As it had higher market value compared to maize and other crops, there was high motivation towards rice cultivation among farmers. In the Eastern Region of Uganda, there was the need for utilizing the water resource and promoting the irrigated rice

[9] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[10] ③: High, ②: Fair, ①: Low

cultivation which enables stable and high yield. The terminal evaluation report[11] stated that the increasing demand of rice has led to the rising importance of rice as food crop not only as cash crop and also that the irrigated paddy rice cultivation techniques introduced by the Project was low-cost so that it could be easily applied by farmers. Therefore, the contents of the Project were an appropriate response to the needs of targeted areas and the rice crop farmers who are to benefit. In summary, it can be evaluated that the Project was consistent with the Ugandan development needs at the time of planning and completion.

3.1.3 Consistency with Japan's ODA Policy

At the time of planning, the basic policy of the Japanese Official Development Assistance (hereinafter referred to as "ODA") for Uganda (Ministry of Foreign Affairs Country-wise Data Book, 2008 version) had identified agricultural development (promotion of rice and increasing added value of agricultural products) as one of the priority areas. Also, one of the goals held up at the fourth Tokyo International Conference on African Development (TICAD IV: 2008) was to "promote rice production with the aim to double it in African countries in the coming decade, through a systematic crop management method and capacity development to adopt new methods such as expanding the use of New Rice for Africa (hereinafter referred to as "NERICA")". Here, we can see the consistency with the Project.

Furthermore, JICA launched the Coalition for African Rice Development (hereinafter referred to as "CARD") with other donors in 2008. With the aim of doubling the African rice production from 14 million tons to 28 million tons by 2018, JICA has been supporting to shape the national rice promotion strategies of CARD participants (23 countries, Uganda is one of them) and aiding to increase rice production according to the strategy of each country. Therefore, the Project shows high consistency with Japan's development aid policies at the time of planning.

This project was highly relevant to the development plan and development needs of Uganda, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Effectiveness and Impact[12] (Rating: ②)

3.2.1 Effectiveness

3.2.1.1 Project Output

(1) Status of Achievement of Output 1

Output 1 is to have the "Capacities necessary to provide training and extension on irrigated rice production techniques to the smallholders are developed among the District Agricultural Officers (DAOs) in the target area", for which two indicators have

[11] The terminal evaluation was conducted in April 2011, two months before the Project completion (June 2011). Therefore, information obtained at the terminal evaluation can be regarded as situation at the Project completion.

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

been set up.

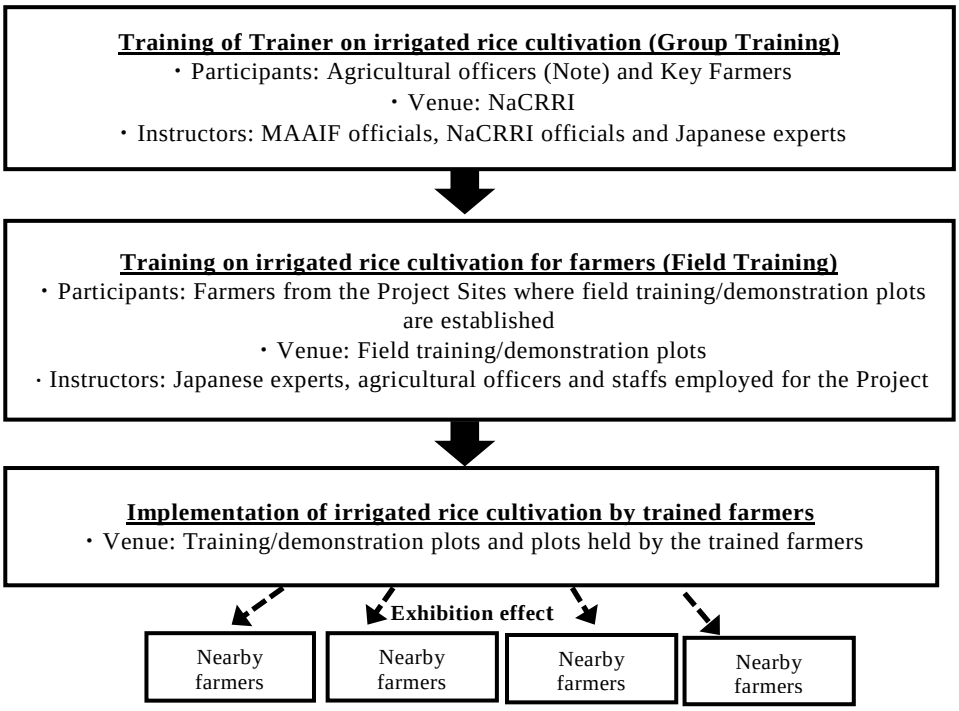
As shown in Table 1, both indicators have been achieved at the time of project completion. In other words, the training program on irrigated rice cultivation techniques for agricultural officers has been developed, the agricultural officers in the target area received the training, and later, they actually implemented the extension activities to farmers. Through these, it can be judged that the capacities of agricultural officers on training and extension on irrigated rice production have been enhanced, thus Output 1 has been achieved.

For reference, Figure 1 shows the flow of dissemination of irrigated rice cultivation techniques in the Project.

Table 1: Status of Achievement of Indicators for Output 1

Output	Indicators (Target)	Achievement at the Time of Project Completion	Status of Achievement
Capacities necessary to provide training and extension on irrigated rice production techniques to the smallholders are developed among the District Agricultural Officers (DAOs) in the target area.	1-1 Training program on irrigated rice cultivation techniques for DAOs is developed	Group training program for agricultural officers and key farmers had been already finalized at the time of terminal evaluation.	Achieved
	1-2 More than 60% of the trained DAOs disseminate the irrigated rice cultivation techniques to the smallholders in the target area.	Group training for agricultural officers and key farmers have been implemented 22 times in total with a gross total of 319 participants (189 agricultural officers/ agricultural officers, 112 key farmers and 18 others). According to the questionnaire implemented during the Project period, 48 agricultural officers (98 %) out of 49 valid respondents are engaged in instruction of irrigated rice cultivation techniques to the farmers in respective area. The ratio exceeded the target indicator (60%). Furthermore, 18 agricultural officers (37 %) out of 49 established training/demonstration plots just like in the Project Sites and have instructed to farmers.	Achieved

Sources: Terminal evaluation report and documents provided by JICA



Note: Agricultural officers are placed at district agriculture offices or sub-county offices. They belong to NAADS or MAAIF.

Figure 1: The extension flow of irrigated rice cultivation techniques in the Project

(2) Status of Achievement of Output 2

Output 2 is to have "Irrigated rice cultivation techniques are promoted among smallholders in the Project Sites", for which two indicators have been set up. As shown in Table 2, the two indicators have been achieved at the time of Project completion. Field trainings for farmers have been implemented at a total of 59 Project Sites in 21 among 22 districts in the Eastern Region. The cumulative total of 817 farmers, which considerably exceeded the target number of 440, received the training by the completion of the Project, 66% of which actually applied irrigated rice cultivation techniques. Establishing the Project Sites (training and demonstration plots) and extending the irrigated rice cultivation in a pilot plot way have achieved a major effect. Therefore, it is confirmed that Output 2 has been achieved.

Table 2: Status of Achievement of Indicators for Output 2

Output	Indicators (Target)	Achievement at the Time of Project Completion	Status of Achievement
Irrigated rice cultivation techniques are promoted among smallholders in the Project	2-1 More than 440 smallholders participate in the Field Training.	Field training for irrigated rice cultivation (partly including upland sites and wetland verification sites) has been conducted at a total of 59 Project Sites in 21 districts among 22 in the Eastern Region. The gross total number of participants is 817, exceeding the target number of 440.	Achieved

Sites	2-2 At least 220 smallholders apply the irrigated rice cultivation techniques.	Out of a gross total of 817 farmers who have received the training, 540 farmers (66%) have already been applying irrigated rice cultivation techniques. Therefore, the number of farmers that apply the irrigated rice cultivation techniques has surpassed the target number. The terminal evaluation report states that the farmers at the Project Sites appreciated the effects of the techniques trained in the Project and were eager to apply the techniques. Also, from the interviews with farmers made at the terminal evaluation, it is reported that farmers highly evaluated the effects of new techniques such as less seed requirements, reduction of weeding labor, and increase of yields. The trainings of irrigated rice cultivation techniques for smallholders were conducted at training/demonstration plots, 4 times in total during one cropping season, according to the growth stages. Specifically, these four periods are: 1) land preparation, 2) rice nursery and seeding, 3) transplanting and 4) harvesting. The training was not planned to study all cultivating techniques from plot preparation to post-harvest treatment in one training, but rather to learn by actually implementing the techniques at important periods of rice cultivating cycles and thereby learn techniques. Also, it was easy to confirm the effects of training by the growth situation and yields of rice. These points contributed to the establishment of techniques among farmers.	Achieved

Sources: Terminal evaluation report and documents provided by JICA

3.2.1.2 Achievement of Project Purpose

The Project purpose is to see that “production and productivity of rice are increased through introduction of sustainable irrigated agriculture techniques in the Project Sites.” As preparation of the field training program for smallholders was completed and the sustainable irrigated rice cultivation techniques were introduced through training, there were 1.5 times more yields (3.6 t/ha) in the Project sites compared to the average yield in 2008 (The rice productivity increased.) Also, as the trained agricultural officers extended the techniques to farmers, the target area saw the extension of techniques (The production increased.)

As shown in Table 3, all indicators have been achieved by time of Project

completion. It is confirmed that the Project purpose to increase rice productivity and production through introduction of sustainable irrigated agriculture techniques has been achieved.

Table 3: Achievement of Project Purpose

Project Purpose	Indicator	Achievement at the Time of Project Completion	Status of Achievement
Production and productivity of rice are increased through introduction of sustainable irrigated agriculture techniques in the Project Sites.	1. Rice yield per unit area is increased at least to 1.5 times more in the Project sites compared to baseline figure in the UNRDS in 2008.	Rice yield per unit area in the UNRDS in 2008 was 2.4t/ha on average. Yield surveys were carried out during the Project period. Specifically, the data from 30 out of 54 Project Sites (at the time of the terminal evaluation) were derived. The data of yield per unit area ranged from 0.5 t/ha to 7.6 t/ha and it was 3.6 t/ha on average. The performance yield per unit area of the Project sites (3.6 t/ha) is 1.5 times more than the average of 2.4 t/ha in 2008. Therefore, the indicator 1 has been accomplished.	Achieved
	2. More than 110 ha of farmlands are planted with rice with application of the techniques introduced by the Project in the areas covered by the trained district agricultural officers (DAOs).	The area in which the techniques introduced by the Project have been applied is 109 ha in the areas around the Project sites. According to the investigation targeted at agricultural officers, the cultivation techniques have been applied to approximately 112 ha of farmlands outside the areas of Project sites. Therefore, the indicator 2 has been achieved.	Achieved
	3. Training programs on rice cultivation techniques suitable to specific local conditions for smallholders are identified.	The field training program which is the training program for smallholders has been finalized by the time of project completion. Therefore, the indicator 3 has been achieved.	Achieved

Sources: Terminal evaluation report and documents provided by JICA

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

As the smallholders in the Project sites of the Project acquired and implemented appropriate irrigated rice cultivation techniques, their rice productivity and production increased. The rice cultivation areas of the farmers who received training expanded; at the same time, the irrigated rice cultivation techniques were extended to the farmers in the vicinity so that new farmers started to grow rice. After the Project completion, the "Promotion of Rice Development Project" (hereinafter referred to as "PRiDe Project") started, in which the training for agricultural officers and that for farmers were implemented nationwide. The training were conducted in approximately half of the

districts in the Eastern Region, which have contributed to the increase of irrigated rice cultivation and upland rice cultivation farmers and growth of rice production in the region. Since there is no statistical data for rice production by district and it is difficult, at the time of ex-post evaluation, to confirm how much the rice production has increased in the Project target area (Eastern Region), the level of achievement was verified by beneficiary survey [13], interview surveys and national rice production statistics. It has been acknowledged from the information confirmed qualitatively that the rice production in the Eastern Region has increased; however, there is no sufficient proof whether the target value has been achieved. Therefore, the achievement level of Overall Goal is evaluated as fair.

Table 4: Achievement of Overall Goal

Overall Goal	Indicator	Actual
Rice production is increased in the Districts in the Eastern Region of Uganda.	Rice production in the Districts in the target area is increased 1.5 times more compared to the time of commencement of the Project by the year 2014.	There is no statistical data on rice production by districts. From the results of the beneficiary survey, the rice production before receiving the training was 0.98 tons per farmer/household, which almost doubled to 1.83 tons per farmer/household after the training (in average). (The farmers who have not received training showed production of 1.08 tons per farmer/household, which slightly surpassed that of the participating farmers before receiving the training.) Also, judging from the results of hearings from agricultural officers [14] and rice millers' staff members [15] (See Tables 5 and 6), it is certain that the number of rice farmers and the production of rice are increasing in the Eastern Region as a general trend. It is confirmed that the number of rice millers has steadily increased during the last 5 years (See Table 7). However, since the information from the officers at the district agricultural offices and rice milling staff members are not in accordance with any records or data, there is no way to assert that the production has increased by more than 1.5 times. In addition, as for the Ugandan national rice production data, it was 177,857 tons at the time of the start of the Project and 237,000 ton in 2014, which is 1.3 times more, but not reaching 1.5 times.

[13] Ten districts out of 22 in the Eastern Region were randomly selected (by using the random formula of Excel software) for the beneficiary survey. One Project Site was chosen for each district to conduct questionnaire survey from 12 farmers. In 1 Project Site, however, the number of farmers did not reach 12, so the questionnaire survey was conducted in a Project Site in another district. Therefore, the number of districts surveyed was 11. Questionnaire surveys were targeted at irrigated rice cultivating farmers in the vicinity of the Project Site location. (The information on irrigated rice farmers was obtained from influential people in the area where the Project Site is located, after then, hearings were made from those farmers who could be interviewed on the day of survey, including both farmers who have received training and those that did not.) 175 farmers were surveyed and the valid respondents are 175, too. 135 farmers (77 %) were those who had received the Project's training and 40 (23 %) were those who had not received the training. 125 farmers (71 %) were male and 50 (29 %) were female. The 11 districts surveyed were Budaka, Butaleja, Iganga, Kumi, Manafwa, Mayuge, Mbale, Namutumba, Pallisa, Sironko and Tororo.

[14] Hearings were conducted at 10 district agricultural offices out of 11 districts where the beneficiary survey was carried out. Hearings were conducted to 1 or 2 officer(s) at each district (17 officers in total).

[15] Hearings were conducted at rice millers located in 8 districts (one location in each district) out of 11 districts where the beneficiary survey was carried out.

Table 5: Results of Hearings from District Agricultural Offices on the Changes in Rice Cultivation Areas and the Number of Rice Farmers

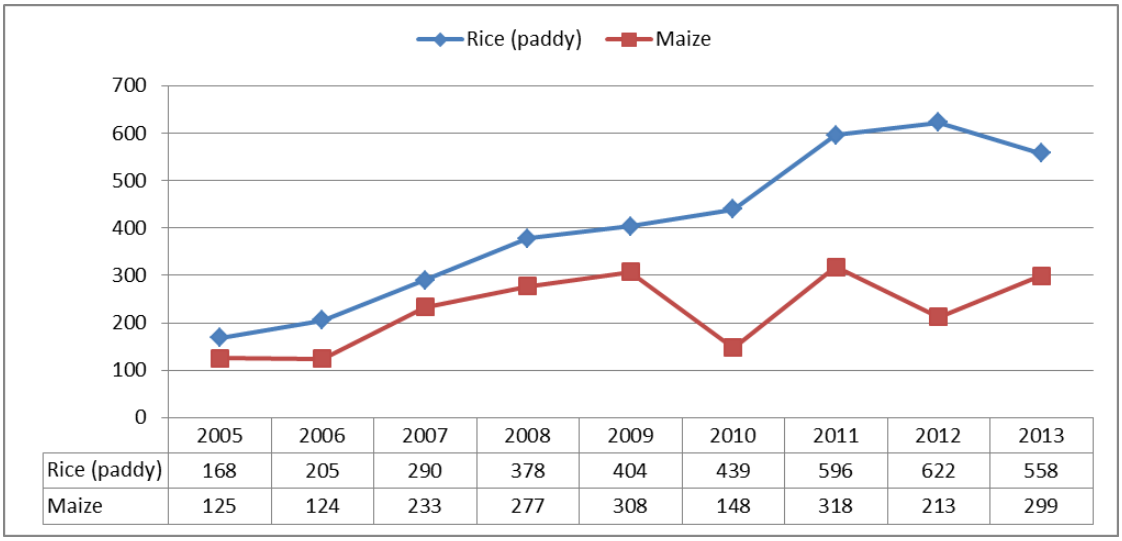
	District	Rice cultivation areas	Number of rice farmers
1	Mayuge	[Prominently increased] - The rice cultivation areas in the district are prominently increasing. - Rice cultivation is found in most of the wetlands.	[Increased] - Even if there is an influence of climate change, harvest is possible to some degrees. So, many farmers are growing rice utilizing the wetlands.
2	Iganga	[Increased] - The rice cultivation area has increased due to the following two reasons: 1. Rice is a crop with a market and stable price (See Figure 2), thus an important source of income for the family budget compared to other crops (maize and sweet potato). 2. The staple food so far had been maize, sweet potato and cassava, but since they are influenced by climate changes (drought), the importance of rice as a staple food is increasing. - After this JICA Project was completed, the rice cultivation area increased prominently. At present, rice is cultivated in most of the wetlands.	[Increased: about 200 %] - The number of farmers who apply irrigated rice cultivation is increasing. It is estimated to have doubled approximately. Many farmers are going into the wetlands and cultivating rice. - Rice can be cultivated in wetlands and even if there is an influence of climate change, harvest is possible to some degrees. Therefore, farmers are willing to apply irrigated rice cultivation.
3	Namutumba	[Increased: approx. 10 to 30%] - There are many places suitable for irrigated rice cultivation, and the cultivation area is increasing. In comparison to 2008/09, an increase of 10 to 30% is estimated. Rice is one of the most important crops in the district, and its productivity is prominently increasing.	[Increased: approx. 10%] - Rice farmers should have increased by approx. 10%. Although there is no accurate data, rice farmers are estimated to be approx. 10,000 households.
4	Butaleja	[Increased: approx. 50%] - The rice cultivation area in the district increased by approx. 50%. - Most of the wetlands were developed for rice cultivation. About 50% of the wetlands were used for rice cultivation at the time of training in the Project; at present, all areas of wetlands are used for rice cultivation.	[Increased: approx. 40%] - Irrigated rice cultivation farmers have increased by approx. 40%.
5	Budaka	[Increased: approx. 40%] - In all areas of the district, the irrigated rice cultivation areas are increasing. The rice cultivation area is estimated to have increased by approx. 40%. However, since the wetlands have been utilized to the maximum with rice cultivation, there is a problem in getting more usable farmlands for expanding the cultivation area. From now on, there is a need to increase the productivity (yield) in the	[Increased: approx. 50%] - Since the fertile soils in wetlands are better than those in uplands, the irrigated rice cultivation farmers are increasing. The rice farmers have increased by approx. 50%. There are some farmers who rent the farmland in wetlands far away from their house and conduct rice cultivation.

		existing rice farmlands. - For the upland rice, the problem of parasitic plant has emerged. Therefore, there is a shift from upland rice to paddy rice.	
6	Tororo	[Increased] - The rice cultivation area in the district has increased. Before the Project was implemented, there were not many wetlands with rice cultivation. At present, rice cultivation is implemented in most of the wetlands.	[Increased: approx. 30%] - The number of irrigated rice cultivation farmers (households) has increased by about 30%. Farmers are focusing on rice cultivation which can be a constant source of income, and are going into the wetlands. Rice is an important crop for income and food. - On the other hand, the number of upland rice farmers has not risen very much due to climate risk.
7	Mbale	[Increased: approx. 50%] - The rice cultivation area in the district has increased (approx. 50%). Most of the increase is in wetlands (Most wetlands were developed for rice cultivation). Upland rice farmers are affected by drought.	[Increased: approx. 40%] - The number of irrigated rice cultivation farmers (households) has increased (approx. 40%). - In this district, the rice is one of the important crops. The farmers in the area of high altitude are coming to the wetland to cultivate rice. The reasons for the increase of rice farmers are the price stability of rice and the existence of a market compared to other crops.
8	Manafwa	[Not increased very much] - The upland rice cultivation area is decreasing because the yield of upland rice is low. On the other hand, the area of irrigated rice cultivation is still limited.	[Not increased very much] - The farmers are highly interested in rice cultivation. However, as there are little wetlands, increase in the number of farmers is limited.
9	Sironko	[Increased] - Most of the wetlands in the district have been developed for rice cultivation and rice is grown. Some farmers are looking for wetland in other districts in order to conduct irrigated rice cultivation.	[Increased] - Because of its high profitability, many farmers are engaged in rice cultivation. There are farmers who rent the land to cultivate rice.
10	Kumi	[Had increased] - The rice cultivation area had increased until the drought damaged the rice last year.	[Increased] Many farmers are cultivating rice as a cash crop.

Source: Result of the hearing survey from the staffs at the district agricultural offices (at the time of ex-post evaluation)

(Note: This information was achieved by visiting each district agricultural office and asking one or two staffs about the recent trend (of approx. past 5 years). The information on increase rate is according to the respondents' subjective information, and not based on records.

(Unit: US Dollars/ton)



	2005	2006	2007	2008	2009	2010	2011	2012	2013
Rice (paddy)	168	205	290	378	404	439	596	622	558
Maize	125	124	233	277	308	148	318	213	299

Source: Data from *Technical Note: analysis of price incentives for Rice in Uganda for the time of 2005-2015, FAO* and *Technical Note: analysis of price incentives for Maize in Uganda for the time of 2005-2015, FAO* have been used to draw this graph.

Figure 2: The change in prices of rice and maize at farm-yard level

Table 6: Result of the Hearing Survey from Rice Millers on Changes of Rice Production and the Number of Rice Farmers

	District	Rice production	Number of rice farmers
1	Mayuge	Increased: approx. 50%	Increased: approx. 20%
2	Iganga	Increased: approx. 10%	Increased
3	Butaleja	Increased	Increased
4	Budaka	Increased	Increased
5	Tororo	Increased	Increased
6	Mbale	Increased	Increased
7	Sironko	Increased	Increased
8	Kumi	Increased	Increased

Source: Result of the hearing survey from the rice millers (at the time of ex-post evaluation)
(Note: This information was achieved by asking rice millers' staff members about the trend of recent years. The information on increase rate is according to the respondents' subjective information, and not based on records.)

There were 22 districts in the Eastern Region at the time of the start of the Project; however, the number has increased to 32 at the time of ex-post evaluation, according to the division of districts due to population growth. Table 7 summarizes the result of hearing surveys conducted at 8 rice millers in 8 districts. Five (5) out of 8 have been established after project completion (from 2012 on). Also, 7 out of 8 have responded that privately managed rice mills are increasing in recent years. Generally speaking, rice mills increase when the rice brought into the rice millers shows such an increase that the

capacity at the existing rice mills cannot handle the milling (in other words, when the waiting time for rice milling becomes longer). According to the hearings from rice millers, the reasons for the increase in the number of rice mills are the increase of rice cultivating farmers and the growth of rice production[16]. Although these hearings do not provide quantitative data of how much the rice farmers and rice production has increased, it sufficiently suggests that there is a possibility of prominent increase in rice production.

Table 7: Changes in the Number of Rice Millers in Recent Years

	District	Location of the rice miller (private) where a hearing was conducted	Year of start-up and number of employees *1	Number of rice mills in the vicinity of the rice mill where a hearing was conducted *2	Change in the number of rice mills in recent years (Number in parenthesis is the increased number of rice mills from 2012 and on, after project completion)*3
1	Mayuge	Town Council	**2012** (19)	3	Increased (1)
2	Iganga	Town Council	**2012** (13)	3	Increased (1)
3	Butaleja	Town Council	2010 (4)	8	Increased from 2 to 8 in the past 5 years (6)
4	Budaka	Kamonkoli S/C	**2014** (9)	6	Increased from 2 to 6 in the past 3 years (5)
5	Tororo	Western Division S/C	2007 (3)	5	Increased from 2 to 5 in the past 5 years (3)
6	Mbale	Mbale town	**2012** (8)	15	Increased from 11 to 15 in the past 5 years (5)
7	Sironko	Town Council	**2014** (21)	0	Increased from 0 to 1 (Only 1 in the district) (1)
8	Kumi	Town Council	2008 (5)	7	Increased from 5 to 7 last year (2)
number of employees per rice miller (in average)			10.25		Increased by 24 locations on and after 2012 onward 24 locations.

*1 Including both regular staffs and seasonal employment.
*2 Excluding the rice mill where the hearing was conducted.
*3 Including the rice mill where the hearing was conducted, if it was established from 2012.

3.2.2.2 Other Positive and Negative Impacts

(1) On gender aspect

In the beneficiary survey, we asked if it is a male or female who does the majority of the farm-work for rice cultivation (land preparation, seeding, fertilization and pesticide spraying, weeding, harvesting and marketing/rice sales). The results are shown in Table 8. While the marketing is taken charge of by male in higher percentage, other farm-works are taken charge of by both male and female to the degree as high as about 80%.

[16] The rice mills visited were small-scaled, and mill the rice brought in from rice farmers in the neighborhood. They are not the type of mills to process imported rice.

Table 8: Ratio of Male and Female Engaged by Types of Farm-work

(%)

Types of farm-work	Male	Female	Both Male and Female
Land preparation	12.6	7.4	80.0
Seeding	10.3	8.0	81.7
Fertilization and pesticide spraying	13.2	7.5	79.3
Weeding	10.3	8.0	81.7
Harvesting	10.3	7.4	82.3
Marketing (rice sales)	43.7	13.8	42.5
Average	16.7	8.7	74.6

Source: Result of beneficiary survey at the ex-post evaluation period (sample size: 175 households)

Table 9 shows the result of survey who in the household decides how to spend the income gained from rice sales. The highest percentage was the case where both husband and wife make decision, with 63.2%. The second highest was the husband with 22.4%.

Table 9: Decision Maker on How to Spend the Profit

Decision maker	Respondents	Percentage (%)
Husband	39	22.4
Wife	21	12.1
Both husband and wife	110	63.2
Other members of family	3	1.7
Unknown	1	0.6
Total	174	100.0

Source: Result of the beneficiary survey at the ex-post evaluation (sample size: 175 households, 174 valid respondents for this question)

According to the hearings from farmers, rice cultivation requires more labor than cultivating other crops. When they cover that labor with outside laborers, the labor cost will run up, so farmers would try to manage labor within their family as much as possible. As a result, females engage in farm-work jointly with males. Farmers say that this has led to women's having more say in decision making. Out of the 175 households of farmers interviewed in the beneficiary survey, about half of them were those who started irrigated rice cultivation after the beginning of the Project. It is possible to say that at least in the farming households that newly started rice cultivation, the degree of participation for the female in decision-making is increasing through engaging in farm-works for rice cultivation gender-equally.

(2) Impact on better livelihood of farmers

Of the farmer households that were interviewed in the beneficiary survey, 52.7% of households responded that their rice sales income covers 75% or more of their gross income, which shows that in many farmer households, the percentage of rice sales income out of gross income is high. When comparing the income from rice cultivation of the farmers who participated in the training and those who did not, the former showed 1.78 million Ugandan Shillings (approx. 57,000 Japanese Yen[17]) (per cropping season) and the latter 1.30 million Ugandan Shillings (approx. 41,000 Japanese Yen). There is 0.48 million Ugandan Shillings (16,000 Japanese Yen) difference between the two. As for the rice cultivation area, the average rice cultivation area has increased from the earlier figure of approx. 0.27 ha to the recent 0.44 ha for both farmers who participated in the training and those who did not. However, the yield per unit for the farmers who participated in the training was 2.6 t/ha on average, while it was 1.9 t/ha on average for those who did not participate in the training. The fact that the trained farmers have higher yield per unit area is considered to be the primary factor for the income difference. The realization of higher yield is regarded as the fruit of the training in the Project. Judging from this point, the Project has strongly contributed to a better livelihood of the farmers.

It was confirmed in the beneficiary survey that the main use of the income from rice production included an education fee for children, food and drink for families, healthcare for families, agricultural inputs/materials and so on. Some were able to build a new house or buy a motorbike for starting a transportation business.

(3) Job creation through rice production growth

The fact that the number of rice mills is increasing by the growth in rice production signifies that the number of workers at the rice mills is rising, although quantitative data has not been acquired. Table 7 showed the results of hearings on the changes in the number of rice mills in recent years. Where the hearings were conducted, at least 24 rice mills have been newly established from 2012. In the 8 rice mills where the hearings were conducted, the number of employees (both regular and temporary) was 10.25 on average. Therefore, it can be assumed that employment for 146 persons has been created in these 8 areas. In addition, it seems that the employment and labor opportunity for the traders who transport harvested rice from rice production farmers to rice mills (transporters who own cars and transporting staffs who use motorbikes) is on the rise.

(4) Influence to the wetland environment

In the Eastern Region, the irrigated rice cultivation in the wetlands had progressed even before the Project had begun, which had created concerns for its influence on the

[17] Calculated with JICA's rate for fiscal year 2016 (annual average: 1 Ugandan Shilling = 0.03189 Japanese Yen).

wetland environment. From the 1990s, the GoU had developed a National Policy for the Conservation and Management of Wetland (1995) and also formulated guidelines[18] for wetland conservation and management as measures for the conservation of wetlands. The Project considered wetlands conservation with efforts such as selecting the Project Sites through consulting the district environmental officers and providing explanation in the training for agricultural officers and key farmers on national wetlands policies and guidance not to overexploit wetlands and to take care of their conservation. However, in the hearings from the district agricultural offices at the time of ex-post evaluation, the findings were that it is widely acknowledged that the irrigated rice cultivation in the wetlands has even more progressed. While the expansion of irrigated rice cultivation area in the wetlands has been a tendency before the Project began, it is confirmed with officers of district agricultural offices that the area of irrigated rice cultivation has further expanded after the Project as shown in table 5 and it appears that the planting undertaken exceeds the regulation. (According to the Ugandan rule[19], crop cultivation is allowed in up to 25 % of wetlands area.) According to staff of the district agricultural offices, main factor of increase of irrigated rice cultivation area in wetlands is higher profitability of rice cultivation in wetlands compared with upland rice cultivation and also cultivation of other crops. Considering that this information is obtained through hearing at limited project area and detailed cause analysis was not able to carry out, relation of cause and effect with the Project can't be confirmed clearly.

(5) Land acquisition and resident resettlement

Technical transfer of irrigated rice cultivation techniques to farmers has been carried out using training/demonstration plots constructed at the Project Sites. It is confirmed with the officer in charge of the Project at the implementing agency, MAAIF, that land acquisition and resident resettlement were not occurred at the Project Sites.

The Project saw the advancement of extension services by agricultural officers, application of irrigated rice cultivation techniques by smallholder farmers and contributed to the increase in rice productivity. The Project also contributed to increase of irrigated rice cultivation farmers and rice production in Eastern Region even after the project completion. However, it can't be confirm whether the target of the Project in term of rice production is achieved with sufficient evidences, therefore, effectiveness and impact are evaluated as fair.

[18] *Guidelines for Paddy Rice Cultivation in Seasonal Wetlands (2001)* and *Wetland Edge Gardening (2002)*

[19] This is regulated in the *National Environment (Wetlands, River Banks and Lake Shores Management) Regulations* formulated in 2000. In this set of regulations, it is stated that in the case of its violation, there may be a penalty of fine or imprisonment.

3.3 Efficiency (Rating: ③)

3.3.1 Inputs

Below are the planned and actual inputs on the Japanese and Ugandan sides of the Project.

Table 10: Planned and Actual Inputs to the Project

Inputs	Plan	Actual (at the Project completion)
(1) Experts	● Long-Term 3 persons ● Short-Term 10 persons	● Long-Term 3 persons ● Short-Term 6 persons
(2) Trainees received	As required	Total 19 trainees (16 in Japan, 3 in the third country) (Main training topics: irrigation and drainage management, paddy rice cultivation techniques, farmers' groups for water management, agricultural machine improvement, etc.)
(3) Equipment	Vehicles, agricultural machinery	Audio-visual equipment for research, vehicles, office equipment
(4) Operational expenses	88 million yen	41 million yen
Japanese Side Total Project Cost	464 million yen	328 million yen
Ugandan Side Total Project Cost	(not known)	1 million yen

3.3.1.1 Elements of Inputs

For the dispatch of experts, 3 long-term experts[20] and short-term experts from 10 areas[21] were assumed at the time of planning. As an actual result, 3 long-term experts[22] and short-term experts from 6 areas[23] were dispatched. There are some differences between the plan and the actual results; although there is no change in the number of the long-term experts, the chief advisor turned to short-term and a long-term expert on livelihood improvement and project management was sent instead.

As for the short-term experts, there was no need to send experts on rice variety selection proper to the Project, as the NERICA Rice Promotion Project in Uganda (2008-2011), a technical cooperation project, was underway at the same period and the tests for selecting the suitable variety were included in the activity field of NERICA Rice Promotion Project and such experts had already been dispatched. For the fields of remote sensing and marketing, they became unnecessary since there were no activities directly

[20] 1) Chief advisor, 2) Farming/extension, 3) Project coordinator/training
[21] 1) Irrigated agriculture, 2) Farmer's economic survey, 3) Rice variety selection test, 4) Remote sensing, 5) Farming community/organization strengthening/gender, 6) Environmental society consideration, 7) Education material preparation, 8) Agricultural infrastructure development, 9) Post-harvest processing/marketing 10) Agricultural machinery
[22] 1) Project coordinator/training, 2) Farming/extension, 3) Livelihood improvement/project management
[23] 1) Chief advisor, 2) Irrigated agriculture, 3) Small-scale water sources development, 4) Farmer's economic survey, 5) Farmer economy and agricultural survey, 6) Rice cultivation

related to these areas. As for the receiving of trainees, there was no exact number shown at the time of planning (in the ex-ante evaluation sheet). As an actual result, 16 trainees participated in the training in Japan to acquire knowledge on paddy rice cultivation techniques and extension, irrigation and drainage technology, agricultural water management by farmers' groups, improvement of agricultural machinery and so on. Three (3) trainees participated in the training in the third country (Egypt) to acquire the technology of agricultural water management in the field-level (Total of 19 trainees). The equipment was supplied as planned.

3.3.1.2 Project Cost

The actual project cost (328 million Japanese Yen) was 136 million Japanese Yen less than the estimated cost at the time of planning (464 million Japanese Yen) (71 % of the plan). The main reason for this was the reduction of the dispatched short-term experts from the original plan of 10 to 6 and thus the cost was saved. Also, a part of the irrigation facilities in the Project Sites were constructed in a farmer-participation way (labor provided without recompense). While the construction of concrete structures and water source protection facilities were entrusted to the local contractor, easy facility maintenance such as irrigation canals maintenance, paddy plot development and plot leveling were conducted by farmers[24], which led to the reduction of expense.

3.3.1.3 Project Period

The Project period was planned as 3 years from June 2008 to June 2011. The actual Project period was 3 years from June 2008 to June 2011, exactly as planned.

The project cost was within the plan and project period was as planned. Therefore, efficiency of the Project is high.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

After project completion, there have been announcements of new national development plans and agriculture related plans and policies. Also, in the policies and plans that were effective at the time of ex-post evaluation, there is a focus on rice production growth, productivity enhancement and application of irrigation technology. In addition, the strengthening of agricultural extension capability and extension system is focused in agricultural extension policy and strategy.

Specifically, in the plan regarding agricultural field in the *Second National Development Plan (2015/16-2019/20)*, there is a policy to prioritize the investment in 12

[24] By farmers taking charge of water canal maintenance and paddy plot preparation, they understood the way of developing and maintaining water canals. This led to the effect of enhancing sustainability in managing the canals and also new development of canals by farmers themselves.

types of agricultural commodities, one of which is rice. The items to be focused include 1) strengthening agricultural research, 2) implementing the single spine agricultural extension[25] and 3) technology adaptation at the farm level.

MAAIF's *Agriculture Sector Strategic Plan (2015/16-2019/20)* places rice as one of the prioritized crops. Included in its four items of investment strategies are increasing agricultural production and productivity, and improving service delivery through strengthening the institutional capacity of MAAIF and other agencies. Also, it is shown that investment for irrigation infrastructure is necessary to achieve a rice production growth target. Together with the establishment of the Directorate of Agricultural Extension Services (DAES) (2015) at MAAIF, the *National Agricultural Extension Policy (2016)* and *National Agricultural Extension Strategy (2016/17-2020/21)* were formulated at the end of the year 2016 and the agricultural extension system is being reinforced. There are 4 policy goals stated in the *National Agricultural Extension Policy (2016),* including building institutional capacity for effective delivery of agricultural extension services and developing a sustainable mechanism for packaging and disseminating appropriate technologies. Furthermore, the Steering Committee for Development of the Rice Industry in Uganda[26] is continuing its activity. According to MAAIF, since the plan period of the current UNRDS ends in 2018 and the period is approaching its completion, MAAIF is showing its intent to formulate the strategy for the next decade from 2018.

From the above, the sustainability of the Project related to policy aspect is evaluated as high.

3.4.2 Organizational Aspects for the Sustainability of Project Effects

At the time of conducting the Project, there was the parallel existence of the extension system by agricultural officers employed by the district agricultural offices and the extension service system by agricultural officers from NAADS. Therefore, the target participants for capability enhancement of irrigated rice cultivation techniques and training were the agricultural officers who were under both systems described above. NAADS organization was reorganized in 2014, 3 years after the Project completion, and all the staffs related to extension were dismissed. Then, the new Directorate of Agricultural Extension Service (DAES) was established inside MAAIF in 2015, and the system was changed into a single spine agricultural extension system in which MAAIF, district agricultural offices and sub-county offices are in line. Accordingly, the

[25] Until NAADS was reorganized in 2014, there was a parallel existence of the extension service by NAADS employed staff and that by MAAIF agriculture-related staff. After NAADS was reorganized, there remains agricultural extension service by MAAIF only, so it is called the single spine agricultural extension.
[26] The Steering Committee for Development of the Rice Industry in Uganda was established in April 2007. It holds meeting basically twice a year, where stakeholders related to rice gather and raise proposals for future direction of rice sector. Members are MAAIF, National Environment Management Authority, Office of the Vice President, NARO, Ministry of Trade, Industry and Cooperatives, Ministry of Local Government, Uganda National Farmers Federation, Uganda Seed Trade Association, Rice processing association, FAO, JICA and NAADS.

agricultural officers at NAADS who received training in the Project were all dismissed temporarily and the agricultural officers employed by district agricultural offices stayed. Later, a part of the dismissed NAADS officers were reemployed at the district agricultural offices; furthermore from the year 2016, agricultural officers (new recruits) are being increased in district agricultural offices all over the country including the Eastern Region. Continuingly, the augmentation of agricultural staffs is planned in 2017-2018.

The organizational system of the agricultural office in each district is as follows. The office located at the center of a district has jurisdiction over the whole district. There is the district production officer, the district agricultural officer, and officers in charge of agricultural crops, animal husbandry and fisheries. A district is divided into administrative divisions of sub-counties, in each of which there are extension officers for agricultural crops, animal husbandry and fisheries. In case of agricultural crops (including rice), it is set as a target to place an officer in each sub-county. A part of those who were newly recruited and placed in sub-counties is receiving the training on rice cultivation techniques (upland rice cultivation and irrigated rice cultivation) in the PRiDe Project (2011-2018), a technical cooperation project conducted by JICA which is under implementation at the time of the ex-post evaluation. The number of agricultural officers who has acquired rice cultivation techniques is in the stage of increase[27]. The training for agricultural officers is conducted at NaCRRI and the staffs that belong to the crops program at NaCRRI take the role of instructors. The fact that there is no unit in charge of training in NaCRRI organization is a problem to be solved; however, at the time of ex-post evaluation, there is a study going on for establishing a training unit[28].

As shown above, the extension system at MAAIF and district agricultural offices are being developed on the organizational and personnel aspects, hence it is evaluated that they are in a state in which sustainability can be generally secured if strengthening of organizational structure is executed as planned.

3.4.3 Technical Aspects for the Sustainability of Project Effects

In order to sustain the outputs and effects of the Project, it is important for the trained agricultural officers who have acquired the rice cultivation skills to transfer techniques to other agricultural officers who do not hold knowledge of irrigated rice cultivation techniques so that the other officers become able to extend irrigated rice cultivation techniques. It is also essential to extend irrigated rice cultivation techniques to farmers other than those who were the target of extension in the Project by using manuals and materials that have been made on irrigated rice cultivation techniques.

[27] Currently there are 32 districts in the Eastern Region, out of which 18 districts are the targeted areas of the PRiDe project. The agricultural officers in the district agricultural offices and sub-county offices in these districts received training. The scale of the training was approximately 100 participants per year in 2013 and 2014 and approximately 40 participants per year in 2015 and 2016.

[28] The situation is that it has been drafted where to place the training unit in the organization chart of NaCRRI and also what the roles of the training unit are.

There are opportunities such as internal meetings at district agricultural offices, where the agricultural officers who have acquired rice cultivation techniques transfer skills or share information to other agricultural officers. These occasions are limited but there are times the techniques are maintained. Agricultural officers extend rice cultivation techniques in response to the request from farmers; however, since the activity expense and means of transportation needed for extension are limited, the activities for extending irrigated rice cultivation techniques are limited.

Agricultural officers are using the technical manuals produced in the Project as needed. (In some cases, they use the guidebooks produced and revised in the PRiDe Project.) The PRiDe Project currently conducted at the time of ex-post evaluation gives training for a part of the agricultural officers in half of the districts in the Eastern Region. However, it is not covering all the agricultural officers in the Eastern Region, and since there are newly employed officers too, it is necessary to continue conducting training for farmers and for newly recruited agricultural officers in order to secure the sustainability of the technical aspect of irrigated rice cultivation techniques for agricultural officers.

As for the training and demonstration plots set up in the Project Sites, the maintenance of the irrigation canals from the water source to the plots and of plots themselves was conducted in a farmer-participation way. This led to the enhancement of the sustainability of irrigation canal maintenance as well as farmers' capability to manage building and maintaining new canals to bring in irrigation water to the farmers' plots other than training and demonstration plots and developing rice paddy plots (preparing levee to make the water control in the rice paddy plots easy) on their own. The results of the hearings from agricultural officers in district agricultural offices revealed that technical extension is made among farmers. Especially in the case where a farmer had a good harvest, the farmers in the vicinity will show high interest and learn the techniques. The results of the beneficiary survey targeted at the farmers who participated in the training showed that 8 farmer households (on average) in the vicinity newly started rice cultivation after the end of the Project. This also confirmed the fact that technical extension is present among farmers. In the PRiDe Project being conducted at the time of ex-post evaluation, an extension way to spread technical transfer from key farmers' groups to other farmers' groups, as well as using demonstration plots is being tried. As the method is established, it is hoped that the extension way combining technical transfer among farmers will be wide spread.

From the above, it is evaluated that there is sustainability in technical aspect as the techniques are seen to have been fixed among farmers who have received training and the technical transfer is found among farmers from those who have received training to others. However, it is evaluated that the sustainability is not high enough because the extension activity of irrigated rice cultivation techniques by agricultural officers to farmers is limited and the training on irrigated rice cultivation techniques for newly

recruited agricultural officers is insufficient.

3.4.4 Financial Aspects for the Sustainability of Project Effects

It is the role of the agricultural officers at the district agricultural offices (including offices in sub-counties) to extend irrigated rice cultivation techniques to farmers. The activity expenses at the district agricultural offices are borne by MAAIF. However, the annual activity expense per district at the time of ex-post evaluation is approximately 2 million Ugandan Shillings (approx. 63,000 Japanese Yen[29]), a very small amount. Although there are some cases where agricultural officers give technical guidance in response to the farmers' requests, there is rarely an occasion to gather rice farmers of certain numbers and conduct training using the farmers' training program produced in the Project due to limited budget for extension activity as constraint factor. On the other hand, according to the budget plan in the *National Agricultural Extension Strategy* (See Table 11), the operational cost in sub-county level for Fiscal Year (FY) 2017/18 is planned to boost from FY 2016/17 budget (57% increase compared to the previous year). Therefore, the improvement in the activity expense is anticipated compared to the current situation. The overall budget of MAAIF (actual values) increased in FY 2015/16 by approximately 45% compared to the last three years. In FY 2016/17, the level was maintained (excluding external funds[30]). When the external funds are included, the FY 2016/17 budget has almost tripled from FY 2014/15. According to the *National Agricultural Extension Strategy*, more budget increase is expected from FY 2017/18 and on (Table 12). As the external funds have the tendency to increase, and also the government funding is planned to increase, it is anticipated that the budget for extension activities shall be boosted.

Table 11: Budget Plan Related to Agricultural Extension Activities Shown in the National Agricultural Extension Strategy*

(Unit: billion Ugandan Shillings)

Items	2016/2017	2017/2018	2018/2019	2019/2020
District Agricultural Offices				
Fixed cost	18.18	0	0	0.87
Operational cost	12.31	12.31	12.59	12.51
Technology development cost	10.10	10.10	10.10	10.10
Sub-total	40.59	22.41	22.68	23.48
Sub-county offices				
Fixed cost	17.33	9.12	4.56	1.92
Operational cost	26.26	41.46	46.99	46.99
R&D cost	32.07	50.64	57.39	57.39
Sub-total	75.66	101.22	108.94	106.30

Source: *National Agricultural Extension Strategy*

[29] Calculated with JICA's rate for 2016 (annual average: 1 Ugandan Shilling = 0.03189 Japanese Yen).
[30] Funds from donor organizations and others

*Amount excluding the personnel expenses of district agricultural offices and sub-county offices

Table 12: MAAIF's Budget for the Past Five Years and Two Years from the Present

(Unit: billion Ugandan Shillings)

Items	Amount of Approved Budget					Planned Budget (future)	
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Salary	5.46	5.89	5.89	5.59	5.58	5.58	5.86
Non-salary operating budget	14.76	23.85	24.70	42.36	43.82	33.44	36.78
Development budget	35.41	32.35	33.27	45.27	44.14	116.5	133.98
External funds (Note)	24.97	21.47	18.62	37.35	154.01	156.71	170.64
Total (Excluding external funds)	55.64	62.09	63.86	93.22	93.54	155.53	176.62
Total (Including External funds)	80.60	83.56	82.48	130.57	247.54	312.23	347.26

Note: External funds are the amount of funding by donor organizations. Major donors are World Bank, Islamic Development Bank, International Fund for Agricultural Development, Global Environment Facility and others. One of the supports by the World Bank is the Agriculture Cluster Development Project, launched in 2015. The components support for production consolidation of selected crops including rice, for agricultural water management under sustainable wetlands management and for post-harvest processing, storage and added value creation.

Source: *National Budget Framework Paper, Ministry of Finance, Planning and Economic Development*, for each FY.

Although the governmental budget for the agricultural extension had been limited until recently, there is an increasing trend of the MAAIF budget and also a plan of activity budget increase at the sub-county level. Therefore, the sustainability of the Project in financial aspect is evaluated as fair.

From all the above, the Project holds partial problems in organizational, technical and financial aspects. Therefore, the sustainability of the effects manifested by the Project is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project has been conducted by MAAIF as the implementing agency and has been targeted at agricultural officers and smallholders in 22 districts of Eastern Region of Uganda with the aim to increase the productivity and production of rice of smallholder farmers through training and extension of irrigated rice cultivation techniques.

Specifically, the agricultural officers from the 22 districts received training on techniques of irrigated agriculture, usage of appropriate agricultural machinery, marketing and organizing farmers groups and so on. By enhancing the capability of agricultural officers necessary for training and extending the irrigated rice cultivation techniques and also strengthening the extension system, the Project supported the training of irrigated rice cultivation techniques by trained agricultural officers to smallholder

farmers.

The Project, aims to increase rice production and productivity, holds a high relevance as it is consistent with the Ugandan development policies and development needs at the times of planning and project completion and also the Japan's ODA policy at the time of planning. The Project Purpose has been achieved, while the Overall Goal is predicted to have been achieved, however it cannot be fully confirmed quantitatively and qualitatively. Therefore, effectiveness and impact are evaluated as fair. Since the Project cost is within the plan and the Project period is as planned, the efficiency of the Project is high. As an organizational issue, there is a need to reinforce the stationing of agricultural officers. As a technical issue, there is a need to implement training on irrigated rice cultivation for the newly recruited agricultural officers, and as financial aspect, there is a need to increase the budget especially for extension activities. In other words, there are partial problems in organizational, technical and financial aspects; therefore, the sustainability of the effects manifested by the Project is evaluated as fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

Recommendation to MAAIF

a. Increase the extension activity budget

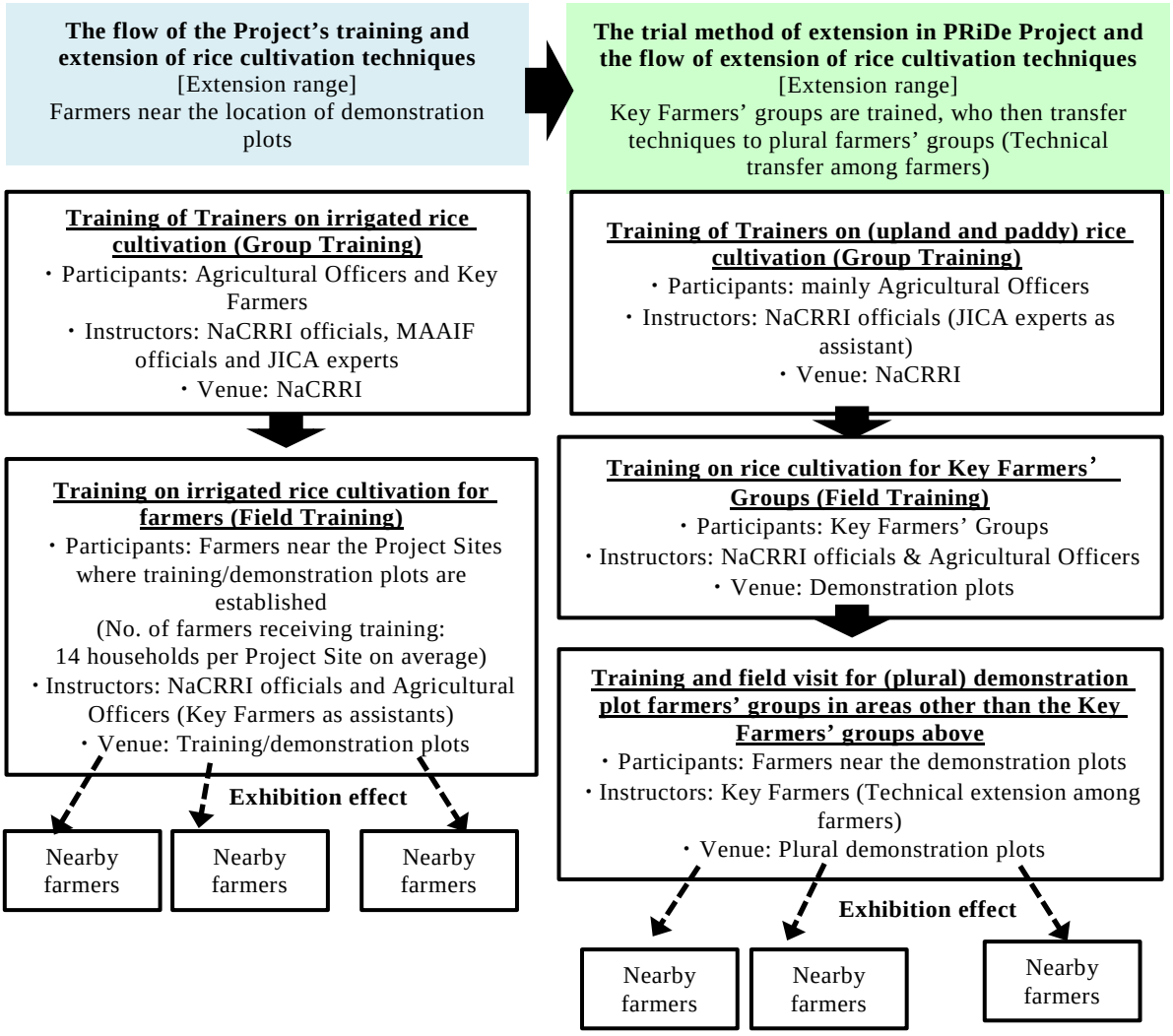
While new agricultural officers are steadily being recruited at district agricultural offices (including sub-county offices), the activity expenses allotted to the district agricultural offices are extremely limited. The means of transportation such as motorbikes needed for extension activities is also limited. As a result, agricultural officers are unable to visit communities and farmers' groups sufficiently. Although it is understandable that MAAIF is giving priority to increasing the number of staffs, the extension operation cannot be conducted in full without enough activity expense. In order to disseminate appropriate irrigated rice cultivation techniques to as many farmers as possible, the budget for extension activity expense must be increased significantly according to the policies in the *National Agricultural Extension Strategy* and others.

b. Study of methods for technical extension among farmers

It was confirmed from the results of the beneficiary survey that the technical extension is present among farmers from the farmers who received training to others. It seems especially that the farmers whose rice growing condition was good and high yield was gained are communicating the techniques to other farmers. In extending irrigated rice cultivation techniques without visiting to farmers frequently by agricultural officers, it would be valuable to consider introducing a method of extension to place the excellent

irrigated rice cultivation farmers at the core, with agricultural officers taking the role of coordinators and advisers, to extend techniques to other farmers. In the *National Agricultural Extension Strategy*, the importance of extension among farmers is stated. Also as mentioned already, in the PRiDe Project, an extension method is being tried out to spread technical transfer from key farmers' groups to other farmers' groups while using demonstration plots at the same time. In regard to such situations, it is hoped that the extension method combining technical transfer among farmers will be wide spread once the method is established as a method for extending irrigated rice cultivation techniques.

The figure below shows the extension method in the Project and the extension method in the PRiDe Project and the new method, in trial, in order to improve the extension.



Note: In the extension method on a trial basis, farmers who belong to the key farmers' group conduct technical extension in the demonstration plots in other areas to farmers in the vicinity of those demonstration plots.

Figure 3: Extension methods in the Project and in the PRiDe Project

c. Preparation of rice production statistics by district

It is difficult to quantitatively evaluate the effect of rice cultivation projects of the area because there is no statistics of rice production by district. The lack of rice production statistics also leads to the inability to appropriately build upon the policies and plans on rice promotion. It is a fact that the number of staffs in charge of statistics at MAAIF is being increased. Now it is necessary to reinforce collecting operation of statistical data regarding the crop cultivation (cultivation area, production amount and so on) in collaboration with staff of district agricultural offices. Also, according to the result of the beneficiary survey, farmers sold 77 % (on average) of rice harvested. Rice is a cash crop for farmers and most of the rice is carried to rice millers after harvest. Therefore, it is one of the realistic ways to figure out rice production more accurately by having the amount of rice brought into the rice millers recorded at the mills.

4.2.2 Recommendation to MAAIF and JICA

a. The promotion of use of the Guidelines for Irrigation Development Process in Wetlands

Rice cultivation in wetlands is expanding with the background that rice is a cash crop with a stable fairly price and high profitability compared to maize and other major crops. Therefore, the Government has been problematizing the deterioration of natural environment of wetlands by the disordered use of land. In the past, the GoU issued the *National Policy for the Conservation and Management of Wetland Resources* (1995) and *Wetland Sector Strategic Framework 2011-2020*, as well as guidelines related to wetlands conservation and management (*Guidelines for Paddy Rice Cultivation in Seasonal Wetlands, 2001* and *Wetland Edge Gardening* (2002)) and has been taking actions to promote conservation and wise use of wetlands.

Considering the population growth and improvement of farmers' livelihood, a set of guidelines is necessary not only on the study of conservation and use of specific wetlands but also of watershed areas and appropriate use of wetlands in reconciling conservation that considers hydrological balance and its sustainable use. In JICA's Project on Irrigation Scheme Development in Central and Eastern Uganda (2014-2017), technical cooperation for Development Planning, the Guidelines for Irrigation Development Process in Wetlands were issued. Described in these guidelines are the legal basis of environmental conservation and cases of processes for implementing field investigations, and also the recommended processes when implementing mid- to large-scale irrigation and drainage projects. Therefore, when mid- to large-scale irrigation projects become implemented in Uganda, it is expected hereafter that the use of these guidelines will be promoted. Furthermore, it is hoped that the activities to educate farmers on reconciling

the wetlands conservation and sustainable use will be implemented.

4.3 Lessons Learned

Securing the continuity of training and technical extension system built in the Project

The activities related to training and technical extension during the Project implementation had depended mostly on funding from Japan. After the Project completion, the continuity of training and extension activities is not sufficiently secured due to the restriction on budget related to farmers' training and extension activities. In order to secure continuity, it is important to build an action plan and budget plan for post-project completion during the Project period, and to support the activities to be incorporated as one of the regular activities in the implementing organization.

Irrigation facilities and plot preparation in a farmer-participation way

In the Project Sites, there were training and demonstration plots prepared. At the time of establishing the demonstration plots related to irrigated rice cultivation, farmers participated in irrigation canal construction and rice plot development. This led to the sustainability of water canal maintenance and also to the development of new water canals now possible to do by farmers themselves.

The timing for holding training on irrigated rice cultivation

In the Project, the trainings on irrigated rice cultivation were divided into four periods: 1) land preparation, 2) rice nursery and seeding, 3) transplanting, and 4) harvesting. The participants learned by practice according to the growth stages of rice. As seen from this, it is evaluated that participating in training multiple times and at important times of rice growing cycles, contributes to the establishment of the techniques learned among farmers.

Republic of Uganda

FY2016 Ex-Post Evaluation of Technical Cooperation Project

"NERICA Rice Promotion Project in Uganda"

External Evaluator: Isao Dojun, Chuo Kaihatsu Corporation

0. Summary

This Project was implemented with the project purpose of improving NERICA[1] rice production (upland rice and lowland rice) in its quantity and quality in the target area, and with the overall goal of contributing to improved rice production for self-sufficiency of Uganda, and increasing farmers' incomes, at the National Crops Resources Research Institute (hereinafter referred to as "NaCRRI") and the Zonal Agricultural Research and Development Institutes (hereinafter referred to as "ZARDIs") under supervision by the National Agricultural Research Organization (hereinafter referred to as "NARO"), acting as the project implementing agency. NARO is a research institute directly controlled by the Ministry of Agriculture, Animal Industry and Fisheries (hereinafter referred to as "MAAIF) of the Republic of Uganda.

At the time that this Project was planned and at the time of its completion, modernisation of agriculture and promotion of rice production had high importance in the Ugandan development policy, plans and development needs. Furthermore, at the time of planning, the Project was highly consistent with the Japan's ODA[2] policy. Therefore, the relevance of this Project is high. The capabilities of NaCRRI and ZARDIs for research and dissemination of NERICA rice (upland rice and lowland rice) have generally improved, and the appropriate rice cultivation techniques are being transferred to farmers, etc. in the target area. On the other hand, regarding improvement of NERICA rice production in its quantity and quality in the target area which was a purpose of this Project, although the result of improvement in quality and quantity has been produced, the indicator for the production quantity has not been achieved. Some of the indicators associated with the overall goal are not necessarily appropriate, and specific numerical targets have not been set, therefore, although it is difficult to evaluate the degree of achievement by comparison with the target values, it can be said that the overall goal has been mostly achieved, as the Project has contributed greatly to the increase income of rice producing farmers. Other impacts of the Project include contribution to improvement in the livelihood of rice producing farmers, improvement of the status of women within the household, etc. In light of the above, effectiveness and impact of the Project are fair. Although the Project was implemented according to the predetermined schedule, the project cost exceeded the planned cost, therefore, efficiency of the Project is fair. As for sustainability of the Project, although no particular problems are observed

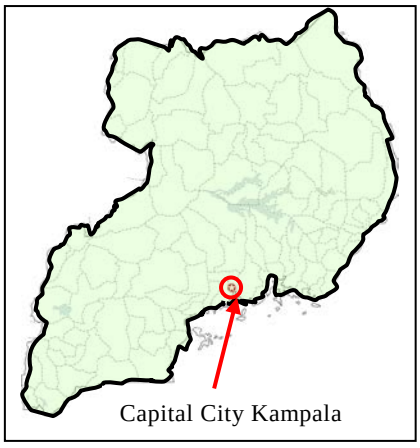
[1] NERICA (New Rice for Africa) rice is general term of rice cultivars developed in 1994 by interbreeding high yield Asian rice varieties with disease- and weed-resistant African rice varieties. There are wet- and dry-growing varieties, enabling NERICA rice to be grown on both dry plots and paddy fields.

[2] Official Development Assistance

in the policy and institutional aspects, there still remains some issues regarding organizational aspect, such as the number of extension officers (agricultural officers), linkage between research and extension. In the technical aspect, some problems remain to be solved in terms of improvement of rice cultivation skills of the agricultural officers, and there are also some problems in the financial aspect, the sustainability of the effects generated by this Project is therefore fair.

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

1. Project Description



Project Location (Target area: Suitable area for NERICA rice production in Uganda)

NERICA rice cultivation field (Masindi District)

1.1 Background

In Uganda, agriculture is the key industry and it accounts for about 43% of the country's Gross Domestic Product (GDP), about 85% of total exports, and about 80% of employment. The Ugandan government has promoted a range of poverty reduction policies based on the national development plan "Poverty Eradication Action Plan (PEAP)" (2004/5-2007/8), especially agriculture was regarded as a significantly important sector indispensable for solving two issues[3] of the country's five priority issues (pillars) established in PEAP. In addition, the government, by developing in 2000 a sector program, the "Plan for Modernisation of Agriculture (PMA)," had been working to make a shift from subsistence agriculture to commercial agriculture. Specifically, under the strong initiative of the Vice President of Uganda, the promotion of NERICA rice production had been advanced in an active manner.

Under these circumstances, in June 2004, by dispatching individual experts (NERICA rice application plan) to Uganda, JICA started technical cooperation in earnest to promote NERICA rice production and implemented 1) various tests including rice

[3] The 2 issues are (1) and (2) of the following five: (1) Economic management, (2) Production, competitiveness and incomes, (3) Human development, (4) Safety, conflict resolution and disaster management and (5) Good governance.

variety experiments and 2) training for farmers. As a result, Uganda became one of the countries in Sub-Saharan Africa where promotion of NERICA rice production is advanced. Based on these results, the Ugandan government requested the Japanese government to provide assistance to this Project, aiming at further increasing NERICA rice production. In parallel with this Project, in 2009, a grant aid project, "Project for Construction of Rice Research and Training Centre" was implemented and research on rice cultivation was conducted and techniques that had been developed were disseminated. In addition, a technical cooperation project, "Technical Assistance Support to Sustainable Irrigated Agriculture Development Project in Eastern Uganda," (June 2008- June 2011) was also implemented at the same time as this Project, with the aim of promoting irrigated rice cultivation in Eastern Region of Uganda.

1.2 Project Outline

Overall Goal		Rice is produced adequately for self-sufficiency and farmers' income is increased through the increased production and productivity of rice in Uganda.
Project Purpose		NERICA rice production is improved in its quantity and quality in the target area.
Output(s)	Output 1	Research and extension capacity of NERICA (upland and lowland) in National Crops Resources Research Institute (NaCRRI) and Zonal Agricultural Research and Development Institutes (ZARDIs) is enhanced.
	Output 2	Appropriate NERICA rice production techniques are introduced to farmers, farmers groups, rice millers, etc. in the Project area.
Total cost (Japanese Side)		385 million yen
Period of Cooperation		August 2008 – June 2011
Implementing Agency		National Agriculture Research Organization (NARO) (*a research organization under the control of the Ministry of Agriculture, Animal Industry and Fisheries)
Other Relevant Agencies/ Organizations		・ National Crops Resources Research Institute (NaCRRI), 9 Zonal Agricultural Research and Development Institutes located around the country (ZARDIs), National Semi-Arid Resources Research Institute (NaSARRI) and Agricultural Engineering and Appropriate Technology Research Centre (AEATREC) (*all of the above entities are research institutes under the control of NARO) ・ Agricultural offices located in each district (district level and sub-county level)
Supporting Agency/ Organization in Japan		None
Related Projects		<JICA Technical Cooperation Project> - Technical Assistance Support to Sustainable Irrigated Agriculture Development Project in Eastern Uganda (2008-2011) - Promotion of Rice Development Project (2011-2018) (including an extended period) <JICA Grant Aid Project> - The Project for Construction of Rice Research and Training Centre (March 2009) <Other Donors' Support> - World Bank:

	1) Agriculture Cluster Development Project (2015-2022), 2) Agricultural Technology and Agribusiness Advisory Services Project (ATAAS) (2010-2017) - Netherlands: Integrated Seed Sector Development (2012-2016)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

Since there is no reliable data on the amount of NERICA rice production, it was not possible to accurately determine how far targets were achieved. On the other hand, the direct increase effect of NERICA rice production can be expected to be around 6,500 tons, based on a calculation using data including the number of farmers that have attended training, land area expected to be used to cultivate NERICA rice per farmer's household and average yield of NERICA rice. By inspecting rice submitted by trained farmers and rice millers, it was confirmed that the quality of NERICA rice had improved. Therefore, it was judged that, before this Project was completed, the project purpose could be fully achieved.

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

It is difficult to predict whether the condition for self-sufficiency in rice will be satisfied in 3 to 5 years after the completion of this Project, because rice production is significantly affected by not only the degree of dissemination of rice cultivation techniques, but also the tariff rate on imported rice, agricultural policies of the government, and the climate. It was also pointed out that, in order to predict whether the income of rice producing farmers would increase or not, analyses of the rise in value chain and revenues from rice should be made (no description was clearly made concerning the prospects for how far the overall goal would be achieved).

Other impacts were identified, which include an increase in the cultivation of NERICA rice which was achieved through agricultural extension activities to farmers by NGOs and Japan Overseas Cooperation Volunteers (hereinafter referred to as "JOCV members"), and dissemination of NERICA rice cultivation techniques and seeds from farmers who have attended the training to other farmers, and an improvement in livelihood thanks to increased income from rice sales (being able to send children to secondary school, pay mobile phone charges and purchase medicines, construction materials such as galvanized sheet iron for roof and motorcycles and bicycles).

1.3.3 Recommendations from the Terminal Evaluation

(1) Strengthening of operating structure of NaCRRI through more appropriate staffing

It was pointed out that it was necessary to increase the number of personnel to

be deployed, including researchers, etc., specialised in rice, and to develop their skills and that it would be effective to assign a coordinator at NaCRRI to promote linkage between rice researchers and training/extension. In addition, it was recommended that, as a centre for rice research and extension, NARO should cooperate with MAAIF in order to strengthen human resources for rice research.

(2) Securing of budgets for continuing project activities

In order to continue to implement research and extension activities that are ongoing when the project was completed and evaluated, it was pointed out that securing financial resources would be necessary and that it would be practical to secure budgets in cooperation with the Agricultural Technology and Agribusiness Advisory Services Project (ATAAS[4]) which is a national project to improve development and extension of agricultural techniques as well as other government bodies such as the National Agricultural Advisory Services (hereinafter referred to as "NAADS") which is an organization to carry out extension service.

(3) Collection of reliable data on the rice value chain

The agricultural statistics of the Ugandan government is in an immature state. In order to conduct policy making and effective monitoring, collection of accurate and useful data on the rice value chain is necessary. To this end, it was recommended that MAAIF should advance the construction of a data collection system in cooperation with international organizations such as the International Rice Research Institute (IRRI[5]), Africa Rice Center, and the Food and Agriculture Organization (FAO) of the United Nations.

2. Outline of the Evaluation Study

2.1 External Evaluator

Isao Dojun, Chuo Kaihatsu Corporation

2.2 Duration of Evaluation Study

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

Duration of the Study: September 2016 – January 2018

Duration of the Field Study: January 15, 2017 – March 3, 2017, and May 1, 2017 – May 14, 2017

[4] A project financed by the World Bank

[5] One of agricultural research organizations under the supervision of the Consultation Group on International Agriculture Research (CGIAR) to conduct research and provide education related to rice. The headquarters are located in the Philippines.

2.3 Constraints during the Evaluation Study

In order to evaluate how far the project purpose and the overall goal are achieved using numerical data, it is necessary to have data on the amount of production of both NERICA rice and rice as a whole. However, although Uganda has statistics data on the annual total amount of rice production of the country, no statistical data is available on the amount of production of NERICA rice or upland rice and on the amount of production by district[6]. In addition, according to the results of interviews made to officials of MAAIF, data on the annual total amount of rice production is not actually reliable[7]. Therefore, it was difficult to numerically determine the degree of achievement of the project purpose and the degree of contribution this Project made to self-sufficiency of rice in Uganda.

3. Results of the Evaluation (Overall Rating: C[8])

3.1 Relevance (Rating: ③[9])

3.1.1 Consistency with the Development Plan of Uganda

At the time that this Project was planned, national strategies aiming at modernisation of agriculture and creation of employment and the poverty eradication action plan were presented in the revised Poverty Eradication Action Plan[10] (hereinafter referred to as "PEAP") (for the period 2004/5-2007/8) and it was also targeted to increase income of poor farmers and improve their livelihood in the Plan for Modernisation of Agriculture (PMA) (2000) which was formulated based on PEAP. At the time of completion of this Project, rice had been positioned as a strategic crop in the Development Strategy and Investment Plan (DSIP) (2010-2014) and the Uganda National Rice Development Strategy (hereinafter referred to as "UNRDS") (2009-2018) was also under implementation. Furthermore, in the National Development Plan (2010-2014), which is the subsequent plan of PEAP, agriculture was recognized as one of the most important sectors and modernisation of agriculture and productivity improvement were greatly emphasized. In light of the above, it can be said that the purpose of this Project was consistent with the Ugandan government's development policies, etc., that were in place when this Project was both planned and completed.

[6] Production data by district are collected only when the agricultural census is conducted. In Uganda, the agricultural census was conducted on 3 occasions in the past (2008, 1991 and 1963).

[7] This is because data on rice cultivation area and production are not collected nationwide and some data are collected from only a small part of areas of a few districts (about 3 districts) as samples, and based on which, national production data are estimated.

[8] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[9] ③: High, ②: Fair, ①: Low

[10] The first edition was issued in 1997.

3.1.2 Consistency with the Development Needs of Uganda

At the time of planning of this Project, both rice consumption and production were increasing every year and farmers were highly motivated to be engaged in rice cultivation. In addition, rice cultivation was promoted in line with the then-current state of water resources of the country. At the time of completion of this Project, however, the rice self-sufficiency rate had not shown improvement (75.5% at the time of project planning in 2008 and 74.2% at the time of project completion in 2011) and import of rice was on the increase (63,000 tons in 2008 and 92,000 tons in 2011). In addition, by then, rice had become an important crop for farmers as a cash crop. In light of the above, it can be confirmed that, at the time of planning and completion of this Project, the project purpose to promote rice cultivation was consistent with the development needs of the country.

3.1.3 Consistency with Japan's ODA Policy

At the time of planning of this Project, in Japan's country assistance policy for Uganda (2008), agricultural development was considered to be a high priority for assistance. In particular, importance was given to the promotion of rice cultivation and increasing value-added agricultural products, etc. Therefore, this Project aiming at promotion of rice cultivation had consistency with Japan's ODA policy. Furthermore, the 4th Tokyo International Conference on African Development (TICAD IV in 2008), as one of its objectives, proposed to "Increase rice production through developing capacities to adopt systematic crop management, and new methodologies including wider use of NERICA rice, aiming at doubling the rice production in African countries in ten years." In addition, JICA launched an initiative known as the "Coalition for African Rice Development (CARD)" in partnership with other donors in 2008 and provided assistance for the preparation of national rice development strategy by CARD member countries (23 countries[11] in total including Uganda) and for increasing rice production in accordance with their respective strategy, with a goal to double the rice production in Africa from 14 million tons to 28 million tons by 2018. Therefore, it can be said that this Project was highly consistent with Japan's ODA policy at the time of its planning.

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.

[11] The 1st group composed of 12 countries including Cameroon, Ghana, Guinea, Kenya, Madagascar, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, Tanzania and Uganda. The 2nd group composed of 11 countries including Benin, Burkina Faso, Central African Republic, Cote d'Ivoire, Democratic Republic of the Congo, Ethiopia, Gambia, Liberia, Rwanda, Togo and Zambia. The 1st group are countries recognised as having a high potential for rice production increase and the 2nd group are countries recognised as taking time to expand the plan, although they have a potential for rice cultivation.

3.2 Effectiveness and Impact[12] (Rating: ②)

3.2.1 Effectiveness

3.2.1.1 Project Output

The major pillars of this Project were to strengthen agricultural research institutes and other relevant organizations' research and extension capacity for NERICA rice and to disseminate NERICA rice cultivation techniques to farmers. Figure 1 shows a flow of activities related to research and extension.

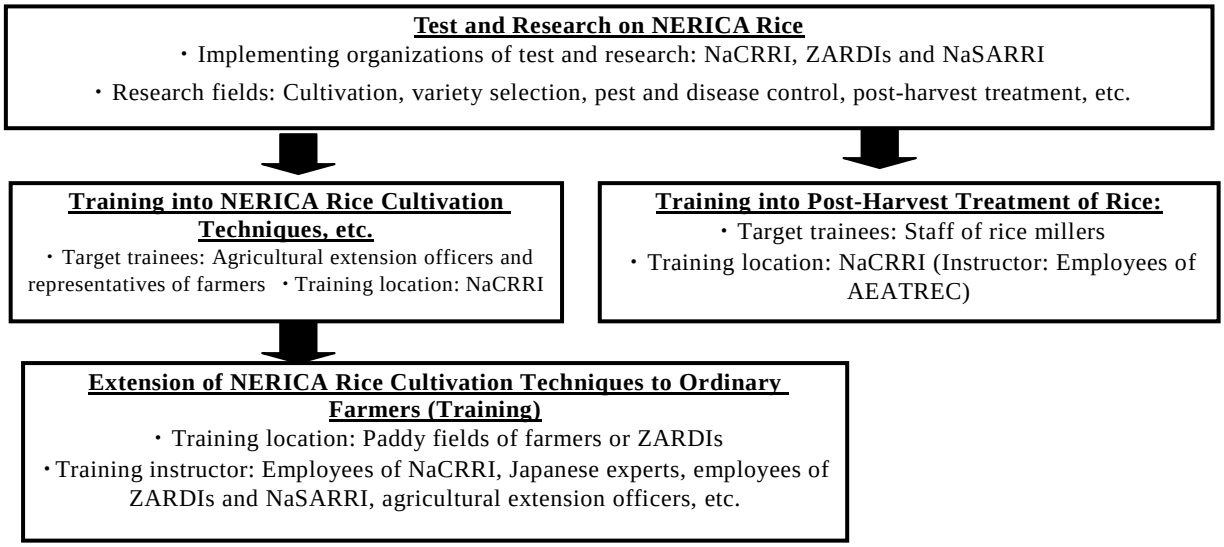


Figure 1: Workflow of Research and Extension Activities in this Project

(1) Achievement status of Output 1

A total of 4 indicators have been set for Output 1: "Research and extension capacity of NERICA (upland and lowland) in NaCRRI and ZARDIs is enhanced". As shown in Table 1, at the time of completion of this Project, all these indicators were achieved. It was found from the result that research and extension capacity of NERICA rice at NaCRRI and ZARDIs was improved as targeted under this Project, which indicates that Output 1 was achieved.

Table 1: Achievement Status of Indicators for Output 1

Output 1	Indicators for Output 1	Achievement status of indicator at the time of project completion	Achievement status
Research and extension capacity of NERICA (upland and lowland) in NaCRRI and ZARDIs is enhanced.	Indicator 1: The results of researches in each selected subject at NaCRRI are compiled.	Results of rice cultivation experiments and collected data were compiled and analysed by researchers of NaCRRI. The results and data, however, have not been published by compiling along with other related data. Since researchers had a large burden as they had other tasks, the editing process was delayed to some extent. It was expected that the publication would	Achieved

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

		be carried out after completion of the editing process.	
	Indicator 2: The results of researches to meet regional characteristics at ZARDIs and NaSARRI are compiled.	At 9 ZARDIs and NaSARRI, rice cultivation experiments were conducted utilizing demonstration farms that had been already prepared respectively. 25 or more reports were prepared on the rice cultivation experiments. Valuable scientific data that could clearly identify regional characteristics of respective eco-regions in Uganda were obtained.	Achieved
	Indicator 3: The training in appropriate NERICA rice cultivation aiming at farmers and supporting actors is conducted by NaCRRI, ZARDIs, and NaSARRI in accordance with the training module.	For NERICA rice cultivation, two different training modules were developed. One module was for a training targeted at agricultural officers and representatives of farmers. The other is for a training targeted at ordinary farmers. As for the training for agricultural officers, etc., could be managed independently by staff members of NaCRRI, while the training for ordinary farmers could be managed independently by staff members of ZARDIs and NaSARRI.	Achieved
	Indicator 4: The training in post-harvest processing aiming at rice millers is conducted by AEATREC in accordance with the training module.	Trainings on post-harvest processing targeted at rice millers were conducted by AEATREC in accordance with the training modules. This training course was developed in March 2010 and a total of 104 trainees participated in the trainings before completion of the Project (June 2011). The target number of 100 participants expected by those who were involved in this Project was achieved by the completion of the Project.	Achieved

Source: The terminal evaluation report, and materials provided by JICA

The results of rice researches and trainings conducted at NaSARRI and 9 ZARDIs were shown in Table 2.

Table 2: Results of Rice Researches and Trainings Conducted at NaSARRI and 9 ZARDIs

	Institute	Results of research activities	Results of trainings
1	NaSARRI	- Rice cultivation tests were conducted since the first half of 2009. During the project period, tests were conducted for 4 cropping seasons. Satisfactory results were obtained from the tests.	- Starting December 2009, mainly in the Eastern Region, trainings were conducted with target farmers (456 farmers in total participated). - The training was also conducted for researchers of Nabuin ZARDI (a neighbouring research institute with NaSARRI).

2	Abi ZARDI	- Rice cultivation tests (varieties and weeding tests) were conducted for 3 cropping seasons. Satisfactory results were obtained. - Seed multiplication was conducted on a 1.5 ha field and the seeds produced were delivered to farmers during the training sessions. - In cooperation with this Project, a rice market survey in the West Nile eco-region was conducted. It was clarified that large effects could be expected through the introduction of NERICA rice and provision of technical guidance.	- Starting November 2009, trainings for farmers were conducted and a total of 306 farmers participated in the trainings.
3	Bulindi ZARDI	- Rice cultivation tests were conducted for 5 seasons and satisfactory results were obtained. In addition, this ZARDI conducted cultivation tests by their own initiative. - Although it is not included in activities under this Project, seed multiplication and fertilizing tests were conducted by receiving support from the Alliance for a Green Revolution in Africa[13] (hereinafter referred to as "AGRA"). - The total land area used for seed multiplication was 1.5 ha, if combining the area used for this Project and AGRA.	- Starting November 2009, trainings for farmers were conducted and a total of 429 farmers participated in the trainings. - When requested by the district agriculture office located within the area in charge, support is provided in terms of upland rice cultivation techniques. - A total of 2 JOCV members were dispatched, who toured around to visit local farmers and provided guidance on cultivation tests in the field located in the ZARDI.
4	Mukono ZARDI	- Starting in the second half of 2008, rice cultivation tests were conducted. The tests concerned varieties, weeding, ratoon rice cultivation, and effectiveness of mixed cropping with beans.	- Training was conducted in cooperation with staff members of NAADS and district agricultural officers. - Starting March 2010, trainings for farmers were conducted and a total of 474 farmers participated in the trainings.
5	Mbarara ZARDI	- Starting in the first half of 2009, cultivation tests (those on varieties, weeding, and fertilizing) were conducted.	- Starting September 2010, trainings for farmers were conducted and a total of 37 farmers participated in the trainings.
6	Rwebitaba ZARDI	- As a result of cultivation tests, this area was found suitable to NERICA rice cultivation.	- Starting March 2010, trainings for farmers were conducted and a total of 106 farmers participated.
7	Nabuin ZARDI	- Starting in the first half of 2009, cultivation tests (those on varieties and weeding) were conducted.	- Starting February 2010, trainings for farmers were conducted and a total of 1,130 farmers participated in the trainings.
8	Kachwekano ZARDI	- Starting in 2010, variety tests and installation of demonstration farms were conducted in Kanungu District and Rukungiri District. Yield of 4 NERICA rice varieties was 1.5 times of that of traditional rice varieties.	- Using the demonstration farms, NERICA rice was introduced, which attracted higher attention of farmers.

[13] Established in 2006 by the Rockefeller Foundation and Bill & Melinda Gates Foundation, it is a comprehensive partnership to provide funds for agricultural development in Africa. It aims at reducing poverty and eradicating hunger through the provision of funds for agricultural development.

9	Buginyanya ZARDI	- Since 2009, cultivation tests (those on varieties and weeding) were conducted using a branch field in Mayuge District and starting in the second half of 2010, the same tests were conducted also in Bulambuli District.	- Trainings for farmers were planned to start in the second half of 2011 (after completion of this Project). (It was deferred because of unsatisfactory results of cultivation tests.)
10	Ngetta ZARDI	- In 2008 and later, cultivation tests were conducted on two occasions. Although the results were not satisfactory, the capacity to conduct rice cultivation tests was somewhat improved through continued provision of technical guidance.	- Trainings for farmers were conducted in cooperation with local NGOs. The number of trainees since the start of this Project totalled 4,025 persons. The result of the impact survey[14] indicated that 66% of participants were continuously engaged in rice cultivation.

Source: Materials provided by JICA

(2) Achievement status of Output 2

For Output 2, which was described as "appropriate NERICA rice production techniques are introduced to farmers, farmer's groups, rice millers, etc., in the Project area", three indicators had been set. As shown in Table 3, at the time of project completion, two indicators were achieved, while the remaining one was almost achieved. Therefore, it can be said that the expected output, the introduction of appropriate NERICA rice production techniques to farmers and farmer's groups, etc., in the Project area has mostly been achieved.

Table 3: Achievement Status of Indicators for Output 2

Output 2	Indicators for Output 2	Achievement status of indicators at the time of project completion	Achievement status
Appropriate NERICA rice production techniques are introduced to farmers, farmer's groups, rice millers, etc. in the Project area.	Indicator 1: A total of 12,000 persons (10,000 farmers and 2,000 others) receive training provided directly and indirectly by the Project.	Trainings were conducted for a total of 15,925 persons (13,910 farmers (note 1) and 2,015 others). "Others" include staff members of ZARDIs, staff members of NGOs, students, JOCV members, and public officials working for rice production-related organizations in African countries. The number of participants greatly exceeded the targeted number of 12,000.	Achieved
	Indicator 2: 30% of farmers who received the training produce NERICA continuously.	According to the impact survey[15] conducted under this Project, of the farmers that participated in the training, 64.3% were engaged in rice cultivation using knowledge learned. The targeted number of 30% was greatly exceeded.	Achieved
	Indicator 3: 70% of rice millers who received the	According to the impact survey conducted by AEATREC, all of the 37 rice millers who were the target of the impact survey were	Mostly achieved

[14] An interview survey (to understand whether techniques were established locally or not) was conducted among some of the farmers that participated in training into rice cultivation techniques. From September 2010 to February 2011, it was conducted through questionnaire surveys and telephone interviews. A total of 1,191 farmers responded including some farmers under the control of other ZARDIs.

[15] Refer to Footnote 13.

	training apply the introduced post-harvest processing techniques.	using rice milling techniques acquired through the training. A total of 55 operators of rice millers[16] participated in the training by the time the survey was made, which means the survey covered 67.3% of those who participated in the training.	

Source: The terminal evaluation report, and materials provided by JICA
Note 1: There is no data on number of persons by gender.

In addition to the above, activities in cooperation between this Project and other donors were also conducted, and such activities contributed to dissemination of NERICA rice. More specifically, partnership between this Project and other donors included the following:

Table 4: Partnership with Other Donors, etc.

Organization	Details of cooperation
Sasakawa Global 2000[17]	A technical manual developed under this Project was provided to Sasakawa Global 2000 so that they could use the manual in their extension activity. Additional cooperation was made also in relation to the provision of rice-milling machines to farmer's groups. In addition, since Sasakawa Global 2000 was one of the organizations to which JOCV members were dispatched, the JOCV members participated in the training of this Project and disseminated NERICA rice cultivation techniques to farmers after having learned the techniques.
World Food Program (WFP) of the United Nations	WFP printed the training materials that were developed under this Project to use such materials in their extension activities. WFP was one of the organizations to which JOCV members were dispatched, and therefore NERICA rice cultivation was promoted.
Food and Agriculture Organization (FAO) of the United Nations	Training materials developed under this Project were provided to FAO. In addition, when rice seeds were delivered to the Northern region of Uganda with Japanese funding (Ministry of Agriculture, Forestry and Fisheries and Ministry of Foreign Affairs of Japan), experts dispatched by JICA provided technical guidance on cultivation.

Source: Interview surveys conducted with Japanese experts

3.2.1.2 Achievement of Project Purpose

The purpose of this Project has been defined as follows: "NERICA rice production is improved in its quantity and quality in the target area." Indicators for degree of achievement are shown in Table 5.

Specific numerical targets for Indicator 1 of the project purpose (upland rice production of 140,000 tons/year) were set for consistency with the target rice

[16] Participants in training were 55 operators who belonged to 25 organizations/rice millers. Of those 55 operators, the interview survey was conducted with 37 (questionnaire survey). (Source: Materials provided by JICA)

[17] An agricultural program conducted by the Sasakawa Africa Association (an NGO for agricultural development) which has operated in 14 countries in Sub-Saharan Africa. At the time of ex-post evaluation, it operates in 4 countries of Ethiopia, Nigeria, Mali and Uganda. In 1986, the association was established in Switzerland jointly by Dr. Norman Borlaug, a Nobel-Prize winner, Ryoichi Sasakawa (the first chairman of the Nippon Foundation), and former President of U.S. Jimmy Carter. (The headquarters is in Tokyo at the time of ex-post evaluation.)

production in UNRDS[18] (at the time of the mid-term review). The target values of UNRDS were very ambitious (to increase annual upland rice production by a factor of 3.4 from about 59,000 tons/year in 2008 to 200,000 tons/year in 2018) and they were set to maintain consistency with the target to increase nationwide rice production in Uganda. As a rule, project purpose should be established within the range that can be achieved as a direct outcome of project activities. It can be considered, however, that the establishment of this project purpose was unreasonable, since it was established within a wider scope of activities not directly related to this Project. Specifically, it was extremely difficult to achieve an increase of 140,000 tons/year in upland rice production only with the increase in production effect to be achieved by farmers that participated in the trainings under this Project. On the other hand, the number of farmers that participated in the trainings reached the figure of about 13,910 within a period of about 3 years, which is a large number (corresponding to 13% of the total rice farmers of 103,579 in 2008 in Uganda) and hence, it can be said that they have built a certain solid foundation to contribute to an increase in NERICA rice production in Uganda. It is difficult, however, to clearly show how far the numerical targets of the project purpose was appropriate in terms of increase in NERICA rice production, based on well-grounded data, and therefore, it is not easy to conclude that the target production was achieved.

With respect to Indicator 2 of the project purpose, 55 operators from 25 rice millers participated in the training into rice milling techniques and they acquired rice milling skills that could satisfy quality standards of Uganda.

Table 5: Degree of Achievement of Project Purpose

Project Purpose	Indicator	Achievement status of indicators at the time of project completion	Achievement status
NERICA rice production is improved in its quantity and quality in the target area.	Indicator 1: The production of upland NERICA rice reaches 140,000 tons.	- As mentioned above, an unreasonable and not easy-to-achieve target values were set for Indicator 1 and it is considered inappropriate as an indicator. Since it is difficult, however, to clarify what kind of indicator should be considered appropriate, it cannot be said that the objective was achieved. - On the other hand, a total of 13,910 farmers participated in the trainings, which led to an	The contribution to increase in upland rice production was sufficient. It is difficult, however, to consider that

[18] In UNRDS, rice production targets for 2013 and 2018 are prescribed along with upland rice production targets. Using annual upland rice production in 2008 and the annual upland rice production target for 2013 in Uganda as a whole, the production target for 2011, when this Project was completed, was calculated to be 137,600 tons. It is presumed that this value was rounded to an estimate of 140,000 tons.

		increase in upland rice production of 7,155 tons/year [19] and hence contributed to increased rice production (total rice production of Uganda increased by 55,143 tons/year from 177,857 tons/year in 2008 to 233,000 tons/year in 2011). - The increase of 7,155 tons/year achieved by the farmers that participated in the trainings under this Project accounts for 13% of the increase of 55,143 tons realized for the period from 2008 to 2011. Based on information [20] indicating that the percentage of NERICA rice cultivation in 2008 was 7.7% of the total rice cultivation, production of NERICA rice in 2008 is estimated to have been 13,695 tons. Based on the contribution of this Project to the increase in NERICA rice production of 7,155 tons, this Project certainly contributed to an increase in NERICA rice production by a factor of 1.5 at least. In this way, this Project can be said to have contributed to a certain amount of increase in rice production.	the project purpose was achieved.
	Indicator 2: NERICA rice which passes the quality standard of the Project is increased.	- Although the number of samples was not sufficient (those involved in this Project collected samples of polished rice from 8 rice millers and examined the samples at an analytical laboratory of NaCRRI), rice millers having satisfied quality standards [21] established by the Uganda National Bureau of Standards accounted for over 80% (87.5%), and based on this, it can be said Indicator 2 was achieved.	Achieved

Source: The terminal evaluation report, and materials provided by JICA

Research and extension capacity for NERICA rice (upland and lowland) at NaCRRI and ZARDIs in general improved, and appropriate rice cultivation

[19] 7,155 tons/year is estimated amount. Estimation method is as follow. Total number of trained farmers in this Project was 13,910. Of these, assuming that 64.3% of the trained farmers started upland rice (indicator 2-2 of Output 2), in average about 0.4 ha of farm land used for upland rice cultivation per a trained farmer, and rice yield per hectare is about 2.0 tons/year, the following figure can be estimated. 13,910 (farmers) x 0.643 x 0.4 (ha) x 2.0 (tons) = 7,155 tons. (An estimation method used in the terminal evaluation report of this Project is applied.)

[20] The Development of Agricultural Markets in Sub-Saharan Africa: The Case of Rice in Uganda, 2012

[21] Success or failure is determined depending on grades established based on the shape, degree of damage, colour, mixing in of foreign substances, etc.

techniques were disseminated to farmers, etc., in the target areas. On the other hand, with respect to quantitative and qualitative improvement of NERICA rice production in the target areas, although there was a certain favourable result as quality improved and production increased, the indicator on production was not achieved. Therefore, it can be judged that the project purpose itself has not yet been fully achieved.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The overall goal of this Project is to ensure that "Rice is produced adequately for self-sufficiency and farmers' income is increased through the increased production and productivity of rice in Uganda." Note that specific numerical targets have not been set for when and to what extent the Project will contribute to achievement of self-sufficiency in rice, and the improvement in incomes of farmers. In addition, in the ex-post evaluation, there were no statistical data on the production quantities specifically for NERICA rice, therefore, it was difficult to judge the extent of achievement quantitatively, and it was not able to determine the achievement status of the indicators for the overall goal.

If the self-sufficiency rate in rice in Uganda is calculated using the statistical data for rice production (milled rice) and supply of rice within the country (milled rice), then the self-sufficiency in 2013 was 76% (see Table 6), which does not reach the UNRDS self-sufficiency target value in 2013 (82%). Also, the self-sufficiency rate in the year 2008, the year in which this Project started, was 75.5%, but the self-sufficiency rate in the year 2013 was 76%, therefore, there was no improvement in self-sufficiency rate (virtually unchanged). The quantity of rice production in Uganda was unchanged from 2011 to 2014, and there was no rising trend. However, from the results of interviews with agricultural officers, etc., from the district agricultural offices of 10 districts[22] regarding recent trends in the area of rice under cultivation and number of rice producing farmers, it was found that in 9 out of the 10 districts there is a trend towards increasing rice cultivation area and number of rice farmers (in Wakiso District, there was an increasing trend until around 2012, but then this reversed into a decreasing trend as a result of the progress of urbanization). Also, as a result of interviews with rice millers at 8 locations in 8 provinces[23] regarding recent trends in rice production and number of farmers engaging in rice cultivation, it was found that at all 8 locations the trend is towards increasing production quantity and increasing number of farmers engaging in rice cultivation. In view of the results of these interviews, there is a possibility that the actual rice production quantity is greater than that indicated by the national statistical data. Therefore, it is considered

[22] Amuru, Dokolo, Hoima, Kakumiro, Kole, Luwero, Masindi, Mukono, Nakaseke Wakiso
[23] Dokolo, Hoima, Kakumiro, Kole, Luwero, Masindi, Mukono, Nakaseke

that there is a possibility that the rice self-sufficiency rate may be somewhat higher.

Table 6: Data on Rice Production in Uganda

Item	Unit	Source	2008	2009	2010	2011	2012	2013	2014
Rice production (un-hulled rice)	Ton	FAOSTAT (Note 2)	177,857	205,765	218,111	233,000	212,000	214,000	237,000
Rice production (milled rice)	Ton	FAOSTAT	118,631	137,245	145,480	155,411	141,404	142,738	158,079
Rice imports (milled rice)	Ton	FAOSTAT	63,545	79,962	77,271	92,329	133,640	115,780	132,316 (Note 4)
Rice exports (milled rice)	Ton	FAOSTAT	25,030	37,818	39,792	38,187	70,853	70,742	70,659 (Note 4)
Domestic supply of rice (milled rice)	Ton	FAOSTAT	157,145	179,389	182,959	209,553	204,190	187,775	219,736
Rate of rice self-sufficiency	%	Calculated value	75.5	76.5	79.5	74.2	69.3	76.0	71.9
Total population in Uganda (Note 1)	1,000 persons	UBOS (Note 3)	29,430	30,298	31,165	32,032	32,900	33,767	34,634
Rice consumption per person	kg/ person	Calculated value	5.3	5.9	5.9	6.5	6.2	5.6	6.3

Note 1: In the numerical values of the total population, the value for 2014 is from UBOS data. The values from 2008 until 2013 are values calculated by evaluators using the 2002 UBOS data and the 2014 data, assuming a constant rate of population growth.
Note 2: FAOSTAT = Online statistical database for food, agriculture, and fishery production operated by FAO.
Note 3: UBOS = Uganda Bureau of Statistics
Note 4: The numbers within the thick box in the 2014 data are provided by MAAIF.

Regarding the income of the rice farmers, from the results of a beneficiary survey[24], it was found that there is an increase in the income of the farmers' household that have attended trainings, therefore, generally it can be said that the degree of achievement is high.

After completion of this Project, a technical cooperation project called the "Promotion of Rice Development Project" (hereinafter referred to as "PRiDe Project") (2011-2018) was started as a subsequent project, in which technical training in rice cultivation including NERICA rice (training for farmers) is being carried out in about half of the districts of Uganda. It can be said that this technical cooperation project also contributes to an increase in rice production and an increase in income for farmers in Uganda.

[24] In the beneficiary survey, from the districts where training for farmers was implemented (22 districts were identified from documents such as reports, etc., prepared in this Project), 12 districts were selected for which information on the villages where the training was implemented was provided in the documents (1 village was selected per district) (Mukono, Nakaseke, Nakasongora, Luweero, Wakiso, Amuru, Dokolo, Gulu, Kole, Hoima, Kamikuro, and Masindi) (incidentally, the total number of districts in Uganda as of 2010 was 111). An interview survey was carried out for farmer household who attended the training in this Project (the communities that received the training were visited, and interviews were conducted with trainees who were able to spare time for an interview on the day of the survey after explaining to the key person in the community the purpose of the interview). The number of farmers interviewed was 163. The number of males was 95 (58%), and females 68 (42%).

Table 7: Degree of Achievement of the Overall Goal

Overall Goal	Indicator	Achievement status of indicator at the time of project completion
Rice is produced adequately for self-sufficiency and farmers' income is increased through the increased production and productivity of rice in Uganda.	Indicator 1: Self-sufficiency rate of rice in Uganda	- There is no reliable data on the self-sufficiency rate in rice in Uganda, which is the indicator for the overall goal. Also, specific numerical target and target year for achievement of the indicator have not been set, therefore, it was impossible to confirm the achievement status of indicator 1. Note that according to the statistical data shown in Table 6, self-sufficiency in rice was not achieved as of 2014 (71.9%). The UNRDS aiming at the achievement of self-sufficiency in rice by the year 2018, set the target value for self-sufficiency in the year 2013 as 82%. According to the calculation made by the evaluator using the statistical data, the self-sufficiency rate in 2013 was 76%, which shows that the UNRDS target value was not reached. However, from the overall results of interviews at rice millers and with agricultural officers at the district agricultural offices, etc., it is judged that there is a possibility that the actual rice production is greater than the statistical values (there is a possibility that the self-sufficiency rate is somewhat higher).
	Indicator 2: Household income of farmers who engage in rice cultivation.	- According to the results of the beneficiary survey, the income that can be obtained from rice cultivation is greater than for other products (maize, etc.), and, the income from sale of rice by farmers that have attended the training seminar is about half of the total income of their households. In addition, an income of about 48,000 yen[25] per cultivation season can be obtained (from sale of rice), therefore, it is considered that household incomes of farmers are increasing. - Note that from the results of the beneficiary survey regarding the change in rice production at trained farmers, the quantity of rice production increased after attendance at the training compared with prior to the training. Specifically, an increase from 798 kg per season to 988 kg per season per farmer in average was seen, or an increase of about 190 kg per season per farmer. - Although it is difficult to clearly determine the degree of achievement due to absence of numerical target, it is considered that the Project contributed to increase income of farmers' household, therefore, it is judged that the degree of achievement of indicator 2 is generally high.

Source: Terminal Evaluation Report and materials provided by JICA.

In light of the above, it can be judged that the overall goal has mostly been achieved.

3.2.2.2 Other Positive and Negative Impacts

(1) Positive Impacts

(i) Improvement in rice quality

[25] Value calculated from the price in local currency and the JICA average currency conversion rate for 2016 (1 Uganda shilling = 0.03189 Japanese Yen).

According to interviews with rice millers[26], the quality of the rice brought by the farmers has increased, and the main reason for improvement in the rice quality is that the process of drying the rice after harvesting is more appropriately carried out. Specifically, by drying on vinyl sheets rather than on the ground, mixing of foreign matter such as stones and other is reduced (note that this appropriate method of drying was learned by the farmers at the trainings in this Project).

(ii) Women's empowerment

According to the results of the beneficiary survey, the percentage of farm-works for rice cultivation, which is carried out by both men and women, varies depending on the type of farm-work[27], but on average is 51.5%. This percentage greatly exceeds in which men only make decisions (27.8%) and also women only make decisions (20.8%). Regarding decision-making on how to use the income obtained from rice sales, the percentage in which the decision-making is made by both men and women was 59.3%, the percentage where the decision-making is made by men was 18.6%, the percentage where the decision-making is made by women was 20.0%, and the percentage where the decision-making is made by other members of the family was 2.1% (number of respondents 145). According to interviews with farmers cultivating NERICA rice, the following explanation was received regarding the cause and effect relationship between men and women jointly carrying out farm-works and the increase in the right of women to have a voice. "Compared with cultivation of other crops, rice cultivation requires more labour. If this labour is provided by employing external labourers, the labour costs will increase, therefore, farmers use family labour as much as possible. Therefore, women and other family members are jointly involved in farm-works associated with rice cultivation. The income obtained as a result of farm-works carried out jointly by women and men is property of both sides, and this leads to an increase in the right of women to have a voice in decision-making on how this income is used." Based on this information, it is judged that work carried out jointly by men and women leads to an increase in decision-making by women regarding how the income obtained from rice sales is used. Uses of the income include school fees for the children, nutritional improvement for the family members (purchase of foods), purchase of livestock or land, etc. Also, there are examples (6 cases) in which some women have started small scale businesses (retail of products, etc.) using the income obtained from rice production. This type of women's

[26] Interview surveys were carried out with 9 rice millers in 9 districts, from among the districts where training for farmers were conducted in this Project and the beneficiary survey was carried out (1 rice miller in each district, and the interviews were carried out with all male operators (there were virtually no female operators)). The district agricultural offices introduced to us about rice miller that could potentially be interviewed, and locates along the road were selected.

[27] Land preparation, seeding, applying fertilizer and agricultural chemicals, weeding, harvesting, and sales. (Supplementary explanation: As for post-harvest in Uganda, threshing and drying are conducted at each household. After that individual farmer transports harvested rice to rice miller for milling.)

empowerment has been confirmed.

(iii) NERICA rice as a stable source of income

According to interviews with district agricultural officers, rice is a cash crop, and the potential yield (quantity produced per unit area) is high compared with other crops, and the price of rice is stable. Therefore, rice is a stable income source for many farmers (see Table 8).

Table 8: Profitability of Crops (an Example of the Northern Region in Uganda)

Units: Ugandan shillings/acre

Crop	District		
	Amuru	Nwoya	Otuke
Maize	536,000	391,000	---
Rice	**655,000**	**732,500**	**417,500**
Groundnuts	483,000	718,500	58,500
Sunflower	---	---	158,500
Sesame	---	---	122,500

Source: Agricultural Value Chain Analysis in Northern Uganda: Maize, Rice, Groundnuts, Sunflower and Sesame, March 2014, Action Against Hunger
Note 1: The above numerical data has been calculated based on information obtained in a field survey (interviews with farmers and those engaged in distribution and processing) conducted in 2013.
Note 2: "---" means that there is no data.

(iv) Use of increased income obtained (livelihood improvement)

The main uses for the income obtained from rice cultivation are expenditure on children's education (109 out of 152 households (71.7%)), repair or construction of house (46 out of 148 households (31.1%)), purchase of durable goods such as bicycles, etc. (45 out of 152 households (29.6%)), purchase of foods (39 out of 149 households (26.2%)), etc., and there were also cases of purchase of livestock (16 out of 155 households (10.3%)). In this way, NERICA rice production contributes to livelihood improvement (results of the beneficiary survey).

(v) Effect of creation of employment

Although there was no specific numerical data, the interview survey conducted at rice millers (one location in each district of a total of 9 districts in the Northern, Western, and Central regions of Uganda) revealed that the number of rice millers has increased in recent years (see Table 9). Of 9 rice millers that were interviewed, 4 rice millers started business since 2014 (44%). The districts where the number of rice mills has increased since 2012 were at 8 of the 9 locations, therefore, it can be said that there is a certain level of increase in the number of farmers producing rice and the quantity of rice being produced. The increase in the number of rice mills in rural

areas close to the rice production areas shortens farmers' traveling distance to the rice mill, and reduces the transportation cost of harvested rice.

Furthermore, it is considered that the rice production increase and the increase in the amount of rice being transported to rice mills generated income opportunities for persons who provide transport service (rice is transported by truck or by motorbike). In addition, the increase in the number of rice mills means that there is an increase in employment opportunities as operator at rice millers.

Table 9: Results of Interviews Regarding the Change in Number of Rice Millers and the Improvement in Rice Quality

	District (Note 1)	Location of rice miller	Year of commencement of operation	Number of nearby rice millers	Change in the number of rice millers in recent years (in last 5 years)	Improvement in rice quality (Note 3)
1	Kole	Ayer S/C	**2014**	1	Increased	Improved
2	Dokolo	Town Council	**2016**	1	Increased	Improved
3	Amuru	Pabbo S/C	**2015**	5	Increased	---
4	Kakumiro	Bugangaizi West S/C	2010	4	Increased from 2 to 4 in the past 3 years	Improved
5	Hoima	Hoima town	2004	25	Increased from 10 to 25 since 2004	Improved
6	Masindi	Pakanyi S/C	**2014**	3	Increased (first rice miller installed in 1990)	Improved
7	Nakasongola (Note 2)	None	None	0	None	---
8	Luwero	Zirobwe S/C	2005	4	Increased (to increase by 1 more location in 2017)	Improved
9	Wakiso	---	---	2	Decreased	---
10	Mukono	Nakisunga S/C	2008	6	Increased	Improved
11	Nakaseke	Semuto Town Council	2007	3	Unclear (operating at 2 rice millers)	Improved

Source: Interviews with staff at rice millers. In Wakiso district only, an interview was conducted with staff of the district agricultural office.
Note 1: Rice millers No. 1 to No. 3 are located in Northern Region, No. 4 to No. 6 in Western Region, and No. 7 to No. 11 in Central Region.
Note 2: There is no rice miller in this district (because the rainfall is low, rice cultivation is difficult).
Note 3: At 8 out of 9 rice millers, the rice mill staff replied that the quality of the rice brought by the farmers has improved.

(vi) New commencement of rice cultivation by nearby farmers

From the results of the beneficiary survey, it was found that 16 households (on average)[28] near the trained farmers under this Project commenced rice cultivation. It is considered that this was because the farmers recognize higher profitability of rice cultivation compared with that of other crops in general, and, the trained farmers were

[28] In the beneficiary survey, the farmers that had attended the training seminar were asked how many nearby farmers newly commenced rice cultivation after the completion of this Project, and responses were obtained from 140 farmers (farmers that had attended the training). The average value of the numbers obtained was 16 households.

instructed at the training to transfer acquired skills on rice cultivation to the other farmers. Therefore, it can be said that NERICA rice cultivation is extending naturally to the nearby farmers.

(2) Negative Impacts

From the results of the beneficiary survey and interview surveys, there was no information regarding negative impacts (natural environment or resident resettlement) directly caused by this Project.

On the other hand, according to interviews with district agricultural officers, information was received that rice cultivation can be seen in some part of wetlands or along rivers in the project target area, and development of wetlands, which are subject to conservation, has started to expand, therefore, there is a fear that degradation of wetland environment progresses.

In Uganda, a National Policy for the Conservation and Management of Wetland was enforced in 1995 regarding the use of wetlands, and, there are guidelines regarding the conservation and management of wetlands. Conservation and sustainable use of wetlands in accordance with the policy and guidelines are being carried out mainly by the Ministry of Water and Environment. It is possible for wetlands to be sustainably used for rice cultivation and fisheries. However, conservation and orderly use are necessary, therefore, it is necessary to carry out awareness-raising activities toward the farmers, etc. Note that an environmental officer is assigned in the natural resource department in each district, who is engaged in environmental conservation of the wetlands.

In addition, the “Wetland Sector Strategic Framework” (2011-2020) has been formulated as a 10 year-plan for wetland management. Its strategic objectives include a legal framework for effective management of wetlands, strengthening fairness, improving productivity of wetlands, etc. Also, in 2011 an environmental conservation team was established within the Ministry of Water and Environment that carries out controls and monitoring of wetlands, etc., based on the laws and regulations, and is carrying out work to clarify the boundary lines of the wetlands[29].

In light of the above, it can be seen that a certain level of effect has been realized through implementation of this Project, and that its effectiveness and impact are fair. “NERICA rice production is improved in quantity and quality in the target area”, which is the project purpose, has not necessarily been sufficiently achieved. On the other hand, some of the indicators of the overall goal of the Project are not necessarily appropriate, and specific numerical targets have not been set, therefore, although it is difficult to evaluate the degree of achievement by comparison with the target values, the Project has contributed greatly to the increase in income of rice

[29] Source: Ministry of Water and Environment, Advertiser Supplement, February 2, 2016

farmers, therefore, it can be said that the overall goal has more or less been achieved.

Box: Operation of a Rice Mill by a Group of Farmers Cultivating NERICA Rice

In 2009, some farmers from Pakanyi Sub-county in Masindi District attended the training on NERICA rice cultivation of this Project, and received training from staff members of NaCRRI and Japanese experts. The number of farmers cultivating rice in a part of the area within Pakanyi Sub-county was 28 in 2009, but by 2017 this had increased to about 250. It can be seen that there is interest in rice cultivation among the farmers, and, that the increase in the number of farmers cultivating rice is due to the fact that farmers who had already commenced rice cultivation are transferring acquired rice cultivation techniques to the other farmers.

The local government management and services delivery project[30] is considered to be one of the approaches to rural development. With support from this Project, in 2014, a farmers' group within this sub-county purchased rice mill machinery. Initially, the farmers' group rent the land for installation of the rice mill, and provided the rice milling service, but they saved jointly their earnings to invest for construction of a building for installing rice mill machine. At the time of the ex-post evaluation, one rice milling machine had been installed within the constructed rice milling house, and one operator employed by the farmers' group was working there. The number of members of this farmers' group which is operating rice mill is 32, the majority of members cultivate rice.

During the interview with members of the farmers' group carried out by the external evaluator at the rice mill, by coincidence, a rice farmer brought rice (unhulled) that had been dried. As far as the external evaluator could see, there was no dirt, etc., mixed with the unhulled rice before milling. Inspection of the rice after milling showed that virtually almost none of the rice grains were broken, and that the milled rice had extremely good quality. It also appears that there was no mixing of rice varieties. According to the interview with the members of the farmers' group, the members of this group provide instruction to rice farmers on the appropriate rice drying methods after rice harvest. It is considered that this kind of instruction has resulted in producing good quality rice.

[30] Project implemented by the Ministry of Local Government, with assistance from the World Bank

Rice milling machine installed in the building

Rice after milling

Note that almost all the rice produced in this area is consumed within the area. According to interviews with a shop owner, for about 3 months after the rice harvesting season, locally produced rice is available in the shops, but thereafter purchased imported rice is sold. From this, it can be seen that the number of farmers producing rice in this area has increased and the amount of rice production has also increased. On the other hand, it can also be seen that the demand for rice in this area greatly exceeds the quantity of rice produced in the area, and that the demand for rice in the rural areas has greatly increased.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

The planned and the actual inputs on Japanese and the Ugandan sides to this Project are shown in Table 10.

Table 10: The Main Planned and Actual Inputs for This Project

Inputs	Plan	Actual
(1) Experts	The long-term and short-term deployment plan for experts is unclear. (Chief advisor, rice cultivation techniques/training, dissemination, upland rice irrigation technology, post-harvest processing, etc.)	3 long-term experts (82.4 MM*) 30 short-term experts (33.5 MM)
(2) Trainees received	As necessary	8 persons (training in Japan)
(3) Equipment	Vehicles, agricultural machinery, laboratory equipment	Vehicles, tractors, office equipment, agricultural machinery
(4) Operational Cost	Including day-to-day work cost, training cost, cost of field preparation	130 million yen
Japanese Side Total Project Cost	330 million yen	385 million yen
Ugandan Side Total Project Cost	(Not stated)	0.8 million yen

* MM stands for man month.

Source: Prepared by the external evaluator based on the ex-ante evaluation document of this Project, the terminal evaluation report, and materials provided by JICA.

3.3.1.1 Elements of Inputs

In November 2010, construction of the "Rice Research and Training Centre" financed by a grant aid project was completed. Thereafter, research and training for rice cultivation were carried out using the centre buildings, the rice experimental fields, workshops, etc., and as a result, the activities of this Project were smoothly carried out.

In this Project, equipment was provided not only to NaCRRI, but also to ZARDIs. Also, development of rice fields at ZARDIs was carried out. The costs of installing fences around the Rice Research and Training Centre (within NaCRRI) that was constructed by the said grant aid project were also included in the expenditures. In addition, the number of short-term experts dispatched was 30, a large number[31]. According to interviews with Japanese experts, these factors resulted in an increase in the project cost.

Equipment including office equipment such as computers and printers, vehicles, agricultural equipment such as threshers and tractors, and research equipment such as leaf area meters was procured in this Project. On the other hand, the grant aid project intended to procure equipment that is directly connected to the facilities to be constructed, therefore, it can be said that the equipment procured in the grant aid cooperation project and the equipment procured in this Project were complementary to each other.

3.3.1.2 Project Cost

The planned project cost on the Japanese side was about 330 million yen, but the actual cost exceeded the planned amount at 385 million yen (117% of the planned amount). The main reasons for this were the large number of short-term experts dispatched, the necessity of providing equipment, and developing the rice fields at ZARDIs.

3.3.1.3 Project Period

The planned project period was 36 months from August 2008 until July 2011. The actual project period was 35 months from August 2008 until June 2011, which was within the planned period (97%).

Although the project period was within the plan, the project cost exceeded the

[31] According to interviews with Japanese experts, researches on NERICA rice in Uganda was still in the initial stage, and it was necessary for specialized and academic researches to be carried out such as pest and disease control, the relationship between the soil moisture content and NERICA rice growth, etc. Therefore, it was necessary to dispatch many researchers from Japanese universities, so the number of experts dispatched became large.

plan. Therefore, efficiency of the project is fair.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

Increase in rice production and improvement in productivity, and strengthening of the dissemination capabilities and extension system are considered to be important in the Second National Development Plan (2015/16-2019/20) and the Agricultural Sector Strategic Plan (2015/16-2019/20) of Uganda. Also, the Directorate of Agricultural Extension Services was established within MAAIF, the National Agricultural Extension Policy was formulated in 2016, and strengthening of the agricultural extension system is in progress. Under these circumstances, NaCRRI and ZARDIs play important roles in implementing research and training in rice cultivation.

In light of the above, it is judged that the Ugandan government and MAAIF maintain policies and institutional structures in order to actively promote agriculture and rice production in the future, therefore, there are no problems regarding the policy and institutional aspects for this Project.

3.4.2 Organizational Aspects for the Sustainability of Project Effects

At the time of the terminal evaluation, it was pointed out that there was a shortage of research personnel in the field of rice cultivation. The number of researchers and technicians[32] in NaCRRI at the time of completion of the Project (2011) was 8, but according to the data obtained at the time of the ex-post evaluation, this number had increased to 18 (2016). The rice researcher personnel have been strengthened. Note that the rice researchers from NaCRRI have been busy because they have been involved in so many research activities like research provided by the JICA technical cooperation project, or other research activities financed by the Government and donor assistant projects. However, according to the interviews with the Japanese experts, the activities in this Project had been carried out so far under the leadership of the Japanese side, in order to realize the outcome of the Project. Therefore, there is a necessity to further increase the personnel of NaCRRI in order to improve their initiative for the research activities in the JICA technical cooperation project.

[32] Research staff that carry out research based on instructions from researchers

Table 11: Trend in the Number of NaCRRI Research Staff (2009 to 2016)

Unit: persons

Year	2009	2010	2011	2012	2013	2014	2015	2016
Research staff engaged in research and training regarding rice cultivation	2	2	2	3	3	3	5	5
Technicians engaged in the same (research staff that carry out research based on instructions from the researchers)	2	2	2	4	4	4	6	6
Other support staff connected with rice research	4	4	4	7	7	7	7	7
Total	8	8	8	14	14	14	18	18

Source: NaCRRI

Although the status of implementation of research and training into rice cultivation by ZARDIs and NaSARRI, which are regional research institute, differs somewhat depending on each organization, basically these organizations have researchers into rice cultivation (about 5 to 7 researchers per organization), and research and training into rice cultivation continues to be carried out at least a 7 ZARDIs out of 9 ZARDIs (there are 9 ZARDIs in whole country), and at NaSARRI. Table 12 shows the number of researchers working on rice cultivation at the time of the ex-post evaluation.

Table 12: Number of Rice Researchers at ZARDIs and NaSARRI (as of May 2017)

Unit: persons

	Institute	Number of persons involved in rice research			
		Researchers	Technicians	Support staff	Total
1	NaSARRI	3	2	2	7
2	Abi ZARDI	3	3	2	8
3	Bulindi ZARDI	3	2	2	7
4	Mukono ZARDI	---	---	---	---
5	Mbarara ZARDI	3	2	2	7
6	Rwebitaba ZARDI	2	2	1	5
7	Nabuin ZARDI	---	---	---	---
8	Kachwekano ZARDI	1	2	2	5
9	Buginyanya ZARDI	3	1	3	7
10	Ngetta ZARDI	1	2	2	5

Source: Hearing from each ZARDI

Note: It was not possible to contact the relevant persons at Mukono ZARDI and Nabuin ZARDI, therefore, information could not be obtained.

In the field of training and extension, the extension officers working at NAADS were dismissed in 2014 due to the reorganization of NAADS, which was one of the organizations providing agriculture extension services (the agricultural extension service was eliminated from the roles of NAADS). On the other hand, the extension officers (agricultural officers) belonging to the district agricultural offices continued to be employed. Thereafter some of the extension officers that had been dismissed from NAADS were employed by the district agricultural offices. In addition, number of agricultural officers (newly employed) at the district agricultural offices is increasing, in accordance with a new agricultural extension policy. There is no difference in the contents of the extension activities undertaken by the NAADS extension officers and the extension activities undertaken by the agricultural officers belonging to the district agricultural offices. Therefore, it is considered that the increase in the number of agricultural officers will result in strengthening the extension structure, and in terms of institutional aspects it can be said that recovery is in progress. Note that there is no change in the necessity for improvement in promotion of cooperation between the research institutions and the extension organizations. At the ex-post evaluation, discussion on creation of a training unit at NaCRRI is underway in NaCRRI. If this training unit is established, this unit takes roles to communicate and coordinate with agricultural extension implementing institutions for arranging trainings. Therefore, it is expected that a role on promotion of linkage between research institutions and extension institutions is added for the training unit.

In summary, the research and extension structure for rice cultivation promotion is being improved, and although there are no major problems with the organizational aspect of research, there are some issues regarding strengthening the extension system and the linkage between research and extension. Therefore, the sustainability of this Project in the organizational aspect is partially satisfactory.

3.4.3 Technical Aspects for the Sustainability of Project Effects

After completion of this Project, the capability for research into rice cultivation has been continuously strengthened at the research institutes such as NaCRRI, etc., through a technical cooperation project called PRiDe Project (2011-2018) (including an extended period) which was being implemented at the time of the ex-post evaluation. Research reports relating to rice are continuously prepared, and the number of reports and papers produced by NaCRRI is maintained at a certain constant level, and therefore it can be said that the technical level of NaCRRI is being maintained (Table 13). Note that the number of researchers involved in rice research at NaCRRI is steadily increasing as shown in Table 11, but it is necessary to further increase the number in order to develop the young researchers, and for the Ugandan

researchers to take the initiative in proceeding with the research.

Table 13: Trend in the Number of Rice Related Research Reports and Papers Produced by NaCRRI

Year	2009	2010	2011	2012	2013	2014	2015	2016
Number of research reports (No.)	2	2	2	2	2	2	2	2
Number of papers (No.)	2	2	3	3	4	4	4	3
Total	4	4	5	5	6	6	6	5

Source: NaCRRI

Research and training in rice cultivation is continuously carried out at almost all of the ZARDIs and at NaSARRI. There are also institutes where rice seed multiplication is carried out. Table 14 shows the status at the time of the ex-post evaluation. At all of the 8 institutes for which information was obtained, rice research is carried out, and, training in rice cultivation is continuously implemented for farmers. In 6 out of the 8 institutes, rice seed multiplication is carried out. Regarding the research and training capability of the researchers in the field of rice belonging to ZARDIs and NaSARRI, it is said that there are differences in the level of capability depending on the researcher[33], and there is a necessity to further strengthen capabilities in accordance with the research implementation capability.

Table 14: Status of Rice Cultivation Research, Rice Seed Multiplication, and Training on Rice Cultivation at ZARDIs and NaSARRI

	Institute	Continuation on Rice Cultivation Research		Rice Seeds Multiplication		Implementation of Training on Rice Cultivation for Farmers	
		Yes	No	Yes	No	Yes	No
1	NaSARRI	○		○		○	
2	Abi ZARDI	○		○		○	
3	Bulindi ZARDI	○		○		○	
4	Mukono ZARDI	---	---	---	---	---	---
5	Mbarara ZARDI	○			○	○	
6	Rwebitaba ZARDI	○		○		○	
7	Nabuin ZARDI	---	---	---	---	---	---
8	Kachwekano ZARDI	○			○	○	
9	Buginyanya ZARDI	○		○		○	
10	Ngetta ZARDI	○		○		○	

Source: Information obtained through hearing to each ZARDI (May 2017)
Note: It was not possible to contact the relevant persons at Mukono ZARDI and Nabuin ZARDI, therefore, information could not be obtained.

In addition, capacity development (trainings) on rice cultivation techniques for agricultural officers at the district agricultural offices has been continuously implemented through PRiDe Project. Recruitment of new agricultural officers will

[33] Information obtained from the interviews with the Japanese experts at the time of the ex-post evaluation.

continue in the future, therefore, the need for training to the newly employed agricultural officers will continue. In addition, it will be necessary to improve the capabilities (carry out refresher training) for those agricultural officers that already have some knowledge of rice cultivation techniques.

Regarding manuals relating to rice cultivation, a technical manual (Rice Cultivation Handbook) produced in this Project has been revised in PRiDe Project. In addition, training posters have been produced (seeding, weeding, post-harvest processing, etc.), and are used in the trainings for agricultural officers and/or farmers. The necessary manuals and training materials have mostly been prepared.

Regarding operation and maintenance of the equipment used at NaCRRI, almost all the equipment is being used well, and the necessary spare parts are being procured and replaced, therefore, the technical level is appropriate. However, in the future, the service life will be exceeded depending on the type of equipment (for example tractors[34]), therefore, it is necessary to prepare an equipment maintenance and replacement plan, taking into consideration the condition and replacement time for each item of equipment.

In light of the above, it is judged that it is necessary to further strengthen the extension capacity (*e.g.* training of the newly employed agricultural officers), and the sustainability of this Project in the technical aspect is partially satisfactory.

3.4.4 Financial Aspects for the Sustainability of Project Effects

As stated in "3.4.3 Technical Aspects for the Sustainability of Project Effects", the technical cooperation project "PRiDe Project" was being implemented at the time of the ex-post evaluation. Therefore, the majority of the budget necessary for research and training on rice cultivation and seed multiplication at NaCRRI depended on JICA's expenditures for project activities. The degree of dependence on the JICA project was high, and as a result, there were cases in which the budget necessary for facility and machinery maintenance (troubleshooting and replacement) was not sufficiently provided at an appropriate time (there was a delay in the arrival of the budget, and in some cases the amount spent was less than the amount budgeted.). However, a constant level of budget is being provided for the operation and maintenance of the Rice Research and Training Centre (see Table 15).

[34] In Japan, the service life of a tractor is normally taken to be 8 years. This Project was completed in 2011, so about 2018, the tractors procured in this Project will come to the end of their service life.

Table 15: Revenue of NaCRRI (past 3 years)

Units: Ugandan shillings

Revenue		2014/15	2015/16	2016/17
1	Revenue from the Ugandan government	1,235,049,600	1,262,438,357	1,222,845,303
2	Revenue from other donor organizations	6,284,075,703	8,642,318,116	10,942,445,361
3	Revenue from research institutes, universities, etc.	5,593,860,812	5,354,138,450	4,111,114,379
4	Others	47,368,200	32,500,600	169,982,000
Total		13,160,354,315	15,291,395,523	16,446,387,043

Source: NaCRRI
Note: Calculated with JICA's rate for fiscal year 2016 (annual average: 1 Ugandan Shilling = 0.03189 Yen)

Table 16: Expenditure of NaCRRI (past 3 years)

Units: Ugandan shillings

Expenditure		2014/15	2015/16	2016/17
1	Staff salaries	2,478,718,429	2,446,416,819	3,588,115,459
2	Research and training costs	6,040,539,835	6,245,106,149	7,582,824,337
3	Maintenance cost	4,526,069,401	5,033,959,057	4,223,460,177
4	Equipment procurement cost	69,725,000	1,291,559,469	925,000,000
5	Externally commissioned research costs	45,301,650	274,354,029	126,987,070
Total		13,160,354,315	15,291,395,523	16,446,387,043

Source: NaCRRI

Table 17: NaCRRI's Budget for Cereal Program and Maintenance of the Centre

Units: Ugandan shillings

Budget item		2014/15	2015/16	2016/17
1	Rice research and training budget	916,500,000	746,000,253	985,000,000
2	Maize research and training budget	174,984,138	1,025,626,075	1,675,721,100
(1+2)	Total of the above (cereal research program)	1,091,484,138	1,771,626,328	2,660,721,100
3	Operation and maintenance budget for the Rice Research and Training Centre	1,025,789,265	1,260,720,000	1,437,225,000

Source: NaCRRI

Table 18 shows the budget for rice research in ZARDIs and NaSARRI at the time of the ex-post evaluation. Budget information was obtained from 8 out of 10 institutes. Budget for rice research is appropriated for 4 out of the 8 institutes. The amounts converted into dollars range from $3,300 to $14,400. Although this is not necessarily a large amount, budget is allocated for research into rice cultivation, therefore, the sustainability of research on rice cultivation is ensured. At the other institutes, the budget is not officially appropriated for research on rice cultivation, but budget from other projects, etc., is used.

Table 18: Budget for Rice Research in ZARDIs and NaSARRI

Units: Ugandan shillings

	Institute	Whether or not there is budget for rice research (fiscal year 2016/17) and amount	
		Yes/No	Amount
1	NaSARRI	N	Depends on budget of various projects
2	Abi ZARDI	Y	25,000,000
3	Bulindi ZARDI	N	Relies on PRiDe Project
4	Mukono ZARDI	---	---
5	Mbarara ZARDI	N	Depends on various projects
6	Rwebitaba ZARDI	N	Requested after implementation of the activity
7	Nabuin ZARDI	---	---
8	Kachwekano ZARDI	Y	52,000,000
9	Buginyanya ZARDI	Y	12,000,000
10	Ngetta ZARDI	Y	30,000,000

Source: Hearing from each ZARDI (May 2017)
Note 1: the Ugandan fiscal year is from July 1 to June 30 of the following year.
Note 2: "---" means it was not possible to obtain information.

Regarding the budget for the district agricultural offices, according to interviews at MAAIF and district agricultural offices, the activity expenses for the district agricultural office headquarters corresponds to about 63,000 yen per year, and, there is almost no activity expenses that can be used by the agricultural officers belonging to the sub-county offices, therefore, the budget for the extension activities is extremely insufficient. However, the National Agricultural Extension Policy of Uganda indicates that there is an intention to greatly increase the amount of budget for extension activities, and MAAIF has indicated an intention to increase the amount of budget for extension activities in fiscal year 2017/2018[35].

In light of the above, the sustainability of this Project in the financial aspect is not necessarily sufficiently ensured, and there are some problems. According to interviews with the MAAIF staff and the National Agricultural Extension Policy of Uganda formulated in 2016, MAAIF intends to increase the amount of budget for extension activities. Therefore, the amount of budget for extension activities will increase, and it is expected that the sustainability of this Project in the financial aspect will improve.

Some minor problems have been observed in terms of the organizational, technical, and financial aspects. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project was implemented with the project purpose of improving NERICA

[35] The Ugandan fiscal year is from July 1 to June 30 the following year.

rice production (upland rice and lowland rice) in its quantity and quality in the target area, and with the overall goal of contributing to improved rice production for self-sufficiency of Uganda, and increasing farmers' incomes, at NaCRRI and ZARDIs under supervision by NARO, acting as the project implementing agency. NARO is a research institute directly controlled by MAAIF of the Republic of Uganda.

At the time that this Project was planned and at the time of its completion, modernisation of agriculture and promotion of rice production had high importance in the Ugandan development policy, plans and development needs. Furthermore, at the time of planning, the Project was highly consistent with the Japan's ODA policy. Therefore, the relevance of this Project is high. The capabilities of NaCRRI and ZARDIs for research and dissemination of NERICA rice (upland rice and lowland rice) have generally improved, and the appropriate rice cultivation techniques are being transferred to farmers, etc. in the target areas. On the other hand, regarding improvement of NERICA rice production in its quantity and quality in the target area which was a purpose of this Project, although the result of improvement in quality and quantity has been produced, the indicator for the production quantity has not been achieved. Some of the indicators associated with the overall goal are not necessarily appropriate, and specific numerical targets have not been set, therefore, although it is difficult to evaluate the degree of achievement by comparison with the target values, it can be said that the overall goal has been mostly achieved, as the Project has contributed greatly to the increase in income of rice producing farmers. Other impacts of the Project include contribution to improvement in the livelihood of rice producing farmers, improvement of the status of women within the household, etc. In light of the above, effectiveness and impact of the Project are fair. Although the Project was implemented according to the predetermined schedule, the project cost exceeded the planned cost, therefore, efficiency of the Project is fair. As for sustainability of the Project, although no particular problems are observed in the policy and institutional aspects, there still remain some issues regarding organizational aspect, such as the number of extension officers (agricultural officers), linkage between research and extension. In the technical aspect, some problems remain to be solved in terms of improvement of rice cultivation skills of the agricultural officers, and there are also some problems in the financial aspect, the sustainability of the effects generated by this Project is therefore fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

Recommendations for MAAIF, NARO and NaCRRI

(1) Promotion of appropriate use of wetlands

Development of the low-lying wetlands in the Eastern Region of Uganda is a

major problem from the viewpoint of conservation of the natural environment. In contrast, NERICA rice cultivation in upland fields does not cause many problems to wetlands. However, NERICA rice can also be cultivated in wetlands, and there is information that rice cultivation has started in some wetlands in the project targeted area. The Ugandan government has prepared the National Policy for the Conservation and Management of Wetland Resources (1995), a Wetland Sector Strategic Framework (2011-2020), and has elaborated guidelines regarding the conservation and management of wetlands, and activities to promote conservation of the wetlands and its proper use have been carried out. Under these circumstances, "Guidelines for Irrigation Development Process in Wetlands" were produced in the JICA Technical Cooperation for Development Planning Project named "Project on Irrigation Scheme Development in Central and Eastern Uganda" (2014-2017). Therefore, it is desirable that when irrigation development to which these guidelines can be applied is being implemented, the use of these guidelines should be promoted, and awareness-raising activities should be carried out among the farmers in cooperation with the other relevant central government organizations and district governments, in order to achieve both conservation of wetlands and their sustainable use.

(2) Promotion of "farmer-to-farmer" extension

It was found from the results of the beneficiary survey that technology transfer from the rice farmers that have attended the trainings to the neighbouring farmers is being carried out. It is considered that it would be effective to further strengthen this community-based technology transfer (technology transfer from practicing key farmers to other farmers). The National Agricultural Policy of Uganda recognizes the necessity of "farmer-to-farmer" extension. Also in PRiDe Project (technical cooperation project) which was being implemented at the time of the ex-post evaluation, the method of extension being tried was technology transfer from a core farm group to other farm groups, utilizing demonstration farm. Based on these circumstances, it is desirable that trials and establishment of the systems and methods of extension of rice cultivation techniques to farmers should proceed, and thereafter a method should be established incorporating the "farmer-to-farmer" extension approaches within the extension system of rice cultivation techniques.

(3) Community support for creation of added value

According to the beneficiary survey, among the farmers that have attended the trainings and within some rural communities, there are those that wish to participate in the subsequent stages after the stage of production, namely processing, packaging, and marketing, which are part of the value chain. For farming groups that are functioning well, it is necessary to provide support and strengthen capabilities

regarding processing machinery and marketing aspects, in order to create further income.

4.2.2 Recommendations to JICA

It is considered desirable that in future when JICA is carrying out cooperation regarding rice cultivation, including NERICA rice cultivation, awareness-raising activities regarding the conservation and use of wetlands should be included in the contents of the training for the farmers, so that degradation of the wetland environment is not caused. Also, in order to promote the “farmer-to-farmer” extension, it is considered desirable that methods of “farmer-to-farmer” technical transfer be constructed and verified, and activities to apply these methods be included within the project activities.

4.3 Lessons Learned

(1) Improvement in reliability of statistical data regarding rice production and set up of appropriate indicator

To date, trainings on rice cultivation techniques have been carried out for many farmers through JICA assisted projects, which have contributed to increasing the rice production. However, in Uganda, there is no reliable statistical data regarding quantity of rice produced, therefore, it is difficult to accurately determine the magnitude of the increase in rice production, the quantity of rice consumed within the country, and effects of rice promotion activities (including the impact of JICA cooperation). MAAIF is increasing the number of staff in charge of statistics, but in the future it will be necessary for them to strengthen the collection of statistical data relating to crop cultivation such as cultivation area and production, etc., in cooperation with the staff of the district agricultural offices, etc. In particular, regarding rice production statistics, it is desirable that activities be incorporated into project activities, in order to appropriately evaluate the outcome of a project, and, to increase the reliability of the rice production related statistical data. For example, periodically carrying out sample surveys, or preparation of records at rice millers, etc., can be considered.

In addition to incorporating project activities for improving reliability of statistical data, setup of indicators that can measure direct impacts of a project is important. Therefore, setup of appropriate indicators should be well considered at the time of planning for similar project or revision of PDM (project design matrix).

(2) Detailed agreement regarding financial commitment and roles of the implementing agency

During the progress of JICA cooperation projects, the Ugandan government

side tended to rely on JICA for financial matters (rice research, training activities, seed production, etc.), and, according to the interviews with the Japanese experts, the project activities proceeded under the leadership of the Japanese side, in order to realize the outcome of the project. At the time of the ex-post evaluation, the technical cooperation project “PRiDe Project” (successor project of this Project) was being implemented (activities in this project were being carried out with coordination and cooperation between the Ugandan side and the Japanese side on funding and personnel aspects, and specifically if there were financial aspects or personnel aspects that the Ugandan side could not sufficiently deal with, it was supported from the Japanese side). Therefore, although there are no problems with respect to implementation of activities related to research, training, and seed multiplication, there is partial problem from the viewpoint of sustainability. In order to improve these points, efforts are being made in above mentioned PRiDe Project to establish a new training unit within NaCRRI, and generate revenue through seed multiplication and sales, and create a system for the use of earnings (this activity was started from latter half of the project period). In the future, when JICA cooperates project, it is desirable that a project plan be prepared and agreed indicating detailed financial allocation and roles of both implementing institution and JICA sides, including a process so that the counterpart institution takes a more leading and autonomous role. It is considered that in this way the sustainability after completion of a project will be increased in both financial and organizational aspects.

End

The Republic of Uganda

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Construction of Rice Research and Training Centre"

External Evaluator: Isao Dojun, Chuo Kaihatsu Corporation

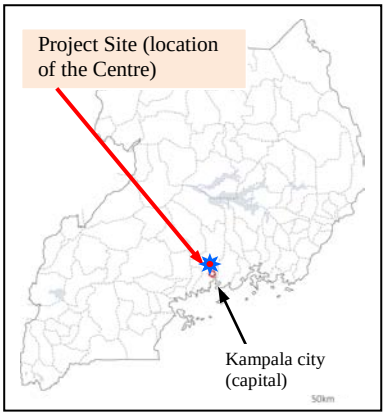
0. Summary

The Project was conducted at the National Crop Resources Research Institute (hereinafter referred to as NaCRRI) with the aim of devising a means to improve the quality of planning, research, training, dissemination, and evaluation necessary for the promotion of rice via the provision of a rice research and training centre and related equipment.

Both at the time of planning and the ex-post evaluation, the Project is and has been in accordance both with the development needs and development policies of Uganda, given the important political objectives on increasing rice production in its national development plans and agricultural planning and policy, as well as its high rice production needs. The Project has high relevance in consideration of its consistent with Japan's ODA policy, given the importance placed upon rice promotion in agricultural development as one of the important areas by the Japanese government for its Ugandan aid policy. Therefore, the actual count of rice cultivation trainees at the Rice Research and Training Centre fell significantly below the target; a primary factor for this was that most farmer-oriented training has been carried out locally (areas where near farmers live) , and so the number of calls to train farmers at NaCRRI decreased. On the other hand, through use of the facility and equipment provided by the Project, rice cultivation researchers were able to showcase their growth and research successes. By way of practical training, agricultural officers and others strengthened their skills in promoting rice cultivation technology. Thus, while the quality of research and training improved, the number of trainees did not meet the target. In terms of contributing to rice promotion in Uganda – the Overall Goal of the Project – the cultivation area and crop yield of rice at the farmer level increased thanks to the distribution of high-quality rice variety seeds to trained farmers and the farmers' trainings. The Project has made a certain contribution to rice production increase. Therefore, the effectiveness and impact of the project is fair. While project cost stayed within the plan, project period exceeded the plan. Therefore, efficiency of the project is fair. There were no issues with operation and maintenance with regards to institutional, technical, financial, or current status; the sustainability of the project effects is high.

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

1. Project Description



Project Location

Rice Training and Cultivation Centre building, NaCRRI

1.1 Background

Seventy four percent (74%) of the Ugandan workforce was engaged in the agricultural sector (2005/6) in Uganda, but their productivity accounted for only 15.6% of GDP (2007/8) with an extremely low growth rate of 0.7% per year. 8.4 million citizens (31.1% of the national population) were estimated to live below the poverty line[1] (2005/2006). In response, the Ugandan government formulated the Plan for Modernization of Agriculture or PMA (2000) based on the Poverty Eradication Action Plan, or PEAP (2004/5-2007/8), which established the key industry of agriculture as an important sector for the reduction of poverty by way of encouraging growth in agriculture and rural development. Further, rice in Uganda is valued as an important cash crop and the consumption and production of rice has rapidly grown: in 2007 total domestic production stood at 162,000 tons, or about doubled the volume in 10 years since 1997. The major factor of this increase in production volume is the increase of the planted area for rice, while yield per unit area has stalled at about 1.5 tons/ha. Furthermore, rice production growth has been unable to keep up with the growth in demand. The deficit has been made up with a reliance on imports. On the other hand, the NaCRRI facility – a base for experimentation, research, and promotion of rice in Uganda – had begun to show wear in its 60 years since construction, and as it was being used also for research and lab work for maize, cassava, and other crops, it was ill-equipped for rice-related research and training. Also, much of the existing research and training equipment was deteriorating or broken down, and farm machinery such as tractors were not receiving sufficient repair or inspection. Furthermore, there was nothing in the way of lodging for visiting or long-term researchers nor experimental fields for cultivar selection experiments or seed multiplication.

[1] The 2005/2006 poverty line varied based on the region, ranging from a PPP (purchasing power parity) of USD $0.94 to $1.07 per person per day. (Source: The Uganda Poverty Assessment Report 2016, World Bank Group)

This is the context in which JICA – having identified rice promotion as the core element of Japanese collaboration – dispatched individual specialists (in NERICA rice adoption techniques) to NaCRRI from June of 2004 to work on establishing technical foundations, training, and dissemination. However, as there was a deficiency in human resource development, the framework for extension, and facilities for rice-related research and extension in Uganda, the Ugandan government requested for the commencement of this project and the technical cooperation project known as the "NERICA[2] Rice Promotion Project," with the aim of improving production and productivity of NERICA rice by way of strengthening NaCRRI's NERICA rice research capabilities, training researchers, developing human resources for local dissemination, and establishing a framework for extension.

1.2 Project Outline

The objective of this project is to improve quality of planning, research, training, dissemination, and evaluation necessary for promoting rice production by providing rice research and training centre facilities and related equipment at NaCRRI, thereby contributing to the rice promotion in Uganda.

<Grant Aid Project>

E/N Grant Limit or G/A Grant Amount / Actual Grant Amount	651 million yen / 578 million yen
Exchange of Notes Date (/Grant Agreement Date)	March 2009 / March 2009
Executing Agency	National Agricultural Research Organization: NARO
Project Completion	November 2010
Main Contractor(s)	The Zenitaka Corporation
Main Consultant(s)	NTC International Co. Ltd.
Basic Design	July 2008 – February 2009
Related Projects	<JICA Technical Cooperation Project> - Sustainable Irrigated Agriculture Development Project in Eastern Uganda (2008-2011) - NERICA Rice Promotion Project in Uganda (2008-2011) - Promotion of Rice Development Project (2011-2018) (includes extension period)

[2] NERICA (New Rice for Africa) rice is general term of rice cultivars developed in 1994 by interbreeding high yield Asian rice varieties with disease- and weed-resistant African rice varieties. There are wet- and dry-growing varieties, enabling NERICA rice to be grown on both uplands and paddy fields.

	<Another Donor's Support> - World Bank: 1) Agriculture Cluster Development Project (2015-2022), 2) Agricultural Technology and Agribusiness Advisory Services Project (ATAAS) (2010-2017) - Netherlands: Integrated Seed Sector Development (2012-2016)

2. Outline of the Evaluation Study

2.1 External Evaluator

Isao Dojun, Chuo Kaihatsu Corporation

2.2 Duration of Evaluation Study

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

Duration of the Study: September 2016 – January 2018

Duration of the Field Study: January 15, 2017 – March 3, 2017, and May 1, 2017 – May 14, 2017

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

3.1 Relevance (Rating: ③[4])

3.1.1 Consistency with the Development Plan of Uganda

At the time of project planning, PEAP (1997-2007), a national development plan, had identified the key industry of agriculture as an important sector for poverty reduction. In addition, PMA (formulated in 2000) identified rice cultivation as an effective means of improving the incomes of poor farmers, raising their standard of living, and realizing food security at the farmer level. In addition, the UNRDS[5] of 2009 (2008-2018) had set a goal of about tripling rice production between the period of 2009/2010 to 2017/2018.

At the time of the ex-post evaluation, rice was included among 12 prioritized commodities for investment in the agricultural portion of the Second National Development Plan (2015/2016-2019/2020). Focus topics included, among others, 1) Strengthening agricultural research, 2) Implementation of a "single spine" agricultural extension system[6], and 3) Technological adoption at the farmer level. In addition, there was a recognition of the necessity for improving the agricultural extension system and strengthening agricultural research. The Agricultural Sector Strategic Plan (2015/2016-2019/2020) continuously places

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[4] ③: High, ②: Fair, ①: Low

[5] Uganda National Rice Development Strategy

[6] Until the reformation of the National Agricultural Advisory Services (NAADS), extension services by NAADS employees and extension services by agricultural employees of the Ministry of Agriculture operated independently. As only the Ministry-led service remained after the reformation of NAADS, it became known as the Single Spine Agricultural Extension System.

rice as one of 12 priority commodities[7], with plans for rice research, promotion, pest management, post-harvest processing, marketing etc. In addition, the fourth item[8] in the investment strategy section of the Agricultural Sector Strategic Plan discusses improvement of agricultural productivity and increase of agricultural production, and improvement of services of the Ministry of Agriculture Animal Industry & Fisheries and related institutions by way of strengthening their organizational capacity. Further, the National Agricultural Extension Policy of 2016 established a goal of developing organizational capacity for effectively providing agricultural extension services, and developing sustainable mechanisms in order for packaging and disseminating appropriate technologies. The Rice Research and Training Centre established at NaCRRI acts as the primary institution for rice cultivation promotion (rice cultivation research activities and rice cultivation technical training). In this way, the Project has a high level of consistency with national development policy and agricultural policy both from the time of the project planning and at the time of ex-post evaluation.

3.1.2 Consistency with the Development Needs of Uganda

JICA began development of rice cultivation researchers in Uganda with the dispatch of individual JICA expert starting in 2004. Until that point there were almost no researchers doing work on rice researches in Uganda and there were almost no agricultural officers who have knowledge about rice cultivation techniques. At the time of planning of the Project, demand for rice in Uganda was on the rise, and there was a need for strengthening both rice cultivation research capability and extension capability. The vice president of the country at that time was aware of the higher productivity of NERICA rice, and aggressively promoted rice cultivation as a part of the poverty reduction campaign.

As of the ex-post evaluation, the Second National Development Plan (2015/2016 - 2019/2020) has set a target of 680,000 tons in rice production by 2020 (as of 2014 the production was 237,000 tons). Meeting this target requires ongoing development of appropriate rice cultivation techniques, multiplication of high-quality seeds, extension of techniques to farmers, improvement of post-harvest processing, etc. There is thus a need to further strengthen the research and extension capabilities of NaCRRI, which acts as the central institution for the research and extension of rice cultivation. In this manner, at the time of planning as well as for the ex-post evaluation, the Project has high consistency with Uganda's development needs.

[7] Bananas, legumes, maize, rice, cassava, tea, coffee, fruit, vegetables, dairy, fish, livestock

[8] 1) Improvement of agricultural productivity and increase of agricultural production, 2) Improvement of access to important agricultural inputs, 3) Improvement of the agricultural market and added value, 4) Improvement of services offered by the Ministry of Agriculture, Animal Industry and Fisheries and other institutions by way of improvement of their organizational capacities.

3.1.3 Consistency with Japan's ODA Policy

At the time of planning, agricultural development was identified as a priority area in Japanese aid policy according to the country-wide data book for Uganda (2007). Rice promotion, animal husbandry promotion, and strengthening and promotion of local industry were all raised as possible cooperative areas in the agricultural development; rice promotion was identified an important area as the nucleus of Japanese cooperation.

This project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The major facilities established by the Project include blocks for research and administrative affairs, training block, a canteen/kitchen, a dormitory for researchers, a screenhouse[9], a warehouse for agricultural machinery, a drying yard[10], a workshop[11], and irrigation facilities for experimental fields. Major equipment furnished includes research equipment, equipment for the experimental fields, post-harvest processing equipment for demonstration, and workshop equipment.

While there is some variation in the floor space of some of the facilities and irrigation/drainage canals used for the experimental fields, changes from the original plan were small. We consider the continued use of the provisional drainage canal, which was used during construction period for improving drainage condition, to be reasonable. As for the equipment, a compressor, a gantry crane,[12] and workbenches have been added, but these are not significant changes in a quantitative or financial sense. The specific facilities and equipment are as outlined in Table 1.

Table 1 Comparison of Planned and Actual Output (Facility)

Facility Type	Plan (see Note 1)	Actual
Contributions by Japanese side		
Administrative block	Laboratory, administrative affairs office, equipment storage room, workroom, pass ways etc. (total floor area 700m^2)	As planned
Training block	Lecture rooms (2 rooms for up to 90 persons, total floor area 424m^2)	As planned
Canteen and kitchen block	Canteen, kitchen, and storage (total floor area 216m^2)	As planned
Dormitory for researchers	6 rooms accommodating 12 individuals, 1 common space. (total floor area 252m^2)	Alteration: area increase (336m^2)

[9] A construction made with netting that prevents penetration by insects and other pests into facilities being used for botanical and cultivation experiments.
[10] A facility with a concrete floor for the sun-drying of harvested rice
[11] A workroom for the repair and maintenance of equipment
[12] A portal crane with an element capable of moving above the rail, used to lift machinery and others

Screenhouse with glass roofing	For cultivation experiments of rice varieties and installation of lysimeters[13] (total floor area 600m^2)	As planned
Warehouse for agricultural machinery	For storing agricultural machinery and research workspace for threshers etc. (total floor area 270m^2)	As planned
Drying Yard	For drying unhulled rice (total floor area 450m^2)	As planned
Workshop, demo rice mill	Place for equipment and repair work, automotive repair. (total area 348m^2), installation of rice huller/miller, and training activity space (total floor area 200m^2), 548 m^2 altogether	Alteration: total floor area decrease (498m^2)
Public Toilet	For researchers and trainees	As planned
Generator Room	Furnished with generator for power outages	As planned
Septic tank and infiltration wells	Facility for processing waste and sewage water	As planned
Irrigation Facility	Experimental fields (2ha)	As planned
	Main irrigation canal (650m)	Nearly as planned (648m)
	Secondary irrigation canal (700m)	Alteration: length decrease (580m)
	Drainage canal (320m)	Alteration: length increase (939m) (breakdown: main drainage canal (619m) secondary drainage canal (320m))
	Farm road (1,200m)	Nearly as planned (1,189m)
Contributions by Ugandan side		
	NaCRRI land needed for construction of new facilities	As planned
	Securing land for facilities and equipment for the Project, and demolition/clearing of existing buildings and subsequent soil preparation when necessary	As planned
	Assurance to diverge existing power lines/water supply necessary for constructing new facilities	As planned
	Legal procedures relating to environmental impact assessment	As planned
	Procurement of furniture, fixtures, appliances, and consumables not included in the scope of the Project	As planned
	Preventative measures against accidents and theft during construction	As planned

Source: Basic Design Study Report, materials provided by JICA, and interviews with individuals involved in the Project.
Note 1: items in parentheses refer to facility scale.

Table 2 Comparison of Planned and Actual Output (Equipment)

Use Location/ Purpose	Plan (see note 1)	Actual
Research/administrative block	Generator (1) and solar battery system (1)	As planned
Research equipment	Meteorological observation equipment (2) and lysimeters (8)	As planned
Equipment for experimental fields	Tractor (2), disc plow (2), bottom plow (2), seeder 1 (1), seeder 2 (1), pesticide sprayer (1), cultivator (1), and trailer (Traction type) (2)	As planned
Post-harvest	Rice huller/miller (1)	As planned

[13] A vat placed in the soil made of metal and concrete used to measure the amount of water movement in the soil and evapotranspiration.

processing equipment for demonstration		
Workshop equipment	Arc welding machine (1), gas welding machine (1), upright drill press (1), high-speed cutter (1), bench grinder (1), pipe threading machine (1), electric tools (1 set), high pressure cleaning machine (1), hydraulic jack (3), other assorted tools (1 set)	Mostly as planned. One compressor, one gantry crane, and 2 workbenches were added.

Source: Basic Design Study Report and materials provided by JICA
Note 1: items in parentheses refer to quantity

3.2.2 Project Inputs

3.2.2.1 Project Cost

The Project was budgeted at 651 million yen on the Japanese side and 7 million yen on the Ugandan side for a total budget of 658 million yen at the time of planning. However, as we have been unable to obtain actual figures from the Ugandan side, we are only able to make final comparisons with the Japanese actual costs only. Costs on the Japanese side came to 578 million yen, or lower than planned at 89% of the initial estimate. The reason for this disparity was due to a reduction in the exchange rate (strengthening yen) and price reductions as a result of the bidding process.

3.2.2.2 Project Period

The Project was expected to last for about 19 months in total from March 2009 to June 2010 at the time of planning, but in reality, it ran for 21 months from March 23, 2009 to November 30, 2010 (completion ceremony), exceeded the plan (111% of planned duration). The main reasons for the extended duration were the longer than expected time from the signing of E/N to the signing of the consultant contract (2 months compared to the estimated 0.5 months), and the extension of the construction period by one month (13 months actual vs. 12 months planned).

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

3.3 Effectiveness[14] (Rating: ②)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

"Trainees numbers at the Rice Research and Training Centre" in 3.3.1.1 shows the quantitative result indicator decided at the time of project planning. 3.3.1.2 and 3.3.1.3 show the increase in rice cultivation researchers and research reports as a result of the establishment of the Rice Research and Training Centre and provision of equipment, which show provided as a supplementary index.

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

3.3.1.1 Rice Cultivation Trainee Numbers at the Rice Research and Training Centre

Table 3 shows the actual numbers of trainees from 2009 to 2016. Further, trainee numbers from farmer-oriented training that was carried out apart from the Rice Research and Training Centre (mainly in rural communities) have been included as a supplementary index.

Table 3: Rice Research and Training Centre Trainee Figures

Units: person

Entry	**Baseline**	**Target**	**Actual**					
	2008	2012	2009-2011	2012	2013	2014	2015	2016
	Planned Year	2 Years After Comple-tion	(the Project Completed in 2010)	2 Years After Comple-tion	3 Years After Comple-tion	4 Years After Comple-tion	5 Years After Comple-tion	6 Years After Comple-tion
Indicator 1: Total trainees at the Rice Research and Training Centre	Yearly total of 1,300	Yearly total of 2,600	4,810 in 3 years (yearly average of 1,603) (see Note 1)	321	229	290	228	244
*Breakdown								
(1) Government engineers 1) Rice researchers (ZARDI) (see Note 2)	50	980	21	11	10	10	9	7
2) Extension officers, etc.			1) 4,506 (9/2008-3/2011) 2) 283 (12/2008-2/2011)	202	102	112	39	48
(2) Farmers/NGO	1,190	1,460		20	20	48	32	25
(3) Foreign researchers etc.	60	160		3	22	38	72	72
(4) JOCV members (see Note 3)	---			85	75	82	76	92
Target of Index 1 (2,600 persons/ year)	---	---	62%	12%	9%	11%	9%	9%
(supplementary indicator 1) Farmers who received rice cultivation training at locations other than the Rice Research and Training Centre (training took place at farming communities etc.)	---	---	1) 9,749 (9/2008-3/2011) 2) 780 (3/2009-4/2011)	3,570	9,505	10,556	10,964	8,870
(supplementary indicator 2) Farmers who received training away from the Centre and indicator 1 (Centre trainees): Total	---	---	15,339 over three years (yearly average of 5,113)	3,891	9,734	10,846	11,192	9,114
Yearly target attainment (2,600 persons/year)	---	---	197%	150%	374%	417%	430%	350%

Source: NERICA Rice Promotion Project Terminal Evaluation Report, Sustainable Irrigated Agriculture Development Project in Eastern Uganda Terminal Evaluation Report, data provided by the Promotion of Rice Development Project

Note 1: Training results from 2009-2011 (3 years) are drawn from 1) the technical cooperation project "NERICA Rice Promotion Project", and 2) the technical cooperation project "Sustainable Irrigated Agriculture Development Project in Eastern Uganda". The figures for 1) are from September 2008 to March 2011 (2 years and 6 months), and for 2) are from March 2009 to April 2011 (2 years and 1 month). In other words, these results are not from the period of January 2009 to December 2011. As the monthly breakdowns are unknown, average values are displayed.

Note 2: Zonal Agricultural Research and Development Institute (hereinafter referred to as "ZARDI").

Note 3: Generally, for technical cooperation projects, participation from the Japan Overseas Cooperation Volunteers (hereinafter referred to as "JOCV members") is not included in the effect target, but it has been included as an indicator as a means of judging effectiveness and impact as this project is a special case.

Looking at the project target year of 2012, there were a total of 321 trainees at the Centre, or about 12% of the target (in total 2,600 trainees per year) – well below target. In the 4 years ranging from 2013 to 2016, the figure was around 10% (from about 220/year to about 320/year), again failing to reach the target. Indicator 1 was established based on the training plans of two technical cooperation projects: the NERICA Rice Promotion Project and the Sustainable Irrigated Agriculture Development Project in Eastern Uganda (based on the plans prepared in 2008 at the time of this project's planning). From 2009 to 2011 (including a portion of the training results from 2008), the average number of trainees per year was 1,603, or about 62% of the target. The level of achievement during this period was so much higher compared to 2012 onward due to the large number of farmer trainees at the Rice Research and Training Centre (however, in spite of the fact that the indicator was defined based on the training plan of the two aforementioned technical cooperation projects, targets were not reached). From 2012 onward, as most of the farmer-oriented training took place in rural areas where farmers live, there was a decrease in the number of farmer trainees at the Centre. The target was for 1,460 trainees per year made up of farmers and persons involved with NGOs at the Centre, but from 2012 onwards the number of trainees was from about 20 to 50 persons per year.

The 2,600 target figures for rice cultivation trainees was calculated in accordance with the training plans of two technical cooperation projects;[15] over half of trainees were expected to be farmers. However, it is thought that this target became difficult to reach, because the policy of the technical cooperation project "Promotion of Rice Development Project" contained a decision that most farmer-oriented training would be held locally from 2012 onwards.[16]

While the number of trainees at the Centre did not meet target, the degree of achievement with the trainees in rural communities included shows that from 2012 to 2016, the figures range from about 1.5 to about 4.3 times the target (2,600 persons per year).

As shown above, by shifting location for farmers' training from the Rice Research and Training Centre to rural communities' due to the policy change in farmer-oriented training location enacted by the technical cooperation project "Promotion for Rice Development Project", the target figures for the Project (as an operational indicator) became difficult to achieve. As a result, while a steady number (about 200 to 300 persons per year) of trainees

[15] There is one technical cooperation project ongoing since 2012.
[16] The Promotion of Rice Development Project, which began in 2011, plans to conduct training with 40,000 farmers over the course of 5 years. Based on interviews with NaCRRI, training with farmers has shifted from taking place at the Centre to taking place locally.

continued to study at the Centre according to the available reliable data,[17] due to the large disparity with the initial target, the level of achievement is judged to be low.

3.3.1.2 NaCRRI Rice Cultivation Researcher Numbers

As shown in Table 4, the total number of rice cultivation researchers at NaCRRI (researchers, technicians,[18] and related staff) gradually increased from 8 individuals in 2011 to 18 at the time of the ex-post evaluation in 2016: two times or more increase.

Table 4 NaCRRI Rice Cultivation Researcher Figures

Units: person

	Before / During /After Project Completion							
	1 Year Before Completion	Year of the Project Completion	1 Year After Completion	2 Years After Completion	3 Years After Completion	4 Years After Completion	5 Years After Completion	6 Years After Completion
Year	2009	2010	2011	2012	2013	2014	2015	2016
Total Number of Rice Cultivation Research Personnel	8	8	8	14	14	14	18	18
<Breakdown> Researchers	2	2	2	3	3	3	5	5
Technicians	2	2	2	4	4	4	6	6
Other staff	4	4	4	7	7	7	7	7

Source: Answer to questionnaire by NaCRRI

3.3.1.3 Number of Rice Research Reports

Over the project duration there were roughly 4-5 rice-related research reports and papers etc. produced yearly, but since project completion, the number is roughly 5-6 per year (see Table 5).

Table 5 NaCRRI Rice-Related Research Report and Paper Figures

	Before / During /After Project Completion							
	1 Year Before Completion	Year of the Project Completion	1 Year After Completion	2 Years After Completion	3 Years After Completion	4 Years After Completion	5 Years After Completion	6 Years After Completion
Year	2009	2010	2011	2012	2013	2014	2015	2016
Number of research reports	2	2	2	2	2	2	2	2
Number of papers	2	2	3	3	4	4	4	3
Total	4	4	5	5	6	6	6	5

Source: Answer to questionnaire by NaCRRI

Further, based on the results of the questionnaire provided to NaCRRI, among the reports and papers etc. prepared after project completion, 13 papers have appeared in peer-reviewed international journals and 9 presentations have been made at peer-reviewed

[17] Aside from this, the lecture rooms are also being used for rice related or non-rice crop-related training sessions and seminars as well as conferences, but there is no reliable data.
[18] Research staff who conducts research activities at the direction of researchers.

academic conferences (international as well as domestic). In consideration of such achievements about publications of the peer-reviewed international journals, the quality of the research papers appears to have been preserved. The level of achievement in research results is therefore deemed to be high.

3.3.1.4 Use of Provided Facilities

While no data was recorded of utilization or operating rates of the facilities the Project provided, Table 6 presents usage situations of the major facilities based on hearings from a Farm Manager at NaCRRI.

Table 6 Facility Usage Situations

	Facility	Usage Conditions, etc.
1	Administrative Block	- Originally it was planned for around 20 staff to use this space. However, at the time of the ex-post evaluation, around 40 individuals - twice the number - were using it. The rate of use is therefore high, but there is now a need for more space. A major reason for this is that the administrative affairs block is now being used both by researchers and staff working on rice and those working on maize.
2	Training Block	- There are two lecture rooms, and one can accommodate 100 persons at the most. They can be used for a variety of training activities, meetings and seminars. Based on interviews with JICA experts, in months with a lot of training planned, they are in almost constant operation. The lecture rooms are used frequently not just for the JICA technical cooperation project's training activities, but also other crop-related training activities and meetings.
3	Canteen and Kitchen Block	- The Canteen generally has around 70 seats arranged inside, and can hold a maximum of about 100 persons. There are no other dining facilities at NaCRRI; it is used by both lecture attendees as well as NaCRRI staff with about 50 persons using it per day at usual time. When seminars or training activities are being held, lunch is offered to training participants. The use rate of the canteen is high.
4	Dormitory for Researchers	- On top of rice lecture attendees and researchers, the dormitory is also used by researchers and others from other crop research programs. Domestic college students (who come here for long-term stays as interns) and researchers from ZARDI etc. (for long-term OJT[19] before Training in Japan) also use it; the rate of use is constant. However, because the maximum accommodation is low at 12 individuals, people participating in the regular training course (at the scale of around 30 trainees) are unable to use it. Based

[19] OJT: On-the-Job Training

		on an interview with the director of NaCRRI, a dormitory able to accommodate 30-40 persons would have been more appropriate on training expense reduction.
5	Screenhouse with Glass Roofing	- Based on interviews with researchers at NaCRRI, the screenhouse is very helpful for rice cultivation research activities and is used year-round.
6	Warehouse for Agricultural Machinery	- No particular problems. It is being effectively used as a place to store agricultural machinery.
7	Drying Yard	- The drying yard is being effectively used to dry rice seeds.
8	Workshop	- The workshop building and equipment are in good working condition and are frequently used to perform maintenance on the machinery. The rice mill is equipped with a seed sorter. At the time of rice seed harvest, it is used to sort and bag the rice seeds distributed to farmers attending the trainings.
9	Demo Rice Mill	
10	Common Toilet	- Outdoor toilet for trainees and others. In useable good condition.
11	Generator Room	- Generator is in good condition, and is used during power outages.
12	Septic Tank and Infiltration Wells	- Good condition.
13	Irrigation Facilities (on the experimental fields)	- Based on interviews with NaCRRI researchers, in Uganda, rice cultivation is possible year-round with enough water for irrigation. In order to show lecture attendees different stages of the rice-growing stages, rice is planted at different intervals throughout the year. The irrigation facilities are also used year-round for rice cultivation research.

Source: Most of information was obtained from the Farm Manager of NaCRRI and a part of information was obtained from other persons concerned. Information of the results of site observation conducted by the external evaluator is also included.

As Table 6 shows, the administrative affairs block with its offices for researchers and laboratories, the training block, the canteen, the screenhouse with glass roofing, the workshop, and the irrigation facilities are all noted as facilities with a lot of users concerned and a high degree of use. Generally speaking, the facility usage rate is thus considered high.

3.3.1.5 Usage Rate of Provided Equipment

Based on interviews with Farm Manager at NaCRRI, no numerical data is kept at NaCRRI on utilization or operating rates of the equipment provided by the Project. However, going by the field inspection conducted at the time of the ex-post evaluation and the above interviews, almost all of the provided equipment is in operatable condition and used for research activities, field works, and maintenance of machinery. The utilization rate is therefore judged to be high.

3.3.2 Qualitative Effects (Other Effects)

The qualitative effects[20] expected at the time of project planning were "Smooth Implementation of Training Courses," "Improvement of Training Effectiveness Via Practical Training with Equipment," "Proper Equipment Maintenance and Reductions in Maintenance Costs," "Reception of Researchers and Reduction of Researcher-Related Economic Burdens Via the Construction of Dormitory Building," "Implementation of Continuous Year-Round Rice Cultivation Experiments and Improvement of Effectiveness of Researches and Trainings." These qualitative effects were evaluated as follows, based on interviews with NaCRRI staff and trainees[21] at the Rice Research and Training Centre. At the time of the ex-post evaluation, the effects had largely been realized.

3.3.2.1 Continued Implementation of Training

- At NaCRRI, it became possible to plant different rice varieties at different seeding times so that lecture attendees could learn about the rice growing stages and the differences in growth of different rice types. There has also been practical training in rice planting and others. Agricultural officers and farmers who knew very little about rice cultivation were able to acquire rice-related knowledge and techniques because of the practical training activities.
- It became possible to cultivate and conduct research on rice year-round due to the creation of rice cultivation experimental fields with irrigation facilities. With the existence of the irrigation facility, rice seeds multiplication stabilized, and rice seeds could be produced for distribution to trainees.
- Post-harvest processing equipment like the rice milling machine is useful during practical training sessions of rice cultivation trainings.
- The Centre functions as a base for domestic rice cultivation research. As a variety of topics relating to rice cultivation can be learned at the Centre in one place, it operates as a "one-stop centre" for rice research and training.

3.3.2.2 Improvement of the Research Environment, Facility Usefulness and Functionality

- Until the construction of the Centre, NaCRRI did not have large lecture room or a canteen. When training events were held, outside training facilities were rented, and lunches were catered. With provision of the lecture rooms and the canteen, NaCRRI and training sponsors

[20] Direct effects of the Project which are described in the Basic Design Study Report

[21] 11 NaCRRI staff, 11 JICA employed staff, 10 ZARDI staff, 44 agricultural officers, 19 farmers, and 7 members of JOCV, for a total of 102 persons. NaCRRI staff and JICA employed staff members who were involved in rice research and training and available for interviews at NaCRRI at the time of the ex-post evaluation were selected. As for the ZARDI staff, visits were made to the regional agricultural offices of the Eastern, Northern, Western, and Central regions during the ex-post evaluations of the Sustainable Irrigated Agriculture Development Project in Eastern Uganda and the NERICA Rice Promotion Project, with interviews conducted at the 4 ZARDI locations along that route. Interviews were carried out to agricultural officers at agricultural offices in districts selected as targets of the beneficiary survey for the ex-post evaluation surveys of the above-mentioned projects. JOCV members were selected from among those who were able to give interviews and who attended trainings at the Rice Research and Training Centre. Farmers, as the counterpart to the JOCV members, were selected from among those who took lectures on rice cultivation at the Centre.

(donor institutions) no longer had to burden the cost of outside training facilities nor deal with the work of procuring lunch, which led to cost reductions and improvement in convenience.

- With provision of research equipment and experimental fields, the types of rice cultivation research expanded, rice seed multiplication capabilities were enhanced, and it became possible to conduct year-round rice cultivation experiments and demonstration of rice growing stages.
- As a result of the equipment provided, research and training can continue uninterrupted during power outages (by using the generator), weather data can be utilized (by using the weather observation equipment), and research on post-harvest processing can be conducted (by using the post-harvest equipment).
- Before commencement of the Project it was necessary to travel outside the country in order to enhance rice cultivation research capability, but with the establishment of the Rice Research and Training Centre, it is now possible to strengthen one's research skills on rice domestically.

3.4 Impacts

3.4.1 Intended Impacts

The main impact (overall goal) of the Project was to “contribute to the promotion of rice in Uganda,” and at the time of project planning the following items were expected as impact.

(1) A dormitory facility will enable researchers to visit from afar, or reduce their financial burden.

(2) The quality of planning, research, dissemination, monitoring, evaluations etc. will be improved.

(3) Through the increase of rice production, farmer incomes will increase, leading to a higher standard of living.

(4) By facilitating use of the Centre by rice-related international institutions, donors, NGO meetings, and seminars, rice promotion can be advanced throughout Uganda.

(5) Use of the Rice Research and Training Centre for learning agriculture by the agricultural schools throughout Uganda.

The realization of the impact of these items is as follows.

3.4.1.1 On the Reception of Researchers and their Financial Burden

The Rice Research and Training Centre dormitory accepts researchers doing work related to rice cultivation, college interns, OJT trainees who is going to be trained in Japan etc. As the dormitory is on the Centre grounds, it is very convenient. Based on an interview with the NaCRRI Farm Manager, institutions conducting training activities save money on lodging and commuting fees via this setup compared to using outside facilities other than NaCRRI.

3.4.1.2 On Quality Improvement in Planning, Research, Dissemination, Monitoring, and Evaluation

Based on interviews with NaCRRI rice cultivation researchers, the number of reports etc. documenting rice cultivation research results is increasing due to provision of facilities and equipment under the Project. It is judged that this is an indication of increased research quality. The rice experimental fields, demonstration fields, and agricultural machinery have enabled hands-on training, which has improved the quality of training.

3.4.1.3 Regarding the Increase of Farmer Income and Improvement of Living Standards

Agricultural officers and ZARDI staff who attended rice cultivation lectures at the Rice Research and Training Centre have conducted farmer-oriented training activities. As the farmers who received the training began to properly utilize rice cultivation techniques, rice productivity increased. According to the results of an ex-post evaluation survey on the Sustainable Irrigated Agriculture Development Project in Eastern Uganda (2008-2011) which compared the rice productions of farmers who had and who had not received training in irrigated rice cultivation techniques,[22] at a farmer who received training, rice production in one cropping season was 0.98 tons before receiving training and 1.83 tons after training, it is roughly double the production. While an increase of land devoted to rice cultivation was partially responsible for the production increase, the unit yield increase is major factor, in particular, an average of 2.6 tons/ha in yield for farmers who had received training versus an average of 1.9 tons/ha for those who had not. Improvement in the unit yield is contributing rice production increase. Based on the results of beneficiary surveys of farmers who received training with the NERICA Rice Promotion Project and the Sustainable Irrigated Agriculture Development Project in Eastern Uganda, the average percentage of income from rice sales within total income of farmer's household was about 73% for farmers doing irrigated rice cultivation and about 51% for farmers growing upland rice. Thus, rice production increase and starting rice cultivation newly are linked to enhancement of farmer income and livelihood.

3.4.1.4 Regarding the Contributions of International Institutions Involved with Rice Cultivation

Among the rice cultivation training programs held at the Rice Research and Training Centre, there were training program aimed at refugees (refugees from neighboring countries such as South Sudan) in collaboration with the United Nations High Commissioner for Refugees (UNHCR). Based on interviews with Japanese experts, these trainings were attended by both refugees and farmers of the host community (the training was held four times in 2015 as

[22] 11 districts out of 22 in the Eastern Region were selected to interview farmers doing irrigated rice cultivation in areas where pilot project sites were set up. 175 farmers were interviewed in total. Among these, 135 (or 77%) had received training of the Project and whereas 40 (23%) had not. 125 interviewees were male (71%) and 50 were female (29%). The districts surveyed were 11 districts, i.e. Budaka, Butaleja, Iganga, Kumi, Manafwa, Mayuge, Mbale, Namutumba, Pallisa, Sironko, and Tororo.

part of the Promotion of Rice Development Project's training activities, with a total of 72 participants made up of agricultural officers, refugees, and host community farmers). This sort of format contributes to rice promotion at a nationwide scale in Uganda.

3.4.1.5 Use of the Rice Research and Training Centre for Learning Agriculture at Domestic Schools

According to interviews with NaCRRI rice cultivation researchers, college students can get engaged with research at the Centre temporarily as interns and write papers. In this way, the Centre has contributed to student rice cultivation research.

3.4.2 Other Positive and Negative Impacts

The following items have been identified as impacts on research, dissemination, and rice production increase. They are based on results of a beneficiary survey for the Project, specifically, targeting users of the Rice Research and Training Centre.[23]

- Rice research specialization has increased in terms of the growth of rice cultivation research personnel who have used the Centre facilities and equipment.
- As a result of rice cultivation technical training and the distribution of high quality rice variety seeds (NERICA 4, WITA 9, etc.), at the farmer level, rice yield and rice cultivation area have increased. As a result, the farmers' interest in rice cultivation has increased yet further.
- Accompanying increases in rice production, the number of rice millers has also increased, which is tied to job creation. Specifically, following results of interviews with 17 millers in 17 different districts, roughly half of them (9 millers) commenced operation since 2012 (after the completion of this project). In recent years (the last 5 years), 16 rice millers noted that the number of rice millers in neighboring areas had increased (90% or more). Table 7 shows data related to the increase of rice millers.

[23] The targets of the beneficiary survey included main researchers and technicians involved with rice cultivation research at NaCRRI as well as the NaCRRI director, researchers and technicians involved in rice cultivation research at ZARDIs (at 4 locations along the route used for regional agricultural office visits), JICA employed researchers and technicians, agricultural officers (interview survey done at the district agricultural offices in 24 districts), farmers who took training lectures at NaCRRI jointly with JOCV members (19 individuals), JOCV members engaged in rice cultivation extension (7 individuals), for a total of 102 individuals. They were interviewed about the effectiveness of the Rice Research and Training Centre's research facilities and equipment.

Table 7 Results of Interview Survey on Changes in the Number of Rice Millers

	District	Miller Location	Opening Year	Number of Neighboring Millers	Recent Change in Miller Number
1	Mayuge	Town Council	**2012**	3	Increase
2	Iganga	Town Council	**2012**	3	Increase
3	Butaleja	Town Council	2010	8	Increase from 2 to 8 in past 5 years
4	Budaka	Kamonkoli S/C (note)	**2014**	6	Increase from 2 to 6 in past 3 years
5	Tororo	Western Division S/C	2007	5	Increase from 2 to 5 in past 5 years
6	Mbale	Mbale town	**2012**	15	Increase from 11 to 15 in past 5 years
7	Manafwa	N/A	N/A	0	None (based on information from the district agricultural office)
8	Sironko	Town Council	**2014**	1	Increase (only one in this district)
9	Kumi	Town Council	2008	7	Increase from 5 to 7 in 2016
10	Kole	Ayer S/C	**2014**	1	Increase
11	Dokolo	Town Council	**2016**	1	Increase
12	Amuru	Pabbo S/C	**2015**	5 or 6	Increase
13	Kakumiro	Bugangaizi West S/C	2010	4	Increase from 2 to 4 in past 3 years
14	Hoima	Hoima town	2004	25	Increase from 10 to 25 since 2004
15	Masindi	Pakanyi S/C	**2014**	3	Increase (first was established in 1990)
16	Nakasongola	N/A	N/A	0	None (based on information from the district agricultural office)
17	Luwero	Zirobwe S/C	2005	4	Increase (additional increase of 1 in 2017)
18	Wakiso	(data not collected)	(same as left column)	2	Decrease (based on information from the district agricultural office)
19	Mukono	Nakisunga S/C	2008	6	Increase
20	Nakaseke	Semuto Town Council	2007	3	Unknown (2 in operation)

Source: Results from interviews conducted at rice millers at the time of the ex-post evaluation. For some, interview results with district agricultural offices are included.
Note: S/C: Sub-county

- Some of the JOCV members[24] attended rice cultivation training sessions at the Centre and engaged in rice cultivation extension. Farmers who learned rice cultivation techniques from JOCV members held their

[24] JOCV members involved in rice cultivation and community development.

technical transfer activities in high esteem (based on interviews with agricultural officers at district agricultural offices as well as farmers who received guidance from JOCV members).

This project has achieved its objectives to some extent. Therefore, effectiveness and impact of the project are fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

3.5.1.1 On the Research/Training System and the Facility Operation/Maintenance System at NaCRRI

There is a total of 18 regular officers working at the Rice Research and Training Centre, composed of 5 researchers, 6 technicians, and 7 support staff members. The number has doubled since the construction of the Centre in 2010, when there was a total of 8 persons working there. According to interviews with NaCRRI researchers, there is a need to recruit and train more young researchers, and there is currently discussion in establishing a new training unit at NaCRRI. As for the facility and equipment operation and maintenance system, there are a number of research programs at NaCRRI; among them is the cereals program which focuses on researching rice and maize. Each of the research programs has a Program Coordinator who reports directly to the director of NaCRRI. While operation of research and training activities at the Rice Research and Training Centre is handled by the cereals program, Centre facilities and equipment is handled by the facility maintenance supervisor, under the title of Farm Manager (belongs the Administration unit). The Farm Manager oversees all of NaCRRI's experimental fields, facilities, and equipment. Each research program has a staff member who acts as a Farm Manager assistant.

Equipment/facility troubleshooting and periodic inspections at the Centre are handled mainly by the plumber, electrician, and mechanic staff stationed at the workshop (4 persons in total).

In this way, the Centre's sustainability on rice research and training implementing system is guaranteed, and there is an appropriate chain of command to manage and maintain the facilities and equipment. Figure 1 depicts the entire NaCRRI organizational structure.

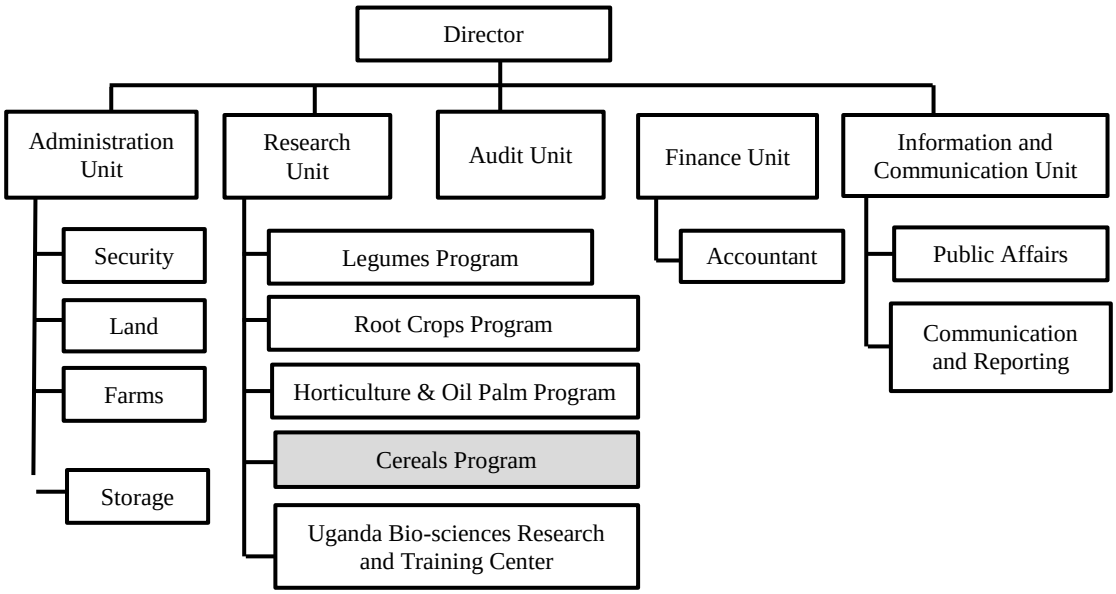


Figure 1 NaCRRI Organizational Chart

3.5.2 Technical Aspects of Operation and Maintenance

There is a monthly and periodical equipment inspection. For the most part, repair and procurement of spare parts for breakdowns is adequately handled. There was no equipment that was inoperable due to an inability to source spare parts. Operation and maintenance manuals are available and utilized. Judging by the fact that most of the equipment is in good operating condition, the technicians in charge of maintenance appear to have the requisite technical skills to carry out their functions.

3.5.3 Financial Aspects of Operation and Maintenance

Table 8 shows revenues and expenditures of the last 3 years at NaCRRI. The NaCRRI income table shows that governmental budgetary assistance has remained roughly constant over the past three years (about 1,200 million Uganda Shillings UGX/year). NaCRRI has also received financial support from a variety of donors, research institutions, foundations, NGOs and the like, making up 90% or more of NaCRRI's total revenue. Over the past three years, NaCRRI's total revenue has increased from 13,160 million UGX to 16,446 million UGX. In other words, outside funding has increased. Until now the World Bank has consistently funded NaCRRI, and at the time of the ex-post evaluation, the Agriculture Cluster Development Project was in operation (2015-2022). As the Project will continue until 2022, it appears that for the time being there will continue to be a steady source of funds. As for the Rice Research and Training Centre's funds, while there has been fluctuation depending on the year, roughly 985 million UGX has been secured for the fiscal year 2016/2017. The maintenance budget for the Centre is increasing, and about 1,437 million UGX has been secured for the fiscal year 2016/2017.

According to interviews with the Farm Manager and researchers at NaCRRI, while the budget for facility and equipment upkeep isn't always abundant, where there is a deficiency, funds from the budgets of other projects and the JICA's on-going technical cooperation project are used to deal with problems. As there have so far not been any major problems with maintenance and it appears that there will continue to be financial support from other donor institutions (NaCRRI received financial support from donor organizations and research institutions etc. even before the implementation of this project, and such financial support is continued to be the major source of revenue), finances to ensure proper operation and maintenance of the Rice Research and Training Centre are considered to be secured mostly.

Table 8 NaCRRI Revenue and Expenditures

(1) NaCRRI Revenue (2 years before Implementation of the Project and Past 3 years)

Unit: Uganda Shilling (UGX)

Revenue		2006/07	2007/08	2014/15	2015/16	2016/17
1	Budget allocation from Ugandan government	1,165,000,000	627,000,000	1,235,049,600	1,262,438,357	1,222,845,303
2	Other donor institutions	3,257,385,792	1,797,039,866	6,284,075,703	8,642,318,116	10,942,445,361
3	Research institutions, universities, etc.	1,396,717,324	1,688,523,286	5,593,860,812	5,354,138,450	4,111,114,379
4	Other	150,000,000	120,000,000	47,368,200	32,500,600	169,982,000
	Total	5,969,103,116	4,232,563,152	13,160,354,315	15,291,395,523	16,446,387,043
	Reference: totals converted to JPY	*190,354,698*	*134,976,439*	*419,694,666*	*487,655,346*	*524,488,988*

Source: Data source of past 3 years is NaCRRI finance officer and data source of 2 years before implementation of the Project is the Basic Design Study Report

Note: The Japanese Yen (JPY) conversion utilizes JICA's average rate for the fiscal year 2016 (1UGX = 0.03189JPY)

(2) NaCRRI Expenditures (past 3 years)

Units: Ugandan Shilling (UGX)

Expenditure		2014/15	2015/16	2016/17
1	Staff Salaries	2,478,718,429	2,446,416,819	3,588,115,459
2	Research and Training	6,040,539,835	6,245,106,149	7,582,824,337
3	Operation and Maintenance	4,526,069,401	5,033,959,057	4,223,460,177
4	Equipment Procurement	69,725,000	1,291,559,469	925,000,000
5	Outsourced Research	45,301,650	274,354,029	126,987,070
	Total	13,160,354,315	15,291,395,523	16,446,387,043
	Reference: totals converted to JPY	*419,683,699*	*487,642,603*	*524,475,283*

Source: NaCRRI finance officer

Note: The JPY conversion utilizes JICA's average rate for the fiscal year 2016 (1UGX = 0.03189JPY)

(3) NaCRRI Cereals Program Budget and the Rice Research and Training Centre Maintenance Budget

Unit: Ugandan Shilling (UGX)

Budget		2014/15	2015/16	2016/17
1	Rice Research and Training Budget	916,500,000	746,000,253	985,000,000
2	Maize Research and Training Budget	174,984,138	1,025,626,075	1,675,721,100
(1+2)	Cereals Program Total Budget	1,091,484,138	1,771,626,328	2,660,721,100
3	Rice Research and Training Centre Operation/Maintenance Budget	1,025,789,265	1,260,720,000	1,437,225,000
	Reference: totals converted to JPY	*32,712,420*	*40,204,361*	*45,833,105*

Source: NaCRRI finance officer
Note: The JPY conversion utilizes JICA's average rate for the fiscal year 2016 (1UGX = 0.03189JPY)

3.5.4 Current Status of Operation and Maintenance

As shown in the facility usage situations in item 3.3.1.3, there is a high rate of use of provided facilities (administrative affairs block, training block, canteen, screenhouse with glass roofing, workshop, irrigation facilities etc.) and equipment (research equipment, experimental field equipment, post-harvest equipment for demonstrations, workshop equipment, etc.). Most of facilities and equipment provided are well working and an equipment ledger for farming machinery and lab equipment has been established; this and similar practices indicate appropriate maintenance. While rate of use of the training block is considered high, facility usage record is not properly taken, therefore, usage rate is not able to confirm numerically. As for improvement of this issue, installation of use record registration book at each lecture room and input data recorded in the registration books in computer periodically are expected.

As of the ex-post evaluation, the JICA technical cooperation "Rice Promotion Project" is underway. As there has been little deterioration of the facilities and equipment roughly 6 years since the completion of the Project, there have been no major issues with the maintenance of facilities or equipment. However, going forward, in order to appropriately approach upgrades and replacements with facility deterioration and equipment service life in mind, it is preferable, for example, to discuss and create a mid-term plan for the renewal of the equipment (including budgetary considerations).

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, Lessons Learned and Recommendations

4.1 Conclusion

The Project was conducted at NaCRRI with the aim of devising a means to improve the quality of planning, research, training, dissemination, and evaluation necessary for the promotion of rice via the provision of a rice research and training centre and related equipment.

Both at the time of planning and the ex-post evaluation, the Project is and has been in accordance both with the development needs and development policies of Uganda, given the important political objectives on increasing rice production in its national development plans and agricultural planning and policy, as well as its high rice production needs. The Project has high relevance in consideration of its consistent with Japan's ODA policy, given the importance placed upon rice promotion in agricultural development as one of the important areas by the Japanese government for its Ugandan aid policy. Therefore, the actual count of rice cultivation trainees at the Rice Research and Training Centre fell significantly below the target; a primary factor for this was that most farmer-oriented training has been carried out locally (areas where near farmers live) , and so the number of calls to train farmers at NaCRRI decreased. On the other hand, through use of the facility and equipment provided by the Project, rice cultivation researchers were able to showcase their growth and research successes. By way of practical training, agricultural officers and others strengthened their skills in promoting rice cultivation technology. Thus, while the quality of research and training improved, the number of trainees did not meet the target. In terms of contributing to rice promotion in Uganda – the Overall Goal of the Project – the cultivation area and crop yield of rice at the farmer level increased thanks to the distribution of high-quality rice variety seeds to trained farmers and the farmers' trainings. The Project has made a certain contribution to rice production increase. Therefore, the effectiveness and impact of the project is fair. While project cost stayed within the plan, project period exceeded the plan. Therefore, efficiency of the project is fair. There were no issues with operation and maintenance with regards to institutional, technical, financial, or current status; the sustainability of the project effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Expansion of the Dormitory Facility

The dormitory built by the Project was originally intended for long-term stays by visiting research personnel (maximum accommodation of 12 persons). However, the scale of training events is usually 30-40 persons, and as the training organizer offers lodging at establishments in the capital city, Kampala, as well as transportation to and from NaCRRI when training events are held, these expenses must be included in the training budget. In order to reduce these training costs, it is expected that the National Agricultural Research Organization (NARO) and NaCRRI examine feasibility on building an additional building so that 30-40 persons may be accommodated (however, it will be necessary to sufficiently investigate the financial viability of such an undertaking).

(2) Income Generation at NaCRRI

There is currently heavy reliance on donor support in order to procure the required funds and equipment for rice research and training activities and rice seed multiplication. In order to bolster financial durability, increasing budgetary allocation from the government is ideal, but in the event that that is difficult, NaCRRI will have to find a way to generate income. It would be advisable to look into ways in which funds may be generated through use of the Rice Research and Training Centre's facilities and equipment and its research and training activities. For example, the Promotion for Rice Development Project, which is under implementation at the time of the ex-post evaluation, is constructing a system for the generation and use of income via the multiplication and sale of rice seeds. We propose that NARO and NaCRRI look into generating income by selling high quality rice seeds produced at NaCRRI to NGOs, seed companies, and seed production farmers.

(3) Creating a Mid-Term Plan for Equipment Renewal

There have been no major issues with the upkeep of equipment provided by the Project. However, moving forward, breakdowns as a result of deterioration of equipment will increase, and there will be a need for replacement of the equipment. As funds are necessary to carry out such a renewal when the time comes, it would be advisable for NARO and NaCRRI to put together an equipment update plan that includes a financing plan.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

<u>Look into Income Generation Activities to Supplement Expenses for Activities of Implementing Organization and Its Maintenance Expenses</u>

If it is thought that government budget allocations may not necessarily be sufficient for research and training activities and the maintenance of equipment and facilities on site, it would be advisable to look into the viability of income generation by way of utilizing the lecture rooms, dormitory, seed multiplication fields, farm machinery etc. which are provided by the Grant Aid Project. It is desirable to consider such requirements during any forthcoming planning stage.

The Republic of Rwanda

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Rural Water Supply" and "The Project for Rural Water Supply (Phase II)"

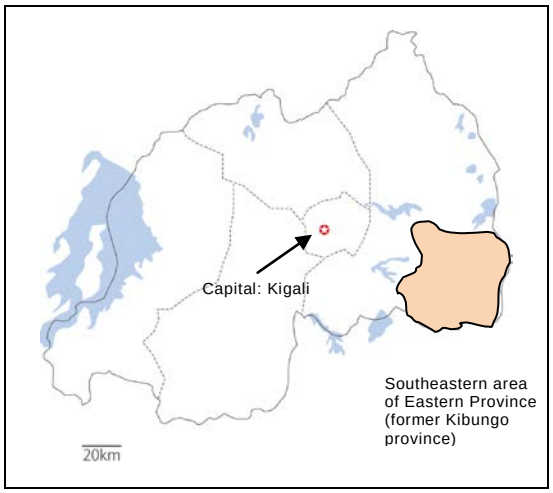
External Evaluator: Koichi Sekita, Chuo Kaihatsu Corporation

0. Summary

The Project was conducted with the aim of enhancing the water supply rate of the Target area and contributing to the improvement of living conditions in the water and sanitization sectors by developing the water supply facilities in the Ngoma, Kirehe, Kayonza and Rwamagana districts in the Eastern Province of the Republic of Rwanda. The Project matched with the Rwandan development policy "to provide all the population access to safe water by 2020" the development needs and the Japanese government aid policy. At the time of ex-post evaluation, a new development policy for the water sector had been set out and the development needs were still strong. Therefore, the relevance of the Project is evaluated as high. While the results of the Project cost were below 100 % of the plan, the Project period was 136 % of the original plan (45 months). Therefore, the efficiency is evaluated as fair. The water served population, an operation indicator, has increased significantly and met the target goals. As for the water supply rate, 100 % was almost achieved in regard to the Project for Rural Water Supply, but 62.9 % in regard to the Project for Rural Water Supply (Phase II). The achievement rate at the low 62.9 % is attributable to the increase of population in the water supply area, which was greater than expected. Within the beneficiary survey undertaken, there were many responses that: 1) the time spent on drawing water was significantly reduced, 2) user were satisfied with the water supply facilities and 3) the water supply was contributing to the children's education. Therefore, the effectiveness of the water supply system of the Project is high, and the impact on the improvement of the community's living conditions is large. Effectiveness and impact are evaluated as high. The districts contract with the Water Service Provider (WSP) on one's own responsibility, to perform the operation and maintenance. Minor repairs and daily operational management are undertaken by the WSP; however, there are financial issues in the case of equipment renewal and large-scale repairs which require high cost against the district's budget implementation system. Therefore, the sustainability is evaluated as fair.

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

1. Project Description



Project Location

Photo: Mukarange Scheme[1] (water sales shop)

1.1 Background

In the policy document known as Vision 2020 and formulated in 2000, the Government of Rwanda stated that the improvement of water supply service rate was indispensable for the economic and social stability of the nation. In the Poverty Reduction Strategy Paper (PRSP) established in 2002, the access to safe water was set out as one of the main strategies, in order to: 1) reduce the water drawing time for women and children, 2) improve the school enrollment rate for girls, and 3) reduce the number of water-borne diseases so that a higher productivity rate can be achieved for the Rwandan citizen. The Target area, the southeast district of the Eastern Province (former Kibungo Province), is located in the southeastern part of Rwandan and its water supply facilities are underdeveloped compared to other districts of the country. Water supply service rate was as low as 31 % (17 % in the Target sector)[2].

Under these circumstances, the Government of Rwanda made a request to the Government of Japan for grant aid consisting of the development of water supply facilities in 64 sites, procurement of operation and maintenance equipment, and the improvement in the operation and maintenance capacity. The Japan International Cooperation Agency (JICA) implemented the basis design study (2005 – 2006) and the rural water supply facility development was planned to be implicated in three stages.

1.2 Project Outline

[1] In Rwanda, "sector" is the next level administrative unit of city and district, and Pipeline water supply facility is called as "scheme". In case of referring to a specific pipeline system water supply facility, it is represented by "sector name + scheme".

[2] Source: Basic Design Study Report

The Project was conducted with the aim to enhance the water supply rate of the Target area and contribute to the improvement of the living conditions in the water and sanitization sectors in the Eastern Province by developing the water supply facilities in Ngoma, Kirehe and Kayonza and Rwamagana districts.

G/A Grant Amount / Actual Grant Amount	(1) The Project for Rural Water Supply (Stage 1/3): 551 million yen / 541 million yen (2) The Project for Rural Water Supply (Stage 2/3): 692 million yen / 33 million yen (fee for consultant contract only) (3) The Project for Rural Water Supply (Phase II): 1,435 million yen / 1,171 million yen
Exchange of Notes Date /Grant Agreement Date	(1) The Project for Rural Water Supply (Stage 1/3): June 2006 / Not applicable (2) The Project for Rural Water Supply (Stage 2/3): June 2007 / Not applicable (3) The Project for Rural Water Supply (Phase II): March 2010 / March 2010
Executing Agency	(1) The Project for Rural Water Supply (Stage 1/3): Ministry of Land, Environment, Forestry, Water and Mines[3] (2) The Project for Rural Water Supply (Stage 2/3): Ministry of Land, Environment, Forestry, Water and Mines[4] (3) The Project for Rural Water Supply (Phase II): Ministry of Infrastructure[5]
Project Completion	(1) The Project for Rural Water Supply (Stage 1/3): February 2008 (2) The Project for Rural Water Supply (Stage 2/3): (Suspended) (3) The Project for Rural Water Supply (Phase II): July 2013
Main Contractors	(1) The Project for Rural Water Supply (Stage 1/3): Shimizu Corporation (2) The Project for Rural Water Supply (Stage 2/3): None (Bidding failure, suspended) (3) The Project for Rural Water Supply (Phase II): Tone Engineering Corporation
Main Consultants	(1) The Project for Rural Water Supply (Stage 1/3): Nippon Koei Co., Ltd. (2) The Project for Rural Water Supply (Stage 2/3): Nippon Koei Co., Ltd. (3) The Project for Rural Water Supply (Phase II): Joint Venture of Earth System Science Co., Ltd. and Nihon Techno Co., Ltd.

[3] In 2009, renamed as the Ministry of National Resources and the Project was transferred to the Ministry of Infrastructure.
[4]Subsequently, the Project was transferred to the Ministry of Infrastructure.
[5]During the Feasibility Study Stage, the agency of responsibility was the Ministry of Infrastructure, with three executing agency district offices (Ngoma, Kirehe, Kayonza). During the Implementation Stage of the Project, from June 2011, the responsible agency shifted to the Energy, Water and Sanitation Authority.

Basic Design	(1) The Project for Rural Water Supply: September 2005 – June 2006 (2) The Project for Rural Water Supply (Phase II): June 2009 – March 2010
Related Projects	<Technical Cooperation Project> ・Improvement of Water Supply and Sanitation in the South Part of Eastern Province (2007 – 2011) ・Project for strengthening operation and maintenance of rural water supply systems in Rwanda (March 2014 – December 2019) <Grant Aid Project> ・Follow up cooperation for of the Project for Rural Water Supply (2013) ・The Project for Rural Water Supply (Phase 3) (2015) (in progress) ・Japan Overseas Cooperation Volunteers (Water Security Action Team) <Related projects of other donor organizations> ・African Development Bank: Lake Victoria Water Supply and Sanitation Program Phase II, 2011-2015

2. Outline of the Evaluation Study

2.1 External Evaluator

Koichi Sekita, Chuo Kaihatsu Corporation

2.2 Duration of Evaluation Study

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

Duration of the Study: September 2016 – January 2018

Duration of the Field Study: January 15, 2017 – February 12, 2017 and May 28, 2017 – June 3, 2017

3. Results of the Evaluation (Overall Rating: B[6])

3.1 Relevance (Rating: ③[7])

3.1.1 Consistency with the Development Plan of the Republic of Rwanda

At the time of planning, it was stated within *Vision 2020* (2000), the national development plan, that access to safe water for the entire population was targeted to be achieved by 2020. Also in *the Economic Development and Poverty Reduction Strategy (2008 – 2012)* formulated in 2007, was targeted to raise the rate of access to safe water from 64 % to 86 % by 2012. The Project aimed at contributing to the improvement of the water supply rate by constructing and repairing water supply facilities for the

[6] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[7] ③: High, ②: Fair, ①: Low

Eastern Province with low rate of water supply. This was consistent with the development policies of the Rwandan Government. Within *the Seven Year Government Programme* formulated in 2010, the target was changed to achieve the access rate of 100 % by 2017. At the time of ex-post evaluation, presented as a priority target in *the National Drinking Water and Sanitation Policies and Strategies* which was formulated in 2016, the new target was designed to: 1) increase the water supply rate in the rural areas from 83.7 % in 2014 to 100 % by 2018, 2) provide appropriate rural water supply service, and 3) maintain sustainable function of the rural water supply facilities.

As can be seen, the Project has high rated consistency with the national development and water sector policies at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of the Republic of Rwanda

The country of Rwanda has geographical features that include hilly areas. Villagers live along ridge lines and slopes in a hilly terrain. At the time of planning, the residents of the area without water supply facilities relied on springs, lakes and rivers that exist in valleys for their domestic water requirements. These area residents had to go up and down steep slopes with height differences of more than 100 meters, repeatedly to fetch their daily water requirements. The time women and children spent on water fetching were more than two hours per day. Within the existing water sources, coliform bacteria and general bacteria were also detected even in the case of springs and the occurrence of water-borne diseases was reported. The time consumed by water retrieval was also a hindrance in rural development. The water supply rate was 17 % (2005) in the Target area of the Project for Rural Water Supply. Furthermore, the average water supply rate was 41.6 % in 2008 in the Target area of the Project for Rural Water Supply (Phase II) (11 areas of Kirehe and Ngoma districts in the Eastern Province), slightly over 60 % of the national average of 64 % (2007). There was a significant need to improve the low water supply rate. At the time of ex-post evaluation, the hearing from the Water and Sanitation Cooperation (WASAC), the executing agency, revealed that the water supply rate was 78 % nationwide and 68 % in the Eastern Province. There continues to be a need for developing water supply facilities.

3.1.3 Consistency with Japan's ODA Policy

Rural development was one of the priority areas in Japan's aid for Rwanda at the time of planning (Japan's ODA Data by Country: 2006 and 2010). The "Program for Rural Development in Eastern Province in the Republic of Rwanda" was implemented for this priority area. The program targeted the Eastern Province which had significant needs to reduce poverty compared to other provinces, and the stated goal of the

cooperation policy is on development of life infrastructure such as water supply facilities, and the maintenance and reinforcement of sanitation education. Therefore, the Project was consistent with the Japanese aid policy at the time of planning.

3.1.4 Appropriateness of the Project Plan and Approach

The implementation of the construction for Stage 1/3 of the Project for Rural Water Supply was decided in FY 2006 and was completed in March 2008. Subsequently, the bid for Stage 2/3 of construction ended in failure. This was due to problems in 1) procurement of materials and construction equipment, 2) subcontract and labor matters and 3) geographic situation of the sites which lead to the access problems. Under such circumstances, the construction for Stage 2/3 and onwards of the Project for Rural Water Supply was suspended. Based on the examination by the Japanese Government in 2010, an Implementation Review Study was carried out. Out of 10 schemes in 14 sectors which were the cooperation target in Stages 2/3 and 3/3, the feasible cooperation details were narrowed down and the Project was implemented, which became the Project for Rural Water Supply (Phase II).

In the Implementation Review Study conducted in 2010, five schemes planned in Stage 2/3 – Mushikiri Scheme, Kirehe Scheme, Nyamugari and Mahama Scheme, Kigina Scheme and Gatore Scheme in Kirehe district – were confirmed as feasible according to: 1) water source survey, 2) social conditions survey, 3) water supply planning, 4) facility construction planning, 5) equipment procurement planning, and 6) Project cost estimate. The Rwandan Government had a strong request for early implementation of these five schemes, and it had been also agreed in the Minutes of Discussion (M/D) of the Implementation Review Study to prioritize these Stage 2/3 schemes.

On the other hand, as for the five schemes planned in Stage 3/3 – Gahara Scheme in Kirehe district, Murama Scheme in Kayonza district, Kibungo Scheme, Karembo /Zaza/Mugesera Scheme and Kazo /Mutendeli Scheme in Ngoma district – priority levels were given for the four schemes excluding Gahara Scheme[8]. Based on the field study results, the prioritization was made according to: 1) cost effectiveness, 2) accessibility to the water source, 3) ease of construction, 4) maintenance cost, 5) ease of operation and maintenance by the scheme type, 6) willingness to pay for the water supply service and 7) residents' satisfaction for the current water usage situation. The Murama Scheme and Kibungo Scheme ranked low in the prioritization based on the results of the above evaluation. Therefore, they were excluded from the target of the Project for Rural Water Supply (Phase II). Consequently, two schemes in Stage 3/3 were

[8] Gahara was excluded because of the plan of clustering with a village located outside the Project Target.

selected.

The Implementation Review Study also examined the road access issue[9] which caused the bid failure, as well as the increase of procurement cost and the Target schemes, then it reviewed the plans for the ten schemes in 14 sectors targeted for Stages 2/3 and 3/3. As a result, it was decided that construction for the access issue would be incorporated onto the Japanese side, instead of being borne by the Rwandan side, to realize a smooth operation. As for the Target schemes, seven schemes were selected based on the requests from the Rwandan government side and examining the check items for operational feasibility. This was organized as the Project for Rural Water Supply (Phase II). The review of the Basic Design contributed to enhancing the efficiency and effectiveness of the Project. An appropriate plan for the original Project goal of improving and achieving the water supply rate in the Target four districts was reformulated.

The Project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore its relevance is evaluated as high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The Project implemented the development (new construction and renovation) of water supply facilities in the southeastern part of the Eastern Province (former Kibungo Province) by executing the Project for Rural Water Supply and the Project for Rural Water Supply (Phase II).

3.2.1.1 The Project for Rural Water Supply

(1) Water supply facility development

In the Basic Design of the Project, the water supply facility development plan was formulated targeting the 16 schemes in four districts. The plan was divided into three stages considering the scale of the construction. While Stage 1/3 (six schemes) was implemented as planned, Stage 2/3 (five schemes) was suspended due to bid failure[10] and Stage 3/3 (five schemes) was not implemented. After an Implementation Review Study, the projects for Stages 2/3 and 3/3 were redesigned. Out of 16 schemes, six

[9] Construction of access road in Stage 1/3 was to be borne by the Rwandan side, but was not carried out sufficiently.

[10] The documents provided by JICA point out the following issues as causes for the bid to be declined and are based on hearings from those who declined the bid and results of analyzing their reasons: 1) procurement of equipment and construction machines, 2) subcontract and labor matters and 3) geographic situation of the sites and access problems (In Stage 1/3 sites, the construction of the access road to the sites, which was to be borne by the Rwandan side, was not sufficient and thereby imposed a load on the constructors.

schemes (two districts) in Stage 1/3 had the water supply facility construction implemented under the Project for Rural Water Supply.

The following table shows the outline of the plan and the stages in the Basic Design.

Table 1: Outline of the Improvement Plan of Each Scheme in the Project for Rural Water Supply and its Selection Status

District	Scheme	Basic Design Stage	Rural Water Supply: Project Selection (Phase II)	Water served population (year 2010)	No. of Deep Wells Equipped with Hand Pumps				No. of Piped Water Supply Facilities				
					New	Renovation	No. of Water Sources	No. of Facilities	Deep Wells (Renovation / Expansion)	Springs		No. of Water Sources	No. of Water Supply Facilities
										New	Renovation/ Expansion		
Rwamagana	Mwulire, Munyaga, Kigabiro	1/3		20,060						1		1	1
Kayonza	Mukarange	1/3		9,639					1			1	1
	Kabarondo	1/3		922	2	1	3	3					
	Rwinkwavu (Gishanda/ Nyankora)※	1/3		6,632					1			1	1
	Rwinkwavu	1/3		3,313	8	2	10	10					
	Murama	3/3	Not Selected	9,132						1		1	1
Ngoma	Kibungo	3/3	Not Selected	8,536						1		1	1
	Murama	1/3		2,718	5	6	11	11					
	Karembo, Zaza, Kibare, Mugesera	3/3	Selected	22,421						1	1	2	1
	Mutendeli, Kazo	3/3	Selected	8,361							1	1	1
Kirehe	Mushikiri	2/3	Selected	11,884						1		1	1
	Kirehe	2/3	Selected	12,000						1	1	2	1
	Nyamugari	2/3	Selected	16,776							2	2	1
	Kigina	2/3	Selected	10,082						1	1	2	1
	Gahara	3/3	Not Selected	13,244						1		1	1
	Gatore	2/3	Selected	4,948						1		1	1
Total				160,668	15	9	24	24	2	9	6	17	13

Source: Drawn from the Basic Design Study Report and the Implementation Review Study Report

* Old sector names and water source names. Sector is administrative division in the district. Color pink has been added in the case where the Stage is 1/3 of the project term.

As shown above, the water supply facilities for Stage 1/3 (six schemes) were developed for the Project for Rural Water Supply. Table 2 below shows the specific details of the facilities developed in Stage 1/3 of the Project, their plans, actual results and the difference between the plan and the actual result.

Table 2: Output (facilities) of Stage 1/3 of the Project: Comparison between Plan and Actual Result

Facility	Plan	Actual	Difference
(1) Rwamagana district (Mwulire, Kigabiro, Munyaga Scheme)			
1) Spring Water Intake Facility	Cut-off wall type, stonemasonry, L=20m, H=2.0m	Cut-off wall type, Reinforced concrete, L=80m, H=2.0m	Change type of structure and increase of Length (+60m)
2) Suction Pit for Pumps	Round type precast concrete, aboveground type, V=100m^3 x 2units	Box type reinforced concrete type, semi-underground type, V= 200m^3 x 1 unit	Change type of structure, type change, change of breakdown of volume (no change in total volume)
3) Transmission Pumping Station	Independent housing for transmission pumps: 3 units	One pump house was integrated with the pump reservoir	Among 3 transmission pump houses, one unit was integrated with the pump reservoir. There is no change in total number of pump facilities.
4) Transmission Pipe	Pipe Length: 15.1km	Pipe Length: 18.0km	Pipe Length (+2.9km)
5) Reservoir	11 sites: (V=25 - 80m^3)	11 sites: (V=25 - 100m^3)	Change of Breakdown of Volume
6) Distribution Pipe	Pipe Length: 53.8km	Pipe Length: 50.1km	Pipe Length (-3.7km)
7) Water Supply Facility	Public Tap Stand: 57 sites	Public Tap Stand: 63 sites	Public Tap Stand (+ 6 sites)
(2) Kayonza district (Mukarange Scheme)			
1)Transmission Pumping facility	Generator for pump (37kVA, 1 unit)	Generator for pump (0unit)	Number of generators -1 unit.
2) Transmission Pipe	Pipe Length: 1.9km	Pipe Length: 1.8km	Pipe Length reduced by 0.1km
3) Reservoir	New 1 site (V=80m^3), rehabilitation 2 sites	New 0 site, rehabilitation 2 sites	Number of new reservoirs -1 site
4) Distribution Pipe	Pipe Length: 3.2km, diameter: 63 - 160mm	Pipe Length: 1.5km, diameter: 75 - 125mm	Pipe Length: -1.7km, change of diameter
5) Water Supply Facility	Public Tap Stand: 6 sites, connection to each house: 10 sites	Public Tap Stand: 0 sites, no other change	Public Tap Stand: -6 sites
(3) Kayonza district (Nyankora Scheme)			
1) Transmission Pipe	Pipe Length: 0.19km	Pipe Length: 0.25km	Pipe Length (+0.06km)
2) Distribution Pipe	Pipe Length: 13.0km	Pipe Length: 9.9km	Pipe Length -3.1km
3) Water supply facility	Public Tap Stand: 15 sites	Public Tap Stand: 14 sites	Public Tap Stand -1 site
(4) Kayonza district (Kabarondo Scheme)			
1) Deep well with hand pump (replacement of hand pump)	Rehabilitation: 1 site	Rehabilitation: 0 site	Hand pump renovation site was reduced.
(5) Kayonza district (Rwinkwavu Scheme)			
1) Deep well with hand pump (replacement of hand pump)	Rehabilitation: 2 sites	Rehabilitation: 1 site	Hand pump renovation -1 site
(6) Ngoma district (Murama Scheme)			
1) Deep well with hand pump (replacement of hand pump)	Rehabilitation: 6 sites	Rehabilitation: 5 sites	Hand pump renovation -1 site

Source: Documents provided by JICA
Note: L: Length, H: Height, V: Volume, kVA: Kilo Volt Amperes

Securing the site and building the access road by the residents were the tasks to be borne by the Rwandan side. The construction of the access road by the Rwandan side was insufficient[11], and the information for these results was unobtainable.

(2) Technical Assistance

The activities for the Technical Assistance (hereinafter referred as Soft Component) of the Project were conducted as planned from April 2007 to February 2008 except for the activities that were inapplicable for the Stage 1/3 Project. In the course of these activities, the privatization program of water supply business began to be promoted in Rwanda at the end of September 2007. In March 2008, the managing entities of all water supply facilities were reorganized into the private sector. Issues caused by these changes in the external circumstances had to be dealt with. For the soft components of the Project for Rural Water Supply (Phase II), activities were implemented to deal with these issues.

The table below shows the output for the soft component which were submitted: evaluation documents of the selecting conditions for water user association members and staff, manuals for operating and maintenance, and administrative supports, training materials and various reports.

Table 3: Output of Stage 1/3 of the Project: Soft Component Product

No.	Product Name
1	Adjustments and on-site minutes report for establishing water user associations
2	Committee selection criteria: evaluation document
3	Staff selection criteria: evaluation document
4	Public application form
5	Operation and maintenance manual
6	Manual for administrative supports
7	Training programs
8	Training materials for administrative supports
9	Training materials for water user associations
10	Reports on results of training for administrative supports
11	Reports on results of training for water user associations

3.2.1.2 The Project for Rural Water Supply (Phase II)

[11] Source: Documents provided by JICA

(1) Construction of Water supply facilities

Feasibility studies were conducted for the ten schemes in Stages 2/3 and 3/3 in the Basic Design Study Report shown in Table 1. As a result, seven schemes were selected for the Project for Rural Water Supply (Phase II).

Table 4: The Project for Rural Water Supply (Phase II) Plan Output (facilities): Comparison between Plan[12] and Actual Result

District	Scheme		Contents of Main Facilities		
			Plan	Actual	Difference
Kirehe	Mushikiri	New	Water intake facility (3 sites), Receiving tank (1 site, 90m^3), Distribution tank (1 site, 120m^3), Conveyance pipe (1.8km), Transmission pipe (2.5km), Distribution pipe (16.0km), Break pressure tank (8 sites), Public Tap stand (19 sites), Maintenance road (3.0km)	Water intake facility (3 sites), Receiving tank (1 site, 90m^3), Distribution tank (1 site, 120m^3), Conveyance pipe (1.7km), Transmission Pipe (2.2km), Distribution Pipe (15.3km), Break pressure tank (7 sites), Public Tap Stand (19 sites), Maintenance road (3.6km).	Length of conveyance pipe (-0.1km), Length of transmission pipe (-0.3km), Length of distribution pipe (-0.7km), Break pressure tank (-1 site), Length of maintenance road (+0.6km).
	Kirehe	Renovation	Water intake facility (1site), Receiving tank (1 site, 30m^3), Distribution tank (70m^3, 4 sites), Conveyance pipe (0.2km), Transmission pipe (2.8km), Distribution pipe (4.7km), Public Tap stand (new 8 sites, Renovation 7 sites), Maintenance road (2.5km).	Water intake facility (1site), Receiving tank (1 site, 30m^3), Distribution tank (2 sites, 70m^3), Conveyance pipe (0.2km), Transmission pipe (2.6km), Distribution pipe (4.5km), Public Tap stand (new 8 sites, Renovation 7 sites), Maintenance road (2.3km).	Distribution tank (-2 sites), Length of transmission pipe (-0.2km), Length of distribution pipe (-0.2km), Length of maintenance road (- 0.2km).
	Nyamugari/ Mahama	Renovation	New distribution tank (1 site, 62.5m^3), Rehabilitation of existing distribution tank (8 sites), Conveyance pipe (0.2km), Transmission Pipe (6.3km), Distribution Pipe (1.7km), Public Tap Stand (new 3 sites and Renovation 30 sites), Maintenance road (1.6km), Rehabilitation of existing water intake weir (2 sites).	New distribution tank (1 site, 80m^3), Rehabilitation of existing distribution tank (6 sites), Conveyance pipe (0.2km), Transmission pipe (6.7km), Distribution pipe (1.7km), Public Tap Stand (new 3 sites, Renovation 30 sites), Maintenance road (1.4km)	Rehabilitation of existing distribution tank (-2 sites), Transmission pipe (+0.4km), Length of maintenance road (-0.2km).
	Kigina	New	Water intake facility (1 site), Receiving tank (1 site, 80m$^{3)}$, Distribution tank (1 site, 120m$^{3)}$, Conveyance pipe (0.05km), Transmission pipe (1.5km), Distribution pipe (12.6km), Break	Water intake facility 1 site), Receiving tank (1 site, 80m^3), Distribution tank (1 site, 120m^3), Conveyance pipe (0.04km), Transmission pipe (1.4km), Distribution pipe (11.9km), Break	Transmission pipe (-0.1km), Length of distribution Pipe (-0.7km).

[12] Plan at time of Feasibility Study

			pressure tank (3 sites), Public Tap stand (17 sites), Maintenance road (2.2km).	pressure tank (3 sites), Public Tap stand (17 sites), Maintenance road (2.2km).	
	Gatore	New	Water intake facility (1 site), Receiving tank (1site, 55m$^{3)}$, Distribution tank (1 site, 80m^3), Conveyance pipe (0.07km), Transmission pipe (1.4km), Distribution pipe (8.3km), Public tap stand (13 sites), Replacement of hand pump of existing well (1 site), Maintenance road (3.0km).	Water intake facility (1 site), Receiving tank (1 site, 55m^3), Distribution tank (1 site, 80m^3), Conveyance pipe (0.07km), Transmission pipe (1.4km), Distribution pipe (7.9km), Break pressure tank (2 sites), Public tap stand (13 sites), Replacement of hand pump of existing well (1 site), Maintenance road (2.1km).	Length of distribution pipe (-0.4km), Break pressure tank (+2 sites), Length of maintenance road (-0.9km).
Ngoma	Karembo/ Zaza/ Mugesera	Renovation	Water intake facility (2 sites), Receiving tank (2 sites, 100m^3 and 30m^3), Distribution tank (2 sites, 120m^3 and 40m^3), Conveyance pipe (1.1km), Transmission pipe (3.4km), Distribution pipe (24.8km), Public tap stand (new 24 sites, Renovation 27sites), Maintenance road (3.6km).	Water intake facility (3 sites), Receiving tank (new 2 sites, 100m^3 and 30m^3, Renovation 1 site), Distribution tank (2 sites, 120m^3 and 40m^3), Conveyance pipe (1.4km), Transmission pipe (3.2km), Distribution pipe (24.5km), Public tap stand (new 24 sites, Renovation 27 sites), Maintenance road (4.0km).	Water intake facility (+1 site), Renovation of receiving tank (+1 site), Length of conveyance pipe (+0.3km), Length of Transmission pipe (-0.2km), Length of Distribution pipe (-0.3km), Extension of maintenance road (+0.4km).
	Kazo/ Mutendeli	Renovation	Water intake facility (1 site), Receiving tank (2 sites, 55m^3 and 100m^3), Distribution tank (new 1 site, 140m^3 and rehabilitation 2 sites), Conveyance pipe (0.05km), Transmission pipe (1.8km), Distribution pipe (17.5km), Public tap stand (new 25 sites, Renovation 27 sites), Maintenance road (2.3km).	Water intake facility (1 site), Receiving tank (2 sites, 55m^3 and 100m^3), Distribution tank (new 1 site= 140m^3 and rehabilitation 2 sites), Conveyance pipe (0.07km), Transmission pipe (1.8km), Distribution pipe (18.2km), Public tap stand (new 25 sites, Renovation 27 sites), Maintenance road (2.2km).	Length of distribution pipe (+0.7km), Extension of maintenance road (-0.1km).

Source: Prepared based on the implementation review study report and document provided by JICA.

(2) Soft Component

The two outputs below were the results of the soft component.

Output 1: The management of the private operators by Ngoma and Kirehe Districts is reinforced.

Output 2: The organization operation of the private operators in fee of operation and management of the water supply facilities developed in the Project is reinforced with the support of districts.

In order to achieve these outputs, the following activities were conducted: 1) drafting

the revised performance evaluation indicator on the private operators, 2) drafting the revised contracts between districts and private operators, 3) improvement of the bidding procedures when selecting private operators, 4) drafting the training manual for capacity building of operation and maintenance on the private operators, 5) training by districts using manuals, 6) reinforcing the monitoring and follow-up system on private operator by districts (1-6 are related to Output 1), 7) drafting the revised rules for organization operation and facility management, 8) improvement of systems necessary for operation and renovation of the water supply facilities, 9) improvement of managerial ability in finance and accounting, 10) organizing the formats of reporting (accountability) made to districts, and 11) organizing public relations with the local residents (7-11 are related to Output 2).

The Table below shows the manuals, collection of formats and various reports in relation to the operation and maintenance submitted as the outputs of soft component activities.

Table 5: The Project for Rural Water Supply (Phase II) Soft Component Product

No.	Product Name
1	Proceedings on promoting the establishment of a Task Force
2	Activity record concerning the promotion of the establishment of a task force
3	Task Force Member List / Task Force Term (draft)
4	Operation and maintenance management performance indicator workshop report on private sector activities
5	Operation and maintenance management performance indicators for the activities of the private sector
6	Operation and maintenance Tender Document (draft)
7	Operation and maintenance contract (draft)
8	Management and maintenance capacity improvement training module
9	Minutes of meeting on the explanatory note on performance indicators
10	Activity report on performance indicators
11	Private operator evaluation report
12	Management and maintenance capacity improvement training report
13	Operation and maintenance manual
14	OJT activity report / participant list
15	Organization chart of private water supply agencies
16	Training and OJT follow-up activity report
17	OJT request formulation summary
18	OJT assessment
19	Monthly report feedback format

20	Public tap stand monitoring format
21	Private water supply assessment format
22	Water sales record table
23	Community awareness activities lecture materials
24	Community awareness activity report

3.2.2 Project Inputs

3.2.2.1 Project Cost

(1) The Project for Rural Water Supply

Table 6 shows the cost borne by the Japanese side on the Project for Rural Water Supply.

Table 6: Japanese side Project Cost Under the Project for Rural Water Supply

Phase	Planned Cost (E/N Grant Limit)	Actual Cost	Difference
Stage 1/3	551 million yen	541 million yen (98% of E/N Grant Limit)	A reduction of 10 million yen. While the extension of the transmission pipe increased by 2.8 km, items that were reduced are a distribution tank, a water distribution pipe extension of 8.5 km, 1 public tap stand and the repair of 3 hand pumps. These scale reductions in facilities seems to be the main reasons for the decrease in actual project cost.
Stage 2/3	692 million yen	33 million yen (5% of E/N Grant Limit)	During the 2/3 Project term, the construction tender bit was unsuccessful. Construction was not implemented. Only the consultant contract sum was expended (the amount was reduced from the initial contract amount). For this reason, the total amount was reduced by 659 million yen.

Source: Documents provided by JICA

For Stage 1/3, the actual Project cost was 541 million yen, 98 % of the planned cost of 551 million yen as per the Exchange of Notes (E/N) and was within the plan. For Stage 2/3, only the consultant contract cost was paid and since the construction of the facilities was not implemented due to bid failure, the actual cost was 5 % of the planned expenditures. The cost to be borne by the Rwandan side were acquisition of site and building the access road, but the information for the cost amount could not be obtained.

(2) The Project for Rural Water Supply (Phase II)

As shown above, the Implementation Review Study was conducted for ten schemes that had been planned for Stages 2/3 and 3/3 of the Project for Rural Water Supply. As a result, seven schemes were selected for the Project for Rural Water Supply (Phase II).

The actual cost borne by the Japanese side for the Project for Rural Water Supply

(Phase II) was 1,171 million yen, which was 82 % of the planned cost and within the planned cost of 1,435 million yen in the E/N and grant agreement (G/A). The results were within the plan. The causes for the difference were that the contractors procured the construction equipment via the economic route of their own and were thereby able to reduce the construction cost tendered for the bid, lowering the bidding price. There was no reduction of the outputs (facilities) themselves. In the plan, the cost to be borne by the Rwandan side was 4 million yen, but no information on the actual cost was obtained.

(3) Total Project cost when evaluating the Project for Rural Water Supply and the Project for Rural Water Supply (Phase II) in an integrated way

In the Project for Rural Water Supply (Phase II), facility construction for seven out of ten schemes that were assumed to be implemented in Stages 2/3 and 3/3 in the Project for Rural Water Supply were carried out. As the construction was supposed to be conducted in the Project for Rural Water Supply, the ex-post evaluation will hereby attempt to compare the plan and actual cost borne by the Japanese side for the Project for Rural Water Supply.

Table 7: Comparison of Japan's side Obligation under the Plan: Planned and Actual Cost

Project	Planned Cost	Actual Cost	Remarks
Stage 1/3	(1) 551 million yen	(4) 541 million yen	6 schemes were implemented.
Stage 2/3	(2) 691 million yen	(5) 33 million yen (Only Consultant Contract)	Not implemented (5 schemes were target)
Stage 3/3	(Not Applicable)	(Not Applicable)	Not implemented (5 schemes were target)
Phase II	(3) 1,435 million yen	(6) 1,171 million yen	7 schemes were implemented.

According to the ex-ante evaluation (Basic Design Study Report) of the Project for Rural Water Supply, the cost to be borne by the Japanese side out of the total Project cost of the Project for Rural Water Supply was 1,828 million yen.

Stages 2/3 and 3/3 in the Project for Rural Water Supply were reexamined after the Implementation Review Study and were carried out as the Project for Rural Water Supply (Phase II). Since the original Stage 2/3 had only the consultation works carried out, the evaluator judged that it was inappropriate to compare the plan (E/N amount) and the actual for Stage 2/3 in the Project for Rural Water Supply. Therefore, to compare the E/N amount and the actual, a comparison of the Project for Rural Water Supply (Stage 1/3) plus the Project for Rural Water Supply (Phase II) was made. The comparison includes the consultation cost for Stage 2/3 as the actual Project cost.

The planned cost to be borne by the Japanese side was an addition of Stage 1/3 E/N

planned cost (1 in Table 7) and the E/N and G/A limit of the Project for Rural Water Supply (Phase II) (3 in Table 7), which was a total of 1,986 million yen (1+3). The actual cost borne by the Japanese side was 1,745 million yen (4+5+6 shown in Table 7), which was 88 % of the plan and thus within the plan. The cause for this difference was that the bidding price for the Project for Rural Water Supply (Phase II) was lower than expected. And Rwandan side contributed in improvement of water quality, supply electricity to the pumping stations, payment of importation taxes and expropriation of lands to construct the facilities, but there was no information obtained for the actual Project cost borne by the Rwandan side.

3.2.2.2 Project Period

(1) The Project for Rural Water Supply

The Project period for Stage 1/3 was estimated as 21 months in the plan, with the starting point as the Detailed Design (consultant contract) up to the completion of the project (counting in the starting month and completion month). The actual Project period calculated from the consultant contract was 20 months from July 2006 (consultant contract) to February 2008 (project completion), which was within the plan (95 %).

While Detailed Design and bidding management had been implemented for Stage 2/3, the period overlapped with Stage 1/3 of the project period. Therefore, it had no influence on the evaluation of efficiency.

(2) The Project for Rural Water Supply (Phase II)

The Project period had been planned as 24 months (including from G/A to project completion) (Source: Implementation Review Study Report). However, it took 41 months from March 2010 (G/A conclusion) to July 2013 (completion ceremony) and exceeded the plan significantly (170 %). The main cause for exceeding the plan was that the estimate had to be reviewed because of the bid failure. The initial bid was conducted as planned (July 2010), but then the bid failed two times, ending successfully on the third attempt (May 2011). It required ten months from the estimate review to the bid completion.

When evaluating Stage 1/3 of the Project for Rural Water Supply integrated with the Project for Rural Water Supply (Phase II), the planned Project period was 45 months (21+24) and the actual Project period was 61 months (20+41) exceeding the plan (136 %).

Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness[13] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

3.3.1.1 Operation Indicator

(1) The Project for Rural Water Supply

The operation indicator of the Project for Rural Water Supply was the water served population (benefit population of the Target area) as shown in Table 8. The baseline figure (2005) was 41,476 persons and the target figure (2010) was 160,668 persons. Since the Project for Rural Water Supply was carried out for Stage 1/3 only, the baseline figure (11,174 persons) and target figure (43,284 persons) for the Target area of Stage 1/3 are shown in Table 9 together with the actual figures.

Table 8: Operational Indicator of the Project for Rural Water Supply

Effect Indicator	Baseline (2005)	Target (2010)
Water served population of the target sectors	41,476 persons	160,668 persons
Water supply service rate of the target sectors	17%	64%

Source: Basic Design Study Report

Table 9: Status of achievement of Operation Indicators by the Stage 1/3 of the Project for Rural Water Supply

	Baseline	Target	Actual			
	2005	2010	2008	2010	2015	2016
	Planned Year	2 Years After Completion	Completion Year	2 Years After Completion	7 Years After Completion	8 Years After Completion
Water Served population (persons)	41,476	43,284	---	---	117,300	120,450

Source: Baseline and target figures are the water served population for the Target area of Stage 1/3 in Basic Design Study Report. Actual figures are data obtained from districts.

Note: The actual figures for 2015 and 2016 include the water served population in the Target area of Stage 1/3 in the Project for Rural Water Supply and the water served population of the water supply facilities other than those of Stage 1/3. In the M-K-M Scheme in the Rwamagana district, the water served population of the JICA water supply facility was 38,376 persons (2010 target was 20,060) according to district Inquiry.

(2) The Project for Rural Water Supply (Phase II)

Table 10 shows the planned and actual figures of the operation indicator in the Project for Rural Water Supply (Phase II).

[13] The impact was also considered when determining the effectiveness rating.

Table 10: Status of achievement of Operation Indicators for the Project for Rural Water Supply (Phase II)

Item	Baseline	Target	Actual		
	2008	2014	2014	2015	2016
	Planned Year	2 Years After Completion	2 Years After Completion	3 Years After Completion	4 Years After Completion
Water Served population (persons)	95,000	150,000	---	151,000	157,000

Source: Ex-ante evaluation and interview data from districts

3.3.1.2 Effect indicator

(1) The Project for Rural Water Supply

The table below shows the achievement status of the water supply rate in the Project for Rural Water Supply.

Table 11: Status of achievement of the Project for Rural Water Supply

Item	Baseline	Target	Actual			
	2005	2010	2008	2010	2015	2016
	Planned Year	2 Years After Completion	Completion Year	2 Years After Completion	7 Years After Completion	8 Years After Completion
Water Supply Rate (%)	17%	64%	---	---	65.7%	66.2%

Note: Water supply rate is calculated from the water served population divided by the population in the water supply area. Actual figures for 2015 and 2016 include both the water served population in the Target area of Stage 1/3 in the Project for Rural Water Supply and the water served population of the water supply facilities other than those of Stage 1/3.
Source: Basic Design Report and the hearing from the districts (at the time of ex-post evaluation).

(2) The Project for Rural Water Supply (Phase II)

The table below shows the achievement status of the water supply rate of the Project for Rural Water Supply (Phase II).

Table 12: Status of achievement of the Project for Rural Water Supply (Phase II)

Item	Baseline	Target	Actual		
	2008	2014	2014	2015	2016
	Planned Year	2 Years After Completion	2 Years After Completion	3 Years After Completion	4 Years After Completion
Water Supply Rate (%)	41.6%	57.4%	---	37.9%	36.1%

Source: Implementation Review Study Report and interview data from the districts (at the time of ex-post evaluation)
Note: The water supply rate decreased in 2016 compared to 2015. This is likely due to the fact that the population in the water supply area increased more than expected.

The water served population, an operation indicator, has increased significantly and met the target goals. As for the water supply rate, 100 % was almost achieved in regard to the Project for Rural Water Supply, but 62.9 % in regard to the Project for Rural Water Supply (Phase II). The achievement

rate at the low 62.9 % is attributable to the increase of population in the water supply area, which was greater than expected.

3.3.2 Qualitative Effects (Other Effects)

As for the operation and maintenance, private WSPs, make contracts with their district and operate the water supply business by providing water sales at a revenue to cover the operation and maintenance cost. When signing contracts with WSPs, districts select private companies upon screening their operation and maintenance capability. Districts take responsibility for conducting large renovation and facility replacement. WSPs are in charge of daily maintenance and repairs. By using private companies, daily operation and maintenance are conducted without problems. This outcome is evaluated to be the output of training to private operator for operation and maintenance realized with the soft component activities.

The table below shows the results of the beneficiary survey which addresses the satisfaction level of the water supply service.

Table 13: Overall Satisfaction Rate with the Water Supply Project[14]

Item	Satisfaction Rate (%)
Water quality	90.2
Amount of water	77.3
Reliability (throughout the year)	40.5
Distance	98.5
Latency	64.5
Water fee	72.0
Water company supply agent	90.2
Facility type	95.5
Average satisfaction	78.6

The results of the beneficiary survey revealed that the reliability for the water supply business throughout the year was as low as 40.5 %. The reasons listed were lack of water, cuts in water supply, generator failure and limits on water amount during the dry seasons. What is causing the lack of water and limit of water amount is the demand for water exceeding the capacity of facilities. “Waiting time” has a low degree of satisfaction as well. This is also thought to be of the demand larger than expected in the balance of demand and supply.

3.4 Impacts

3.4.1 Intended Impacts

[14] Total number of beneficiary survey is 132 persons. The details are that “man” is 65 persons, and “women” is 67 persons.

3.4.1.1 Quantitative Effects

(1) Changes in daily water usage amount

The daily amount of water usage before and after Project implementation was asked as part of the beneficiary survey. Table 14 shows the results. The daily water usage amount per capita was 11.2 L/capita/day before Project implementation and has increased to 22.2 L/capita/day at the time of ex-post evaluation (approximately 73 % increase). The Project had been designed to meet 20.0 L/capita/day (unit of water supply amount[15]). Almost all districts have met the target with the average of 19.4 L/capita/day, although some districts slightly missed the target. As for the water usage amount per capita per day, the target of the Project has been nearly achieved.

Table 14: Changes in the Amount of Water Consumed per Resident per Day

Districts	Survey qty. (household)	Before Project Implementation (L /capita / day)	After Project Implementation (L /capita / day)
Rwamagana district	19	8.9	15.7
Kayonza district	23	8.9	16.2
Ngoma district	33	10.3	19.0
Kirehe district	56	13.5	22.2
Average	---	11.2	19.4

Source: Results of the beneficiary survey

The table above shows the calculated amount of daily water usage per capita derived from the average number of water drawings by a Jerry Can (20 L plastic container) per household. The original unit set by the Project was 20 L/capita/day and it is equivalent to the water amount in a Jerry Can. As the table shows, water usage before the Project increased after the Project. While water consumption does not slightly reach the quantity that correspond unit of supply amount, the effect of the Project can be seen.

(2) Changes in the distance to the water supply facilities

A beneficiary survey was carried out on those residents obtaining drinking water from the water supply facilities developed under the Project in the Target area (beneficiary survey[16]). According to the results of the hearing, the data showing the reduction of the distance to the water supply facilities are presented in Table 15.

[15] Daily amount of domestic water usage per capita.

[16] Beneficiary surveys were conducted targeting residents who obtain water for drinking and other use. from water supply facilities in the 13 schemes developed by the Project for Rural Water Supply (Stage 1/3) and the Project for Rural Water Supply (Phase II). (Water drawing labor time and distance, satisfaction for water supply amount and quality, situation of infection of water-borne diseases, effect of life improvement etc.) The total sample size is 132, with 65 males and 67 females. The names of the schemes that were investigated are: Mwulire-Kigabiro-Munyaga in Rwamagana district, Mukarange, Rwinkwavu, Kabarondo, Nyankora in Kayonza district, Murama, Karembo -Zaza-Mugesera, Mutendeli-Kazo in Ngoma district and Mushikiri, Kirehe, Nyamugari, Kigina, Gatore in Kirehe district.

Table 15: Distance to Water Supply Facility

Distance to Water Supply Facility	Before Project Implementation	After Project Implementation
200m or less	2%	68%
201m-500m	15%	27%
501m-1000m	14%	4%
1001m-2000m	31%	1%
2000m or more	37%	0%
Total	100%	100%

Source: Results of the beneficiary survey
Note: Total percentage does not match the sum of the respective breakdown figures due to rounding off.

In Rwanda, it is set as a target in rural water supply to establish a water supply source within 500 meters from each household in order to enhance accessibility to clean water. At the time of planning, the policy was set to keep the maximum access distance to a water supply source at 500 meters one way and 1 kilometer in the case of dispersed rural settlements where maintenance cost would increase too much.

As shown in Table 15, the percentage of residents within 500 meters distance to water supply facilities was 17 % before the Project implementation and rose up to 95 % after Project implementation. This is a significant improvement when compared to the fact that the percentage of residents with 1 kilometer distance one way to water supply facilities was as high as 68 % before the Project implementation.

(3) Change in water fetching time

It is expected that if the distance to water supply facilities becomes shorter, the time required for water fetching would be reduced. In the beneficiary survey, hearings were made to ask the time required for water retrieval before and after Project implementation. The results are shown in Table 16. The percentage of those who required 15 minutes or less for water retrieval was 13 % (2 %+11 %) before Project implementation and 95 % (68 %+27 %) after Project implementation. Comparing with the fact that 45 %, almost a half, of the residents who had required more than an hour to fetch water, most of the water served residents are now able to fetch water in 15 minutes or less after the Project implementation. The effect of a significant reduction of water drawing time is apparent.

Table 16: Water Fetching Time Before and After Project Implementation

Water Fetching Time	Before Project Implementation	After Project Implementation
5 minutes or less	2%	68%
6 minutes-15 minutes or less	11%	27%
16 minutes-30 minutes or less	18%	4%
31minutes-1 hour or less	23%	1%
1 hour or more	45%	0%
Total	100%	100%

Source: Results of the beneficiary survey
Note: Total percentage does not match the sum of the respective breakdown figures due to rounding off.

(4) Other effects

In the beneficiary survey, the majority of the responses showed that access to clean water had effects on their life in general, contribution to the children's education and reduction of water-borne diseases. Comparing the responses between male and female respondents, there was no significant difference; both responded that there were improvements.

Overall, the survey responses showed: Life improved in general [Male: 63, Female: 66], Children's education improved [Male 65, Female 66]. For the improvement of children's education, there were comments as follows: Can save time; Can do homework; More time for concentrating on studies; Can go to school on time.

When asked what kind of welfare it has led to for women and children, the results were: Increase in income [Male: 4, Female: 5], Time to do other jobs [Male: 46, Female: 43], Increase in income and time to do other jobs [Male: 11, Female: 17] and Other reasons [Male: 4, Female: 1]

When asked about impacts of water supply facilities on girls and children, there was no difference in the responses. Both showed that there were improvements in living. It can be understood that reduction of water drawing time is showing effects on the very base of living.

Interviews were carried out from four district health centers on reduction of water-borne diseases. As a result, the number of patients did not clearly change before and after the Project according to the yearly data for the number of patients that health care centers keep. This is related to the fact that the jurisdiction of a health care center is not always equal to the Target area covered by a water supply facility, and patients that come to the health care center are not necessarily the users of the water supply facility. It is also possible that the population increase has exceeded the capacity of water supply facilities;

therefore, it is difficult to measure the impact of the Project with the number of patients of water-borne diseases.

In the interviews with health care centers, there was a comment that during the rainy season there is an increase in the number of residents who use unclean spring water, avoiding the water that costs money, in the areas near wetlands where water is easily available.

3.4.2 Other Positive and Negative Impacts

According to the interviews with WASAC and each district, the responses showed that there were no negative impacts on the environment. Also, there was no resettlement accompany land acquisition for the project sites.

Within the beneficiary survey undertaken, there were many responses that: 1) the time spent on drawing water was significantly reduced, 2) user were satisfied with the water supply facilities and 3) the water supply was contributing to the children's education. Therefore, the impact on the improvement of the community's living conditions is large.

As shown from above, the effects were manifested as planned on the whole by implementing the Project. The effectiveness and impacts are valuated as high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

After Project completion, the authority of the water supply facilities is to be transferred to the districts so that they take responsibility for the operation and maintenance of the facilities. Actual operation and maintenance activity are taken charge by the private operator that has made contracts with district offices. However, it has been decided that district offices are responsible for large-scale renovation and renewals of water supply facilities and private water supply providers are in charge of small-scale repairs. As such, there is an operation and maintenance system based on clear role-sharing. And then, WASAC is in charge of operation and maintenance of the facilities in the provincial urban areas, while also it is in charge of supporting for districts and WSPs for rural water supply and sanitation. In addition, at the "Project for strengthening operation and maintenance of rural water supply systems in Rwanda" as technical cooperation in operation at the time of ex-post evaluation, activities such as elaboration of contract form for the districts and WSP, and elaboration of manual to clarify the division of roles between the districts and WASAC have been done. There are activities to disseminate contract forms developed by this technical cooperation project and to group together plural WSPs with different technical levels into one organization. Therefore, it is considered that the institutional system is being

strengthened.

3.5.2 Technical Aspects of Operation and Maintenance

Each WSP that is consigned from each district is consisted of staffs with technical skills in the waterworks sector. The district confirms that there is no technical problem before signing the consignment contract. The manuals created for the soft component are stored. According to the hearings, the techniques that are necessary in daily management and written in the manuals are already acquired and put into practice. And then, "Project for strengthening operation and maintenance of rural water supply systems in Rwanda" executes the training for obtaining specialized technique and knowledge related to operation and maintenance for rural water supply and strengthening WASAC's instruction skills to districts and WSP. Additionally activities to strengthen of technic level and to merge plural WSPs with different technical levels to unify the applied techniques are operated.

The maintenance of the water supply facility is carried out on a daily basis and collection of rates is undertaken. Therefore, it is judged that WSP has sufficient techniques for operation and maintenance.

3.5.3 Financial Aspects of Operation and Maintenance

The WSP who has signed a consignment contract with the district collects the water fee. Operation and maintenance of water supply facilities is conducted based on the collected water fees. The rates of water fee settings are decided by the Rwanda Utility Regulation Authority (RURA). The water fee differs according to the power system of the water supply system. The rates are equal regardless of the social environment of users. WSP signs a consignment contract with the manager of a public water tap for the water sales business, and then the manager sells water to users. WSP also collects rates for water supply to each household. The table below shows an example of the breakdown of water fee.

Table 17: Water fee Breakdown (Unit: RWF (Rwanda Franc))

Power System	Water fee per Jerry Can (a)	Public Water Stand Management Fee (b)	Ayateke Star Operation and Maintenance Expenses (c)	Water fee per m^3
1) Gravity type	8	3	5	333
2) Commercial electric power	20	5	15	863
3) Power Generator	25	5	20	1087

Ex: Ayateke Star LTD (consigned by Kirehe district)
Note: Water fee per Jerry Can: (a) = (b) + (c)

WSP manages the water sales amount by the flowmeter installed to the public water

tap. The cost of the manager of the public water tap and WSP's operation and maintenance cost are covered by the revenue of the water fee. In addition, WSP pays 10 %[17] of the water fee revenue to the district and yet, the balance of the WSP is in the black. When a large-scale renovation occurs which cannot be covered by the water fee revenue alone, such cost will be covered by the district. So far the total sum of the water fee revenue has become the budget of the district and is utilized for implementing projects of not only water supply but also projects in other sectors. Since Fiscal Year 2017 opening special account of the water fee revenue is approved by Ministry of Finances. Therefore, revenues from water service management can be utilized as budget, so it is expected that the financial aspects of operation and maintenance will be improved.

As for the operation and maintenance, there are no subsidies allocated to the districts from their counterpart WASAC or the government. Likewise, the districts do not pay out any subsidies to the WSP.

According to interviews with WSP, there are some causes that required a request for costly repairs and renewals of facilities that the districts do not approve the costs. To improve this situation of the approval delays, Kirehe district has adopted a method where WSP submits the estimate for repair cost; the district checks the amount and reimburses the repair cost from payment if it is found to be justifiable.

Large-scale facility renovations are dealt differently from district to district, but each WSP collects water fee and secures the funds necessary for daily maintenance, conducts repairs and manages the water supply business continuously. In sum, the financial aspects of the operation and maintenance through private consignment to WSP reveal that there is no problem in the normal operational management, but there are some issues when large-scale repairs are necessary.

3.5.4 Current Status of Operation and Maintenance

WSP is qualified to undertake water service management. The results of the beneficiary survey showed that people were satisfied in general with WSP and there is no problem in daily maintenance situation. However, the budget allocation is not quick enough to deal with large-scale repairs and costly renewals and facilities end up waiting for the renovation. As a specific example, the Kazo Scheme in Ngoma district is operating its facility with one of its two pumps in failure. It is necessary to build a system to enable large-scale renovation like this that exceeds the responsibility area of the WSPs. Another example, the WSP in Ngoma district procured a generator repair part which was damaged by

[17] Some districts count of 90 % of the total water produced amount as a revenue water charge and 15 % of the sales is paid to the district by the WSP.

a lightning from Japan. The control panel is also in failure and they are searching for its repair part in Uganda since it cannot be procured in Rwanda. WSPs are finding trouble in obtaining the parts which cannot be procured within the country. There are facilities where renovations are left undone.

On the other hand, WASAC, the executing agency of the Project, is making efforts to reduce power cost by adding the commercial power grid to their facilities to operate the pump station. WASAC supports operation and management by building new facilities.

Some minor problems have been observed in terms of the financial aspect and current status of the Project. Therefore, sustainability of the Project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project was conducted with the aim of enhancing the water supply rate of the Target area and contributing to the improvement of living conditions in the water and sanitization sectors by developing the water supply facilities in the Ngoma, Kirehe, Kayonza and Rwamagana districts in the Eastern Province of the Republic of Rwanda. The Project matched with the Rwandan development policy “to provide all the population access to safe water by 2020” the development needs and the Japanese government aid policy. At the time of ex-post evaluation, a new development policy for the water sector had been set out and the development needs were still strong. Therefore, the relevance of the Project is evaluated as high. While the results of the Project cost were below 100 % of the plan, the Project period was 136 % of the original plan (45 months). Therefore, the efficiency is evaluated as fair. The water served population, an operation indicator, has increased significantly and met the target goals. As for the water supply rate, 100 % was almost achieved in regard to the Project for Rural Water Supply, but 62.9 % in regard to the Project for Rural Water Supply (Phase II). The achievement rate at the low 62.9 % is attributable to the increase of population in the water supply area, which was greater than expected. Within the beneficiary survey undertaken, there were many responses that: 1) the time spent on drawing water was significantly reduced, 2) user were satisfied with the water supply facilities and 3) the water supply was contributing to the children’s education. Therefore, the effectiveness of the water supply system of the Project is high, and the impact on the improvement of the community’s living conditions is large. Effectiveness and impact are evaluated as high. The districts contract with the Water Service Provider (WSP) on one's own responsibility, to perform the operation and maintenance. Minor repairs and daily operational management are undertaken by the WSP; however, there are financial issues in the case of equipment renewal and large-scale repairs which require high cost against the district’s budget implementation system. Therefore, the sustainability is evaluated as

fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Recommendation to district offices

Districts bear the responsibility of operating and managing the water supply facilities. Water fee incomes used to entere to the common account of the district office and were added together with other types of income. But since Fiscal Year 2017, opening exclusive account for the water fee revenue is approved by Ministry of Finance. This leads to the feasibility in securing budgets to repair and exchange costly equipment. In future, it is necessary to improve the capacity for effective utilization of water fee income. As it is conducted in Kirehe district, the system could be more effective where the WSP estimates the repair cost, the district screens and approves it, and the payment to the district from the water fee income is allotted to the repair cost.

It is recommended that each district make effective use of budget by considering the priority for equipment replacement and repairs that are necessary in the operation and management of the water supply project.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

There is a facility where one of the two transmission pumps is broken and is operated only with the remaining one pump. Also there is some equipment without prospects to be repaired. Even if the operation is handled with the remaining equipment, there is a high risk that these facilities will fail to be operating without any repair parts. Procuring parts unavailable in the country from Japan or other third countries involves big risks when it is urgent. To prevent such issues and to conduct a stable water supply business, it is important to select the equipment which the aided country is able to carry out renewal of water supply facility equipment or the procurement of repair parts with ease. This is an issue in enhancing the sustainability of projects. It is also essential to confirm of the creation of a framework on the aid recipient country’s side to secure funds that enable large-scale repairs.

Democratic Republic of the Congo

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Rehabilitation of Ngaliema Water Treatment Plant in Kinshasa City" and

"The Project for Extension of Ngaliema Water Treatment Plant in Kinshasa City"

External Evaluator: Koichi Sekita, Chuo Kaihatsu Corporation

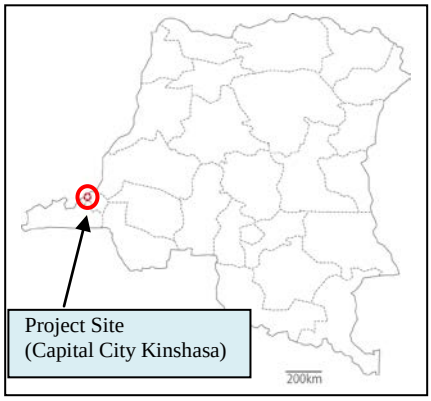
0. Summary

The Project aims to stabilize and increase the amount of water supply by replacing deteriorated facilities/equipment and expanding the water treatment facilities in the Ngaliema Water Treatment Plant, which is the existing water treatment plant in Kinshasa City, the capital of the Democratic Republic of the Congo (hereinafter referred to as "the DRC"), and to contribute to the improvement of living conditions for the residents of Kinshasa urban area.

The DRC is striving to repair, expand and newly build the water supply infrastructure with the goal to improve accessibility to safe drinking water. The Project holds high consistency with the developmental policy and needs of the DRC and also with the aid policy of the Government of Japan for the DRC, which includes "better access to safe water and hygiene" as an essential development issue. The relevance of this project is high. The rehabilitation and expansion (development of new facilities) of the Ngaliema Water Treatment Plant was carried out as planned. The efficiency is evaluated as fair since the Project period exceeded the plan while the Project cost was within the plan. The amount of supplied water (m^3/day) and the amount of supplied water per capita (l/p/d; liter per person per day) reached the target; however, reduction of rate of loss of the volume of water treated at the water treatment facility did not meet its target. The effectiveness and impact are high since the users of water service is showing higher satisfaction for the water supply amount and an impact has been seen that the patients with diarrhea, one of the waterborne infectious diseases, have decreased in number. The sustainability is evaluated as fair as there are minor problems in the operation and maintenance institution and finance of the executing agency, maintenance techniques for facilities/equipment and also a fair equipment maintenance problem.

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

1. Project Description



Project Location

New Water Treatment Plant (extension) and Control Office

1.1 Background

Kinshasa City, the capital of the DRC, had a population of 6.22 million in 2005 and the coverage rate of drinking water service in the city was estimated at 76%. However, the amount of water produced per capita was only about 50 l/p/d and the estimated amount of supplied water was approximately 30 l/p/d taking into account the water leakage rate. This amount of water supply was equal to the level of rural water supply. The water pressure was insufficient in the outlining and higher altitude areas in the water supply service areas. Therefore, suspension of water supply was occurring on a daily basis.

To improve this situation, REGIDESO (Régie de Distribution d'Eau; a public-sector water company and an organization responsible for water supply in the DRC) developed a Master Plan on Drinking Water Supply for Kinshasa City. This master plan included the water demand forecast from 2005 to 2027 and the plan for increasing water supply capacity through new construction and expansion of water treatment plants in order to cope with the increasing water demand. However, the increased water supply capacity by 2009 was still 55% of 266,000 m^3/day of the planned water supply capacity targeted for the FY 2012. The water supply amount[1] of the Ngaliema Water Treatment Plant was 80,000m^3/day, which covered 16% of the total water supply amount for the whole of Kinshasa City (486,000m^3/day)of planned year(2009). The benefited population in the water supply service area was 920,000. It had passed from 20 to 50 years since the construction of the Ngaliema Water Treatment Plant. Due to deterioration of the main core equipment such as transmission and distribution pumps for supplying treated water to the water supply service area, failure on equipment could have occurred at any time. The water supply capacity was fragile.

With such a background, the Government of the DRC requested grant aid from Japan for implementing the plan for increasing the water supply capacity. Consequently, grant aid projects for the rehabilitation and extension of the Ngaliema Water Treatment Plant, namely, 1) Plan for Rehabilitation of

[1] "Water supply amount" refers to the amount of production and supply of clean water.

Ngaliema Water Treatment Plant (Rehabilitation Project) and 2) Plan for Extension of Ngaliema Water Treatment Plant (Extension Project) were implemented.[2]

1.2 Project Outline

The objective of this project is to stabilize and increase the amount of drinking water supply by replacing the deteriorated facilities/equipment and expanding the water treatment facility in the Ngaliema Water Treatment Plant in Kinshasa City, the capital of the Democratic Republic of the Congo. Consequently, the Project will contribute to the improvement of the living environment for the residents in the Kinshasa urban area.

<Grant Aid Project>

G/A Grant Amount / Actual Grant Amount	(1) Rehabilitation: 1,944 million yen / 1,295 million yen (2) Extension: 1) Detailed Design: 81 million yen / 69 million yen 2) Main Works: 3,633 million yen / 2,847 million yen
Exchange of Notes Date /Grant Agreement Date	(1) Rehabilitation: February 2010/ February 2010 (2) Extension: 1) Detailed Design: February 2010/ February 2010 2) Main Works: May 2010/ June 2010
Executing Agency	Public-sector water company (REGIDESO)
Project Completion	(1) Rehabilitation: March 2012 (2) Extension: June 2013
Main Contractors	(1) Rehabilitation: Joint Venture by Toda Corporation and Suido Kiko Kaisha, Ltd. (2) Extension: Joint Venture by Dai Nippon Construction, Iwata Chizaki Inc. and Swing Corporation.
Main Consultant	Tokyo Engineering Consultants Co., Ltd.
Basic Design	(1) Rehabilitation: February 2009 – December 2009 (2) Extension: February 2009 – December 2009
Related Projects	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Koichi Sekita, Chuo Kaihatsu Corporation

2.2 Duration of Evaluation Study

[2] The two Projects are integrated for evaluation since the extension plan improved the capacity based on the improvement and maintenance of existing capacity of the water treatment plant in the rehabilitation plan.

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

Duration of the Study: September 2016 – January 2018

Duration of the Field Study: February 12, 2017 – February 27, 2017 and May 21, 2017 – May 27, 2017

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

3.1 Relevance (Rating: ③[4])

3.1.1 Consistency with the Development Plan of the Democratic Republic of the Congo

At the time of Project planning, better accessibility to social services including water and hygiene sector was touted within *the Poverty Reduction Strategy* (2006 – 2010). The target for the water sector was to improve the access to safe drinking water from 25% in 2005 to 26.9% in 2008 and 49% in 2014. In the Government's five development pillars announced by President Kabila, the water sector has been chosen as one of the top five priority sectors. *The Priority Action Plan* (2009 – 2010), which is the action plan to achieve the targets set out in *the Poverty Reduction Strategy*, focused on the improvement of access to water in urban areas.

At the time of ex-post evaluation, *the Second Poverty Reduction Strategy* (2011 – 2015) pointed out the improvement of access to clean water as an improvement of access to basic social service. As for the water supply in urban areas, the policy to improve access to drinking water through rehabilitation, extension and building new water supply infrastructures has been shown. In the official notice of policies for drinking water supply service sector in urban areas (*Public-Sector Water Company Reconstruction Program*), the development and extension of water supply service infrastructure has been noted.

Therefore, the objective of the Project is consistent with the Government's development policies at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of the Democratic Republic of the Congo

At the time of planning, the main facilities of the Ngaliema Water Treatment Plant, which produces 16% of the 486,000m^3/day (equivalent to 77,760m^3/day) water supplied for Kinshasa, had deteriorated after 20 to 50 years from its construction. The water supply from the Ngaliema Water Treatment Plant was 50 l/p/d[5] and taking into account the water leakage amount between the water treatment plant and households, the actual amount of water reaching (being supplied to) households was estimated as approximately 30 l/p/d. This is at a very low level for water supply in urban areas; therefore, it was necessary to expand the water supply capacity.

At the time of ex-post evaluation, the water supply from the Ngaliema Water Treatment Plant had expanded to 120,000m^3/day and 121 l/p/d, and the estimated amount of water reaching households expanded to 70 l/p/d. The 70 l/p/d of water supply is not sufficient compared to the desirable level of

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[4] ③: High, ②: Fair, ①: Low

[5] This means that the water supply (water that comes out of the water treatment plant) per capita per day is 50 L.

urban water supply (100 – 300 l/p/d). Of the clean water that has been discharged from the water treatment plant, approximately 50 l/p/d is still wasted (approximately 42% of water coming out of the plant is wasted by leakage etc.). From these points, it is judged at the ex-post evaluation stage that there is the need to increase the water supply further and also to reduce the amount of water wasted.

Therefore, the Project is consistent with the development needs at the time of planning and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

At the time of planning, one of the priority areas of assistance in Japan's *Country Assistance Policy* for the DRC was the "improvement of access to social services" and one of the critical development issues was the "improvement of access to safe water and hygiene" (*Japan's ODA Data by Country* 2010 by the Ministry of Foreign Affairs). Therefore, the Project which aims to improve access to safe water in Kinshasa was relevant to the Japanese assistance policy. Furthermore, the Yokohama Action Plan issued at the 4th Tokyo International Conference on African Development (TICAD IV: 2008) pointed out that the water and hygiene area is one of the essential areas. In sum, the Project is highly relevant to Japan's assistance policies at the time of planning.

This project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The Project implemented the rehabilitation and extension (building new facilities) for capacity improvement of the existing Ngaliema Water Treatment Plant. The plant covers 16% of 486,000m^3/day of water supply in Kinshasa and the benefited population is 920,000.

3.2.1.1 Rehabilitation Plan

Table 1 shows the comparison between the rehabilitation plan at the time of planning and the results at the time of Project completion. According to reports provided by Japan International Corporation Agency (hereinafter referred to as "JICA"), there are no changes between the plan and actual results.

Table 1 Outputs which Japanese side provided or procured in the Rehabilitation Plan (plan and actual)

Name of Facility	Contents (mainly Exchange of Facility Equipment)	Quantity		Difference
		Plan	Actual	
Sedimentation Basin	Sludge draining pipe, sludge valve, sluice valve, and control panel.	4 basins	4 basins	As planned
Filtration Basin	Water collecting device, air purifier device, counter-current wash device, blower device, and control panel.	24 basins	24 basins	As planned
Water Conveyance Facilities	Discharge pump, control panel for discharge pump, electric control panel for existing intake pump, electric control panel for new intake pump, and incoming panel.	1 set	1 set	As planned
Reagent Injection Equipment	Alumina sulfate injection equipment, slaking lime injection equipment, calcium hypochlorite injection equipment, and service pump.	1 set	1 set	As planned
Other Equipment	Water level gauge for water purification basin, turbidity-meter, pH meter, flowmeter, and transducer board.	1 set	1 set	As planned

Source: Preparatory study report and other documents provided by JICA

3.2.1.2 Extension Plan

Table 2 shows the comparison between the extension plan at the time of planning and the results at the time of Project completion.

Table 2 Outputs which Japan side provided or procured in the Extension Plan (plan and actual)[6]

Facility	Contents (mainly Exchange of Facilities)	Quantity		Difference
		Plan	Actual	
Intake Facility	Intake pipe, intake pump, electric power facility, and water quality monitoring facility, etc.	1 set	1 set	Expanded the embankment area of the land for intake pump room. Change the excavation work method for the intake pumping room from the "open cut and sumping method" to the "steel sheet pile method". During the detailed design stage, it was planned to intake all the raw water at the point of the newly constructed intake facility. However, to ensure the production level at 110,000m^3/day, with a change of the detailed design above, the existing water intake facility and newly constructed intake facility were connected.
Receiving Well	Receiving well, chemical mixing basin, communicating exit door of receiving well, flow meter, stirrer, distribution tank, and overflow weir	1 set	1 set	As planned.
Coagulation sedimentation Basin	New coagulation sedimentation basin, new inclined plate sedimentation basin, desludging equipment, and water quality monitoring equipment	1 set	1 set	As planned.
Filtration Basin	Filtration basin, siphon facility, cleaning facility, and drainage facility	1 set	1 set	Mostly as planned.
Reagent Injection Facility	Sulfate band, automatic water supply pump, and PVC piping, etc.	1 set	1 set	As planned.
Water Purification Pond	Water purification pond and communicating pipe	1 set	1 set	Change the route of the existing water supply pipes and the connecting pipes with water purification pond due to the temporary works of the existing water purification pipe
On-site Piping	Raw water pipe, water distribution pipe, sluice valve chamber, flow meter box	1 set	1 set	As planned.
Water Conveying Pump	Water conveying pump	2 sets	2 sets	As planned.
Administration Office	Offices (917.13m^2 in total)	1 set	1 set	As planned.
Exterior Facilities	Rainwater drainage facility, interior lighting, interior pavement, safety measures, tree planting, and lightning rod	1 set	1 set	Aggregate the drainage system in the plant. Material handling entrance, concrete pavement in the plant, gate and others were added.

3.2.1.3 Capacity Building Program (Soft Component[7])

On the Job Training (herein after referred to as "OJT"[8]) was provided by consultants for the purpose of enhancing operation and maintenance skills of the operators at the water treatment plant.

The target (plan) of this soft component (OJT for the operation and maintenance at the water

[6] The output on the DRC side was the acquisition of land that had been necessary for the extension plan. Tax exemption equivalent to the land price was provided to the private business operators who owned the land.

[7] A soft component refers to the technical training for improving the management ability and the maintenance skills of the recipient country so that the outcomes expected to occur through facility construction and equipment procurement by grant aid are continued after the project completion.

[8] On the Job Training is a vocational education for employees through practical work experience at the workplace.

treatment plant) was for the operators at the Ngaliema Water Treatment Plant to be able to operate the facilities with the comprehension of the theory of the coagulation sedimentation and the rapid filtration methods, to adjust the operating methods according to the water quality situations, and to form a maintenance plan for cleaning the sedimentation basin and backwashing the filtration basin by themselves.

Table 3 shows the specific action plan, confirmation methods and the implemented results of this soft component. For each of the four technical items, it was confirmed that the work for maintenance was implemented as planned. Therefore, the target for the soft component has been achieved.

Table 3 Action Plan, Confirmation Methods and Implemented Results of the Soft Component

Item	Action	Confirmation Methods	Implemented Results	Difference
Comprehend the theory and process of coagulation sedimentation and rapid filtration methods	Hold seminars (2 times) on water treatment, sedimentation basin and filtration basin. Explanation on operating manual for each facility. Practical training on facility operation and inspection.	Confirm the comprehension by asking questions at seminars, manual explanation and OJT. Conduct practical exercise on operating and inspecting facilities and evaluate according to the items conducted. Conduct written exams to confirm the comprehension.	Written exams were conducted to confirm the comprehension. The average on the 13 examinees was 75 points (out of 100 points) in the first exam, which was quite high in the beginning. In the last exam the average (24 examinees) rose to 88 points, which showed further comprehension	Comprehension has improved further, which is the improvement of skill as planned
Acquire skills for operating the coagulation sedimentation basin	Cleaning according to the sedimentation basin cleaning manual. Setting adjustment of the desludging timer.	Confirm if the cleaning is conducted according to the manual. Confirm if the setting adjustment of the desludging timer is conducted according to the desludging changing manual and daily reports for desludging control.	It was confirmed that the cleaning was conducted under the leader's direction according to the manual. It was confirmed that the daily reports for desludging control and filtration basin washing control were used to check the setting based on desludging changing manual and that the changing timing was comprehended.	Operational skills were acquired as planned
Acquire skills for operating the rapid filtration basin	Operate control panel for rapid filtration basin and change the washing intervals etc. Conduct washing by operating the electromagnetic valve(s) of the local panel according to the electromagnetic valve operating manual. Control washing according to the	Confirm if the changing of washing intervals etc. is conducted by operating the control panel for rapid filtration basin. Confirm if the washing is conducted by operating the electromagnetic valve(s) of the local panel according to the electromagnetic valve operating manual. Confirm if the washing control is conducted according to the filtration	It was confirmed that the operators were able to operate the control panel and change the washing time. It was confirmed that three groups were formed and washing was conducted by each group by operating the electromagnetic valve(s) of the local panel according to the electromagnetic valve operating manual. It was confirmed that washing time and situation of head loss were checked using the	Operational skills were acquired as planned

	filtration basin washing manual and daily reports for filtration basin washing.	basin washing manual and daily reports for filtration basin washing.	daily reports for desludging control and filtration basin washing control (fixed time totalization sheets) and appropriate washing interval was judged. Comprehension was made on the treatment method(s) in a situation when the head loss is high.	
Be capable of forming a maintenance plan	Confirm annual maintenance plan throughout the year. Use totalization sheets to confirm and inspect, and check the operation control.	Confirm if the daily reports for operation control, desludging control, filtration basin washing control and forms for facility inspections have been made. Confirm if the methods of filling in the totalization sheets and inspection have been comprehended.	The annual maintenance plan for the new water treatment facility has been made. It was confirmed that the forms such as the daily report for operation control was made, and that inspection, adjustment and maintenance request were conducted using the forms.	Operators have become capable of forming maintenance plans as planned, and inspection and adjustment are conducted.

Source: Documents provided by JICA.

3.2.2 Project Inputs

3.2.2.1 Project Cost

For the rehabilitation plan, the limit of the grant by the Japanese side was 1,944 million yen. The actual Project cost was kept at 1,295 million yen without using the 13% contingencies. This was 67% of the planned cost and was kept within the plan. The Project cost to be borne by the DRC was planned to be 2 million yen; however, no evidence was found to show the actual figure.

For the extension plan, the limit of the grant by the Japanese side was 3,633 million yen (including 81 million yen for the detailed design). The actual Project cost was 2,916 million yen (including 69 million yen for the detailed design), this amount is 80 % of the planned cost, and was kept within the plan. The Project cost to be borne by the DRC was planned to be 5 million yen; however, no evidence was found to show the actual figure. According to the interview with REGIDESO, 1,200,000 U.S. Dollars compensation was paid to the landowners when acquiring the extension land for the water treatment plant. The compensation was made by tax exemption corresponding to land price for the landowners.

When totaling the Project costs of the rehabilitation plan and the extension plan, the actual Project cost borne by the Japanese side was 4,211 million yen (1,295 million yen + 2,916 million yen) while the limit of the grant by the Exchange Notes (E/N) and Grant Agreement (G/A) was 5,577 million yen (1,944 million yen + 3,633 million yen). The cost was 87% of the plan and was kept within the plan.

3.2.2.2 Project Period

For the rehabilitation plan, while the planned Project period[9] was 20 months (including the detailed design and bidding period), the actual period was 26 months from February 2010 to March 2012 (completion date), which exceeded the plan (130%). The causes of the actual period exceeding the plan were that the detailed design took 6.6 months whereas it was planned as 2.9 months, and the period from the bid announcement to the construction start took 6.5 months for an unknown reason whereas it was planned as 2.6 months. (The period from the start to the completion of the construction was 12 months both in the plan and the actual result.)

For the extension plan, while the planned Project period was 34 months (including detailed design works, tender period and soft component period), the actual period of the Project was 42 months from February 2010 to July 2013 (soft component completion), which exceeded the plan (124%). The causes of the actual period exceeding the plan were that the detailed design took 6.6 months, which was 2.7 months more than the plan of 3.9 months, the period from the tender announcement to the bidding took 2.5 months, which was 0.5 months more than the plan of 2.0 months; as for the construction, the period from the agreement with the contractor to the start of construction took 3.0 months, which was 2.4 months more than the plan of 0.6 months, and the period from the construction start to the completion took 28 months, which was 5 months more than the plan of 23 months. The major causes for the period from the start to the completion of the construction to exceed the plan were the delays in land acquisition, procurement of rebar due to the lack of electricity, cargo transportation due to the presidential election, and the delay due to the cement factory shutdown. The construction was divided into Term I, Term II and Term III. Since Term I was delayed 8 months, the beginning of Term II and Term III had to wait for the dry season in the next fiscal year (May to October); therefore, the term was postponed.

When totaling the period for the rehabilitation plan and the extension plan, it was 54 months when planned, but it was 68 months in actual which exceeded the plan (126%).

Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the Project is fair.

3.3 Effectiveness[10] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

3.3.1.1 Operation Indicators

Since the rehabilitation plan and the extension plan have the same target of increasing the water supply, they will be evaluated integrally. As the completion of the rehabilitation plan was in March 2012 and the completion of the extension plan was in June 2013, the data from June 2013 onwards will be basically used for comparative analysis considering integral evaluation. In order to

[9] Within the ex-ante evaluation table, the revitalization plan was set at 18 months and the expansion plan was set at 33 months. However, here as the starting point is unknown, we adopted the period of the bar chart of the Preliminary Survey Report on which the signing of the Exchange of Notes was as the starting point. Incidentally, the number of months is calculated including both starting and ending months.

[10] When evaluating effectiveness, impact is also considered when evaluating the rating.

grasp change over the years, some data from FY 2012 are shown. The operation indicators are the daily water supply amount (10,000m^3/day) and reduction of loss rate of the volume of water treated at the water treatment facility. Table 4 shows the achievement status of the indicators.

Table 4 Operation Indicator: Status of Achievement

Index	Baseline	Target	Actual				
	2009	(as below)	2012	2013	2014	2015	2016
	Planned Year	Completion Year	1 Year Before Completion	Comple-Tion Year	1 Year After Comple-tion	2 Years After Comple-tion	3 Years After Comple-tion
Volume of Water Supply (10,000 m3/day)	8	11 (yr 2012)	8.3	10.5	12.5	12.5	12.6
Reduction of loss rate of the volume of water treated at the water treatment facility	Approx. 10%	0% (yr 2011)	2.3%	4.1%	5.4%	5.3%	5.4%

Note1: Water supply volume is the amount of water per day received from the Ngaliema Water Treatment Plant into the water supply area. The reduction rate in the amount of purified water is calculated by comparing the amount of purified water produced to the amount of water withdrawn from the raw water source.
Note2: Actual value of loss rate is including not only loss rate by facility's troubles but normal loss rate.
Source: Reports provided by JICA and from the questionnaire results at the time of ex-post evaluation (REGIDESO response)

Of the two indicators, the water supply amount has reached the target from FY 2014 onwards (up to FY 2016) with the actual result of approximately 125,000m^3/day, although it did not quite reach the target in FY 2013 when the extension plan was completed. The other indicator, the reduction of loss rate of the volume of water treated at the water treatment facility, improved compared to the reference figure, but has not reached the target value, and has slightly increased later and ended up at 5.4% in the FY 2016. REGIDESO explains that the causes for this increase are the sedimentation of sludge emerging in the water purification process and the increase of treatment water for washing filter in the filtration basin[11]. Also, there was no flowmeter to measure the intake amount of raw water up to 2012, so the accurate intake amount had not been measured. Therefore, one of the causes is that it has become actually possible to measure the accurate loss with the figures since the Project was conducted.

3.3.1.2 Effect Indicator

The effect indicator is the water supply amount per capita (l/p/d). From 2012, when the rehabilitation plan completed, and onwards up to 2016, the water supply amount per capita is significantly exceeding the target of 77.7 l/p/d. Their main causes are that the produced water amount supplied by the Ngaliema Water Treatment Plant has stabilized by the rehabilitation plan and that the produced water amount of the Ngaliema Water Treatment Plant has increased by the extension plan.

[11] Due to malfunction of sludge pump, sludge's drained from the sedimentation basin, and clogs the filter.

Table 5 Effect Indicators: Achievement Status

Index	Baseline	Target	Actual				
	2009	2011	2012	2013	2014	2015	2016
	Planned Year	Completion Year	1 Year Before Comple-tion	Comple-tion Year	1 Year After Comple-tion	2 Years After Comple-tion	3 Years After Comple-tion
Water supply per person (liter / person / day)	56.5	77.7	90.0	111.0	127.9	123.5	121.2

Note: The per capita water supply volume is the amount of water distributed per day from the Ngaliema Water Treatment Plant to the water supply area divided by the population of the water supply area.
Source: Ex-ante evaluation and questionnaire survey result at the time of ex-post evaluation (REGIDESO response)

The water supply amount per capita includes the amount of leakage etc. that occurs in the distribution pipe network reaching the households. In other words, the amount of water that actually reaches the residents of the water supply service area is smaller than this water supply amount. According to the financial statements made by REGIDESO, the rate of revenue water (the amount of water that be charged out of the water supply amount) was 58% in 2015 and 55% in 2016. The remaining 45% is the rate of non-revenue water. The percentage of leakage due to the defect of distribution pipes, etc. and the water that has not been charged is high; therefore, it is necessary to reduce such non-revenue water.

3.3.2 Qualitative Effects (Other Effects)

Satisfaction on the water supply

A beneficiary survey was conducted targeting the residents in the water supply service area of the Ngaliema Water Treatment Plant[12]. When they were asked about their degree of satisfaction with the water supply itself in 5 grades, 28% of them responded that they were “very satisfied” or “satisfied” at the situation before the Project was implemented. Satisfaction rate was improved to 43% at the situation after the Project was implemented. Degrees of satisfaction on water quality and quantity at the time of ex-post evaluation were also surveyed. The degree of satisfaction on water quality was low and 42% of them responded that they were satisfied (answered in Yes or No). On the other hand, there were some degree of satisfaction on water quantity (also answered in Yes or No), and seventy (70) percent of the users responded that they were satisfied.

3.4 Impacts

[12] A questionnaire survey was conducted covering whole area within the water supply service area of the Project in Kinshasa City and targeting general residence, restaurants, shops, hotels etc. (sample size: 120). The surveyors distributed the questionnaires to the survey cooperators, then collected them or conducted direct hearing and filled them out. Survey cooperators were selected by nonrandom selection so that the ration of male and female becomes half and the gender ratio was male: 58, female: 61, N/A (blank): 1. The questions were: the monthly amount of water used (61 valid respondents), monthly water charge (83 valid respondents), main usage of water (115 valid respondents), water supply suspension time before and after the Project implementation (78 valid respondents), water drawing time (72 valid respondents), effect on the reduction of waterborne infectious diseases (33 valid respondents), satisfaction for the water supply amount (119 valid respondents) and satisfaction for the water quality (118 valid respondents).

3.4.1 Intended Impacts

3.4.1.1 Quantitative effect

The indicator for quantitative effect pertaining to the improvement of living environment of residents in urban areas considered as the Project's impact, was "to contribute to the hygienic improvement such as reduction of waterborne infectious diseases and reduction of disease risk by conducting appropriate water treatment." Data on the number of diarrhea patients were collected in regard to waterborne infectious diseases. Table 6 shows the number of diarrhea patients from 2012 to 2016. Although the Ngaliema Water Treatment Plant contributes only to a part of water supply areas in Kinshasa City and it is assumed that there are other contributing factors, patients with diarrhea have significantly decreased when comparing the numbers up to 2013 and those from 2014 and onwards.

Table 6 Change in the Number of People Suffering from Diarrhea in Kinshasa City (2012-2016)

(Unit: Person)

	2012	2013	2014	2015	2016
Number of persons suffering from diarrhea (Overall)	9,339	17,349	670※	1,417	710
Number of children with diarrhea between the age of 1 to under 5*	5,699	10,272	670※	684	690

Source: Kinshasa City Health Center

Note: *The number of children suffering from diarrhea in 2014 of children between the age of 1 and under 6 and Overall is the same. During the field study, the team inquired to REGIDESO, but did not receive a response.

3.4.2 Other Positive and Negative Impacts

(1) Water supply suspension time

As the water supply amount from the water treatment plant was to increase, it was expected that the water supply suspension time would decrease. In the beneficiary survey, the respondents were asked about the time water supply being suspended. The percentage of the water users who responded one hour or less per day was 17.9% before the Project completion and has significantly increased to 33.8% after the Project completion. Also, while the percentage of the respondents who replied that they experience water supply suspension for 12 hours or more was 23.1% before the Project completion, the percentage dropped to 11.3% after the Project completion. The positive impact of water supply suspension time decreased has clearly occurred.

Table 7 Water Outage before and after Project Completion

Water Outage Time	Before Project Completion (Before 2013)		After Project Completion (After 2013)	
	Number of Responses	Ratio (%)	Number of Responses	Ratio (%)
0 - 1 hr	14	17.9	27	33.8
1 - 3hrs	17	21.8	11	13.8
3 - 8hrs	12	15.4	16	20.0
8 - 12hrs	17	21.8	17	21.3
12hrs and over	18	23.1	9	11.3
Total	78	100.0	80	100

Source: Results of the Beneficiary survey

(2) Relocation of residents

At the time of planning, there were three illegal settled houses and some illegally cultivated land along the Congo River within the site of the Ngaliema Water Treatment Plant. The relocation of these had to be completed before starting the construction works. Twenty-six (26) farmers became subject of actual relocation. REGIDESO gave compensation fee according to the land areas to those people subject of relocation according to the domestic law. Four out of twenty-six farmers are continuing farming outside the site of the water treatment plant. The other two farmers passed away after the relocation. Implementation of relocation of residents is the responsibility of the Government of DRC, therefore, REGIDESO had no information on the relocated places of the farmers and their situation after relocation and it was not possible to confirm with the Government. Although additional information was not able to obtain from REGIDESO, no issues have been reported with relocated residents.

(3) Land acquisition

The land to build the facility was necessary for the extension plan of the Ngaliema Water Treatment Plant. Forty-two (42) ares(0.42 ha) of land, which the neighboring textile factory company owned, was acquired. The negotiation for acquisition required time; however, it was realized by the Government of the DRC compensating through tax exemption to the company in place of the land price. Additional information about process for agreement with the textile factory company was not obtained, although inquiry was made to REGIDESO.

(4) Environmental consideration

The environmental impact assessment which was based on the initial environment survey for the extension plan was approved by the Ministry of Environment, Nature Conservation and Tourism as of April 1, 2010. As a measure to mitigate the impact on the natural environment, trees were planted in the peripheral area of the water treatment plant. Since REGIDESO could not secure the budget for tree planting, the cost was not borne by them but by the construction contractor of the extension plan. Although planted various trees are in growth of the process and their height is low, and interval of tress are not constant, with this tree planting, the mitigation of environmental impact has been implemented to some degree. As for the wastes, they need to be

recycled or disposed according to the environmental and social management plan submitted to the environmental authority. The old equipment exchanged in the Project is stored in the warehouse in the site of the Ngaliema Water Treatment Plant and is planned to be recycled in the future.

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

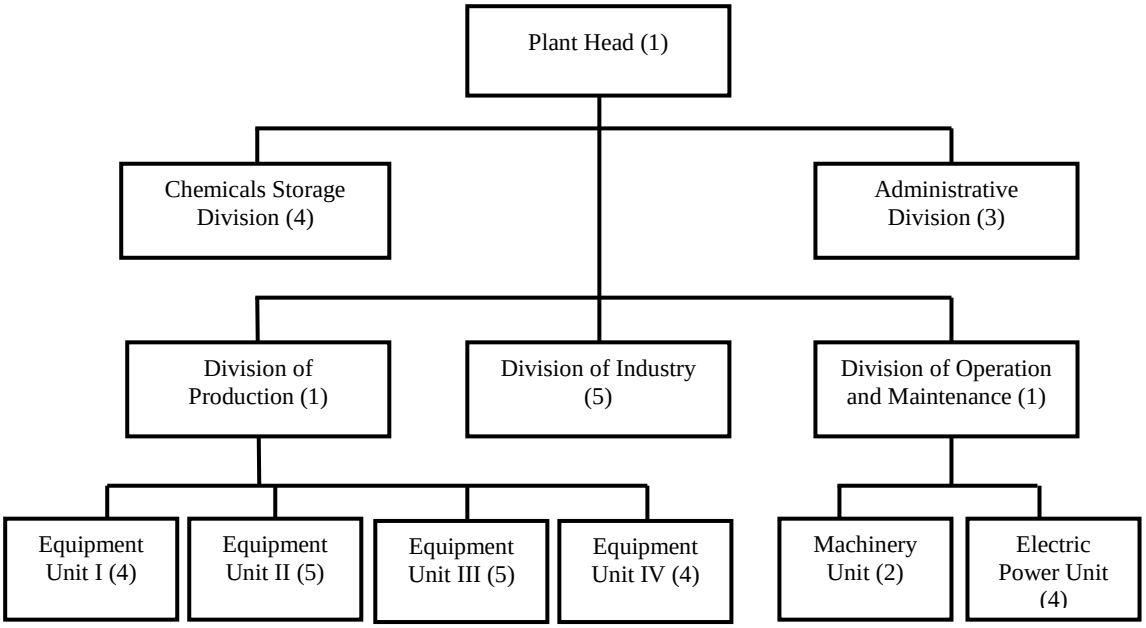
3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The Ngaliema Water Treatment Plant is an organization that belongs to the Kinshasa Production Division in Kinshasa Province Office of REGIDESO. The number of staffs at the time of ex-post evaluation was 39. Chart 1 shows the organizational chart of the Ngaliema Water Treatment Plant. In the Production Division which is responsible for the production of drinking water, there are 4 Equipment Teams under the head of the division and a total of 18 staffs are employed. In the Maintenance Division which is responsible for the maintenance of the facility, there are two teams (Machine Team and Electric Power Team) under the head of the division and a total of 6 staffs are employed. Adding the operational department and maintenance department, there are 26 staffs employed in total.

According to the preparatory survey report, a minimum of 23 staffs were necessary for the double shifts of daytime and nighttime. The number of staffs has increased compared to the time of the preparatory survey. The results of the interview revealed that it has been partially difficult to cope with someone's absence in the team operation to record the operation status of the water treatment plant with daytime and nighttime shift. Although the staff has been increased by this reason, it is regarded that there should be more consideration on how to place the staffs. It was said that the headquarters of REGIDESO believed that the number of the staff could be kept low by automated operation of facilities.

As a matter of fact, the number for the implementation system is secured; however, it is considered that the scheduling of shifts is not appropriate when the control department should be monitoring for 24 hours but that level of achievement is not realized when a member of staff is absent.



Note: Numbers above in parentheses are the number of staff
Source: The Ngaliema Water Treatment Plant

Chart 1 The Ngaliema Water Treatment Plant: Organization Chart

3.5.2 Technical Aspects of Operation and Maintenance

Regarding the technical aspect of the Project, the operation control of the water treatment plant is conducted with no problems by the staffs of the plant. It is judged that the staffs possess technical skills for daily maintenance control.

The records of operating status for each facility are kept. By checking the status of the water supply amount at the intensive monitoring system with the records and visual observation, it was confirmed that the daily water amount of more than the target of 110,000m^3/day was supplied. This demonstrates that the guidance for operating and controlling the plant was appropriate and effective to strengthen the capability of the staffs. As for the soft component, 18 staffs of the Ngaliema Water Treatment Plant have received training[13]. With the personnel changes after that, only two trainees are left currently; yet, it is evaluated that the details of the soft component training for operation and maintenance control are inherited properly.

The manual included with the soft component was utilized to operate the water treatment plant. Water quality inspection of raw water and clean water is conducted in the laboratory established in the Ngaliema Water Treatment Plant at a fixed frequency. When checking the results of the water quality inspection, figures surpassing the control values on several items (color, turbidity) set in the soft component's manual were found. A hearing survey of staffs at the water treatment plant was conducted in regard to this point. Since there are cases when the results surpass the control values set specifically by the Ngaliema Water Treatment Plant depending on the quality of raw water, the operation procedures were changed to be controlled within the range of World Health Organization

[13] With regards to the software component, a total of 35 people including the Ngaliema Water Treatment Plant staff received guidance.

(WHO)'s drinking water quality standard. The manual is followed basically and controlling method is being revised according to the situation of the Ngaliema Water Treatment Plant.

The operation status of each facility is recorded in the daily reports. The water supply amount, water quality, chemicals etc. are recorded in detail. Partially, there were some days that only half a day worth of report was recorded for water supply since there was a problem in allocating staffs for day and night shifts.

The computer(s) in the intensive monitoring room have equipment to monitor the amount of water intake and water supply at all times. However, continuous record has not been printed because the printer is not working. The use of computers is restricted to independent use except for the connection to the equipment in the plant only in order to avoid virus infection. Internet connection and USB memory connection are not allowed and the data cannot be transferred. Since there is a facility to automatically obtain the control data such as water supply amount and water quality, more efficiency can be achieved by improving the operating method to utilize such obtained data.

3.5.3 Financial Aspects of Operation and Maintenance

Table 8 shows the data on the balance sheets of REGIDESO from 2014 to 2016.

Table 8 Annual Income and Expenditure of REGIDESO

(Unit: million CDF[14])

Expenditure		2014	2015	2016
Revenue	Income (fee)	123,921	136,968	160,121
	Construction fee	1,763	2,049	2,280
	Other	40,736	50,920	42,777
	Total	166,420	189,937	205,178
Expense	Personnel	50,871	59,324	66,072
	Maintenance	8,171	2,627	3,332
	Material	1,821	1,584	▲25,268
	Power	1,809	2,240	2,027
	Chemical treatments	4,286	3,303	8,018
	Miscellaneous	110,865	151,237	171,183
	Total	177,823	220,315	225,364
Term-Balance		▲11,403	▲30,379	▲20,186

Note1: Financial Year, 01 January to 31 December
Note2: Total amount does not match due to rounding off.
Source: REGIDESO

The annual data of income and expenditure of REGIDESO as shown in the above table are the financial data of the REGIDESO as a whole including the Ngaliema Water Treatment Plant and other water treatment plants. While REGIDESO has no subsidy income from the government, the water charges that the government should be paying are in delinquency.

The balance sheets from 2014 to 2016 reveal that all three years have seen deficit.

According to the REGIDESO financial balance sheet (2014), REGIDESO supplied

[14] Congo Franc 1CDF=0.1077 Yen (From IMF: International Financial Statistics; Yearbook 2017. Average rate of FY 2016.)

295,287,805m^3 amount of water, of which revenue water was 176,414,023m^3 and the revenue water rate was 60%, and the non-revenue water rate was 40%. According to the REGIDESO financial balance sheet (2015), REGIDESO supplied 311,021,769m^3 amount of water, of which revenue water was 181,406,155m^3 and the rate of revenue water was 58%, and the non-revenue water rate was 42%. Comparing 2014 and 2015, the revenue water rate has dropped and the unit price of water per 1m^3 has risen from 693.08CDF/m^3 (2014) to 740.29CDF/m^3 (2015). One of the causes for the decrease of the revenue water rate from 60% (2014) to 58% (2015) is thought to be the leakage from the piping network. Deterioration of the piping network increases the leakage and reduces the water charges income; furthermore, it is influencing the water cost. The causes of the increase of the unit price of water per 1m^3 are thought to be the reduction of income by non- revenue water and increase of water production cost. As an example of the increase of water production cost, REGIDESO refers to the chemicals used for water treatment, which rely on the imports; therefore, it is heavily influenced by the exchange rates between U.S. Dollars and Congo Franc. Congo Franc is weak against the U.S. Dollars, which brings a disadvantageous situation for procuring import materials.

Table 9 shows the operational cost of the Ngaliema Water Treatment Plant for the three years from 2014 to 2016. The financial statement provided by REGIDESO has some records of the repair cost of each water treatment plant; however, there were no records on the budget allocation of all treatment plants and the Ngaliema Water Treatment Plant.

Table 9 Status of Operating Costs of the Ngaliema Water Treatment Plant

(Unit: CDF)

Expense	2014	2015	2016
Materials, Chemical Treatments & Power Cost	2,614,448,579	1,492,280,289	2,811,970,624
Transportation	58,030,063	1,568,333	
Outside service	27,519,315	40,690,412	8,340,561
Taxes			38,828,589
Bonuses/Allowances	3,475,985	2,317,324	72,943,064
Personnel	358,991,556	179,036,778	389,861,312
Depreciation	790,643,612	487,095,741	1,540,217,148
TOTAL	3,853,109,110	2,202,988,877	4,862,161,298

Source: REGIDESO provided documents

As for the finance pertaining to the operation and maintenance of the Ngaliema Water Treatment Plant, the labor cost of the staffs is secured. The procurement of spare parts which relies on the imports or the repairs that need overseas technology are difficult; nevertheless, the repairs needed in daily maintenance is outsourced, of which expense budget is regarded to be secured.

3.5.4 Current Status of Operation and Maintenance

(1) Daily operation control

As seen in 3.3.1.1, the water supply amount has risen from the beginning of operation in 2013, and it has surpassed the target of 110,000m^3 by maintaining supply of more than 120,000m^3. At the time of ex-post evaluation, the target of water supply amount was set at 127,000m^3 per day and sometimes it reached a maximum of 130,000m^3. In the aspect of maintaining the water supply amount, the operation of the water treatment plant is controlled fully appropriately.

(2) Purchasing and renewing spare parts and expendables

According to the interview from the Ngaliema Water Treatment Plant, quantity of the spare parts stored for facilities and equipment is decreasing. For example, the lamps (made by a Japanese manufacturer) for the automatic turbidimeters of the water intake facility have been exchanged four times in two years and there is no stock of spare parts. Also, the battery of the operation panel in the monitoring facility has reached the timing of renewal (five years) but it is being used continuously since there are no spare parts. These spare parts cannot be procured inside the DRC, so they need to be imported. Some equipment that was out of order in the facilities was not repaired at the time of ex-post evaluation. This is because the budget is limited and the repair cannot be ordered, as the parts that cannot be procured inside the country have to be imported and require higher repair cost.

While there are financial issues for the repair cost, there are some attempts made to procure from lower cost suppliers. For example, as for the automatic turbidimeters in the water intake facility that were not being used because the parts procurement was not possible according to the interview at the first field survey, a quick check had been made that procuring the parts from the manufacturer's overseas branch would be cheaper than procuring them from Japan, and they were ordered and are being waited for arrival according to the interview at the second field survey.

In the Ngaliema Water Treatment Plant, there are four water conveying pumps set in the Project and two water conveying pumps that the EU rehabilitated. Of the four pumps set in the Project, one is out of order. Repair within the DRC has been tried since March 2016, but it was still being repaired at the time of the field survey for the ex-post evaluation (February 2017). However, the target conveying capacity of the Ngaliema Water Treatment Plant is being maintained by the three water conveying pumps and the two EU water conveying pumps that are currently in operation.

In the chemical injection facility, one of the four injection pumps is out of order. As the spare parts could not be found in the marketplace, it was exchanged for an injection pump (made by PEDROLLO) obtainable in the DRC.

As can be seen, there are some innovations made such as researching the suppliers and exchanging for alternatives. The expendables such as calcium hypochlorite and alumina sulfate etc. necessary for water treatment are essential, so they are included in the budget as costs and are purchased to operate the water treatment plant.

The target set for the soft component was "for the operators at the Ngaliema Water Treatment Plant to be able to operate the facilities with the comprehension of the theory of coagulation settling and rapid filtration method, to adjust the operating methods according to the water quality situations,

and to form a maintenance plan for cleaning the sedimentation basin and backwashing the filtration basin by in-house." This is regarded as being able to control the facility and conduct daily operation and maintenance. It is premised that the repairs of the equipment are left in the charge of outside professionals, and the system of ordering the repairs is established. Since the daily operation and control are fulfilled, it is judged that the target for the soft component has been achieved.

Some minor problems have been observed in terms of the institutional aspect and financial aspects and some problems are on current status. Therefore, sustainability of the Project effects is fair.

4 Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project aims to stabilize and increase the amount of water supply by replacing deteriorated facilities/equipment and expanding the water treatment facilities in the Ngaliema Water Treatment Plant, which is the existing water treatment plant in Kinshasa City, the capital of the Democratic Republic of the Congo (hereinafter referred to as "the DRC"), and to contribute to the improvement of living conditions for the residents of Kinshasa urban area.

The DRC is striving to repair, expand and newly build the water supply infrastructure with the goal to improve accessibility to safe drinking water. The Project holds high consistency since it is consistent with the developmental policy and needs of the DRC and also with the aid policy of the Government of Japan for the DRC, which includes "better access to safe water and hygiene" as an essential development issue. The relevance of this project is high. The rehabilitation and expansion (development of new facilities) of the Ngaliema Water Treatment Plant was carried out as planned. The efficiency is evaluated as fair since the Project period exceeded the plan while the Project cost was within the plan. The amount of supplied water (m^3/day) and the amount of supplied water per capita (l/p/d; liter per person per day) reached the target; however, reduction of rate of loss of the volume of water treated at the water treatment facility did not meet its target. The effectiveness and impact are high since the users of water service is showing higher satisfaction for the water supply amount and an impact has been seen that the patients with diarrhea, one of the waterborne infectious diseases, have decreased in number. The sustainability is evaluated as fair as there are minor problems in the operation and maintenance institution and finance of the executing agency, maintenance techniques for facilities/equipment and also a fair equipment maintenance problem.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) On continuous operation of the water treatment plant facilities

To procure the parts whose spare parts have been used up or are now with only a few remaining, the Ngaliema Water Treatment Plant should make the list of exchange parts in order to operate the water treatment plant facilities continuously. REGIDESO should take budgetary measure

for the procurement of the equipment that has reached or is nearly reaching the renewal time and implement renewal while the facility is in operation.

(2) On storing the control records

The electronation of the control records should be promoted so that the past control records in the Ngaliema Water Treatment Plant can be confirmed. Computers and database will be prepared, the format for control records will be made and the data will be input. In addition, by renewing the output equipment (printer) to utilize the data automatically recorded by the monitoring system, the control recording method can be made more efficient and the data backup can be performed. When the control records are made into a database, the past operation status of the water treatment plant facilities can help to detect the failure early and to grasp and respond to the change in the quality of raw water, and such operation will be possible.

4.2.2 Recommendations to JICA

On renewal of equipment of water treatment plant

Some facilities of which exist in plural have stopped operation. For example, one of the six water conveying pumps is undergoing a long-term repair. It is necessary to conduct a survey on current situation and suggest to the government or the executing agency of the partner country for taking necessary measures.

4.3 Lessons Learned

On selection of equipment considering the operation and maintenance

There are some spare parts for the equipment in the water treatment plant that are difficult to procure in the DRC, which is causing delay in replacement. Also, there are equipment aimed at being repaired but it is taking an unusual amount of time. In order to have the facilities operated continuously, it is important to secure the necessary function and quality and yet to select the equipment whose spare parts that the executing agency can easily procure and those that can be repaired, when designing the water treatment plant. Such construction of the Project facilities leads to their continuous operation.

Democratic Republic of the Congo

FY2016 Ex-Post Evaluation of Japanese ODA Grant Aid Project

"Le projet d'aménagement de l'institut d'enseignement médical de Kinshasa"

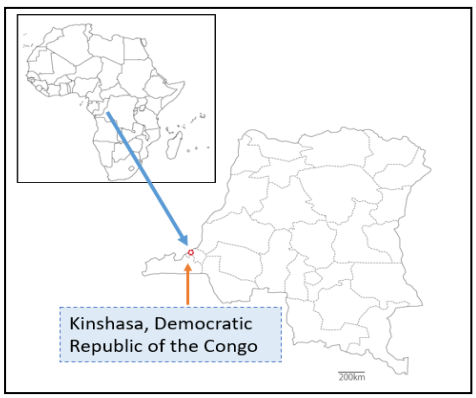
External Evaluator: Mari Nishino, Chuo Kaihatsu Corporation

0. Summary

This project was implemented for the Institute of Medical Education Kinshasa, to improve facilities and equipment devastated by conflict. As a national model school, the project aimed (1) to train high-quality secondary health human resources, (2) to develop educational model for secondary health human resource, (3) to conduct training for teachers of nationwide secondary health professional schools, and (4) to conduct continuous education for secondary health workers, contributing to their quality training, and placing them in necessary regions. This project was consistent with the development policy and needs of the Democratic Republic of the Congo and ODA policy of Japan, therefore its relevance is high. This project was implemented efficiently, and adequate to the project content planned. However, while the project cost kept within the plan, the project period was exceeded. Regarding the project effectiveness, the number of students has increased and the quality of education has been highly evaluated by external practice partners and community people so the foundation as a model school of basic education has been established. Nonetheless, the number of students from rural areas was minimal and dormitory occupancy did not achieve the target. Continuing education and dissemination of curriculum also did not reach the target value. Qualitatively, both students and teachers had satisfaction in the quality of education and the educational environment, meeting their expectations. At the time of the ex-post evaluation, there were no graduates, so it was not possible to confirm the onset of the impact. Therefore, the effectiveness and impact is fair. Institutionally and financially, there were some issues regarding the operation and maintenance of this project thus sustainability of the effect is fair.

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

1. Project Description



Project Location

The Institute of Medical Education, Kinshasa

1.1 Background

Due to civil wars continued more than 10 years since 1991, health system of Democratic Republic of the Congo (DRC) has not functioned properly; Maternal mortality rate[1] (990) per 100,000 live births and under five mortality rate[2] (205) per 1,000 live births[3]. These figures were one of the worst in the world[4]. One of the main reasons is the skewed distribution of human resources for health (HRH) in terms of types of job and particular area[5]. For example, about 81 percent of health human resource was nurse and the majority worked in the western region of the country. Unlicensed schools had provided a number of low quality nurses due to the hollowed out standard of establishment of medical school formulated before starting civil wars. The Institute of Medical Education Kinshasa (IEMK: institut d'enseignement médical de Kinshasa) used to be a national leading secondary human resource training facility to develop service models and manuals for human resource development, expanding them across the other secondary schools in the country. It had four-year secondary HRH courses after graduate from junior high school for nursing, pharmacy, sanitation engineering and medical technology. It used to provide 1,000 health human resources every year before civil wars including foreign students as a pilot school of the country and neighbouring countries. However, IEMK was deprived and damaged in civil wars. The buildings and training equipment were in short, damaged and destroyed. IEMK somehow operated in a small renting room in the Kinshasa General Hospital without training equipment. For example, desks and chairs were obsolete, there were no teaching materials for practical training, there were not enough classrooms compared with the number of students, and there were many cases where classes were conducted in the corridors and outdoors. The faculty's office environment was also underdeveloped, such as lack of teachers' room and lack of teaching materials. Furthermore, because there was no dormitory for students and teachers, students from other provinces could not enter and some students and teachers had to commute more than 2 hours due to bad traffic condition. In order to remedy this situation, it was urgently needed to show nationwide models of secondary health human resource training including nurses and other occupations, as well as to construct facilities that conduct continuous education for teachers of other training schools and existing health professionals.

[1] Number of mortality among 100,000 pregnant women (number of deaths during pregnancy and less than 42 days after the end of pregnancy)
[2] The probability of a child dead by the age of five, usually expressed the number of deaths to 1,000 births.
[3] Mortality data is based on interview information at the time of the JICA preparation survey conducted in 2010.
[4] The average value of western central Africa including the Democratic Republic of Congo is the worst maternal mortality rate (1,100) and under 5 mortality rate (169) which is the worst compared with other areas (UNICEF, 2009).
[5] Information on health human resources census implemented with support of WHO etc. in 2009.

1.2 Project Outline

The objective of this project is 1) to train high-quality secondary health human resources, 2) to develop educational models for secondary HRH, 3) to conduct training for teachers of nationwide secondary health professional schools, and 4) to conduct continuous trainings for secondary HRH by provision of necessary facilities and equipment as a national model school at IEMK, thereby contributing to the allocation of HRH to necessary areas through the provision of quality HRH.

E/N Grant Limit / Actual Grant Amount	Detailed Design: 85million yen / 85million yen Construction: 1,767 million yen / 1,440 million yen
Exchange of Notes Date (/Grant Agreement Date)	Detailed Design: January 2011 (/January 2011) Construction: August 2011 (/August 2011)
Executing Agency	Infra Unit, Ministry of Infrastructure and Public Works and Ministry of Public Health
Project Completion	July 2013
Main Contractor(s)	Toda Corporation
Main Consultant(s)	Oriental Consultants Co., Ltd.
Basic Design	February 2010- December 2010
Related Projects	Technical Cooperation “Support to Human Resource Development in the health sector of DRC (PADRHS)[6]” (November 2010- November 2013) “Project for the Development of Human Resources in Health in DRC Phase 2 (PADRHS2)[7]” (January 2014- January 2018) “Technical Advisor to the Secretary General of the Ministry of Public Health” (2008-) “Expert on the Management of Basic Training Institution” (April 2014, February 2015, October 2015-October 2017) Grant Aid “le projet d'amenagement en equipements des cliniques universitaires de Kinshasa” (May 2010-April 2012)

[6] Support to Human Resource Development in health sector of DRC is called PADRHS for short.
[7] Project for the Development of Human Resources in Health in DRC Phase 2 is called PADRHS2 for short.

2. Outline of the Evaluation Study

2.1 External Evaluator

Mari Nishino, Chuo Kaihatsu Corporation[8]

2.2 Duration of Evaluation Study

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

Duration of the Study: September, 2016 - January, 2018

Duration of the Field Study: February 12 - March 4, 2017 and May 14-19, 2017

3. Results of the Evaluation (Overall Rating: C[9])

3.1 Relevance (Rating: ③[10])

3.1.1 Consistency with the Development Plan of Democratic Republic of the Congo

At the planning phase, the health sector was as one of prioritized areas by President Kabila and included in the priority development issue of "improving access to basic social services" in PRGSP[11] of 2006. The health sector strategy in PRGSP prioritized "HRH development through basic and continuous education." To achieve these goals, the Ministry of Health (MOH) of the DRC established Strategy for Strengthening Health System (SSRS) in 2006 which referred enhancement of professional HRH. Additionally, the Country Assistance Framework and the Priority Activity Plan for implementation of PRGSP set priorities in improving access of health services for the people and provision of balanced HRH.

At the ex-post evaluation phase, the health sector was included in "social service fulfilment" which was prioritized in the PRGSP2 (2011-2015). The National Health Development Plan (PNDS 2011-2015) and the National Health Human Resource Development Plan (PNDRHS 2011-2015) prioritized to strengthen health zones, namely implementation units that provided primary health care services. Secondary HRH trained by the project mainly worked in health zones directly providing health services at front lines to community people. PNDRHS targeted the improvement of both quality and quantity of HRH especially, midwife, pharmacist, medical technologist and sanitary engineer the number was small. A national law on education promoted to apply competency approach[12] (APC) to HRH education[13]. PNDRHS2 (2016-2020) targeted the development and construction of national and provincial pilot schools

[8] Reinforcement member belongs to TAC International Inc.
[9] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[10] ③: High, ②: Fair, ①: Low
[11] Poverty Reduction and Growth Strategy Paper
[12] In the old approach (Objective approach), studying the theory for 3 years and practicing in the last year of the grade, memorization, testing, knowledge was emphasized. In the competency approach, theory, practice, theory, practice are repeated from the first year. It focuses more on how to solve the problem on the site according to the needs of the target (patients / residents). For example, a subject is on "communication skills in the community" of the first grader, and the content is also composed of French, English, communication, statistics, behavior, etc.
[13] Loi-Cadre no. 14/004 de l 'Enseignement National

need to apply APC based on people's needs. In addition, PNDRHS2 targeted increasing schools that followed APC and closing schools that followed the objective approach (APO) which did not fit the required condition.

Thus, the aim of the project is highly consistent with the development plan and health sector strategies at the time of planning and ex-post evaluation.

3.1.2 Consistency with the Development Needs of Democratic Republic of the Congo

At the time of planning and ex-post evaluation, improving the quality of health and medical condition was in urgent need. At the planning phase, health system of DRC had been malfunctioned due to continuous civil wars. Health indicators were limited, such as maternal mortality ratio (990) per 100,000 live births and under five mortality rate (205) per 1,000 live births. One of the main reasons was the shortage of human resource for health (HRH). The ratio of population per HRH were 21,600 per doctor, 2,590 per nurse, 82,935 per pharmacist, and 124,400 per sanitary engineer, which was far below the WHO standard (5,000-10,000 per doctor, 300 per nurse and 5,000 per sanitary engineer). Additionally, distribution of types of job in a particular area, was very skewed. For example, 81 percent of health human resources were nurses and the number of other health professional was small. Nurses were allocated widely in the country but the majority of other health professionals worked in Kinshasa. A number of secondary health schools not fit into the required standard had provided low quality HRH. Health personnel in the country are classified as A0, A1, A2, A3[14], among which secondary health workers are A2. Province runs public secondary health school under the jurisdiction of the Ministry of Health while there are private health schools. Based on the cooperation with other donors and the needs of the country, Japan International Cooperation Agency (JICA) has established bilateral cooperation guidelines with the Ministry of Health "Grands Axes[15]", which centre cooperation in the quality improvement of health human resources. This project clearly follows the indicated objective of improving secondary HRH (A2 health human resources under the jurisdiction of the Ministry of Health).

At the ex-post evaluation phase, health indicators remained the worst such as maternal mortality ratio (850) per 100,000 live births and under five mortality rate (98) per 1,000 live births. The figures of maternal mortality were worse and under-five mortality was nearly equal with the average of Western-Central Africa[16] (maternal mortality ratio: 679, under five

[14] A0 Health human resources are doctors, dentists, pharmacists who are trained at medical department of university under the jurisdiction of the Ministry of Higher Education. Nurses and midwives of A1 are trained at the A1 training school under the jurisdiction of the Ministry of Higher Education, and there are also public and private as well. A3 is not currently being conducted, but midwives and nurses of A3 who were once trained work in hospitals etc.

[15] Grands Axes: The Japanese health advisor assisted the formulation of guidelines through problem analysis workshops with counterpart agencies. The current target is the period of 2014-2018.

[16] Western Central Africa has worst seven out of ten countries with under 5mortality rate in the world (Chad 2nd, Central Africa 4th, Sierra Leone 5th, Mali 6th, Nigeria 7th, Benin 8th, and Democratic Republic of the Congo 9th). UNICEF, 2016

mortality rate: 99). According to the evaluation of PNDS (2011-2015) and PNDRHS2 (2016-2020), there remained a shortage of HRH; especially midwife, pharmacist, medical technologist, and sanitary engineer. Hence, there has still been a need to produce these secondary HRH. Quality improvement of education for nursing is also needed. According to PNDRHS2 (2016-2020), the number of production of nurses as a total has been planned to decrease, but the production by APC has been thought to increase, while production by APO tended to decrease in PNDRHS2. There are number of Institut d'Enseignement Médicale and Institut Techniques Médicales (IEM/ITM) which not fit the standard, MOH is trying to close them based on the required standard. However, due to political reasons and lack of budget for assessment, closing poor quality IEM/ITM hasn't proceeded. Concurrently, MOH is developing a national model school that applies APC. At the time of ex-post evaluation, the number of courses applying curriculum based on APC was nursing (27), midwifery (17), assistant pharmacist (1), sanitary engineer (1), and medical technologist (1) among nation-wide secondary health schools. INPESS[17] assisted by the project applies APC to all 5 courses and INPESS is the only IEM covering 3 courses applying APC, namely pharmacist, sanitary engineer and medical technologist in the country. Therefore, INPESS has a potential to be a national model school in basic education. In the future, there is a strong need to improve other IEM/ITM and it is needed for INPESS as being a leading school to other IEM/ITM.

3.1.3 Consistency with Japan's ODA Policy

At the planning phase of the project, according to Japan's ODA Data for Democratic Republic of the Congo (2010), Japan decided to restart bi-lateral assistance in the discussion of policy economic assistant during February 2007 based on the democratic progress of the country. In this discussion, the following were determined; 1) assistants should be in accordance to Poverty Reduction Strategic Paper and Country Assistance Policy which is uninformative assistant strategy among donners, 2) mean time priority on the access of social service (water, education, health and hygiene) which is a pillar of Poverty Reduction Strategic Paper, 3) three agreed priorities on "consolidation of peace", "economic development", and "access to social service". Health was positioned in the "access to social service" which benefits the nation directly with high priority for social infrastructures such as school and hospital due to heavy deterioration by civil wars. The project also contributed to Millennium Development Goals and Tokyo International Conference on African Development IV (improvement of 1,000 health facilities and training for100,000 health human resource) in Yokohama Declaration. Thus, the project is consistent with Japan's ODA policy.

[17] INPESS: Abbreviation for Institute national pilote de l 'enseignement des sciences de santé. "National Health Human Resources Development Pilot School". Ministerial Ordinance issued in September 2013 that IEMK was closed, and clarified the new name to differentiate as a national pilot school to be a model of human resource development in the country.

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The content of the plan of this project was as follows (Table1 and Table2).

Plan

Site area: about 34,186m^2 (3.4ha)

Total facility area: 7,057.68 m^2

1) Facility Plan

Table 1 Facility Plan

Name of room	Purpose	Capacity	No. of room	Floor area	Total floor area (m^2)
School					
1. Classroom and teacher's room					
1-1. Class room					
Class room (large)	Lecture・study	30	6	51.8	311.0
Class room (small)		10	9	25.9	233.3
1-2. Teacher's room (course)					
Nurse	Course head, chief teacher, Full-time and part-time teacher	12	1	57.6	57.6
Midwife		12	1	57.6	57.6
Pharmacist		11	1	57.6	57.6
Sanitary engineer		11	1	57.6	57.6
Medical technologist		11	1	57.6	57.6
2. Training room					
TP-1 Nurse&midwife	Training for Fundamental Nursing and Adult Nursing (practice with simulator for bed bath, position change, transfer, dressing, injection), Training for Neonatal Nursing (practice with simulator for bed bath, dressing, tube feeding, gastric suction, blood test)	30	1	144	144
Storeroom	Including teacher's room	2	1	28.8	28.8
TP-2 Pharmacy laboratory room	Drag compounding training, Drag sample display	10	1	57.6	57.6
Store room	Including teacher's room, Poison study room	2	1	28.8	28.8
TP-3 Insect/ bacteria/ sanitation	Infectious parasitology observation, Anatomy, Sample display	10	1	115.2	115.2
Store room	Including teacher's room, Malacology, Infection science	2	1	28.8	28.8
TP-4 Medical technology	Training for Medical technology, Sterilizer	10	1	86.4	86.4
Store room	Including teacher's room, Bacteriology, Virology, Haematology	2	1	28.8	28.8
TP-5 Physics, Chemistry, Anatomy	All subjects common training room (Physics, Chemistry, Anatomy)	30	1	115.2	115.2
Store room	Including teacher's room	2	1	28.8	28.8

TP-6 Information processing	PC basic, Medical record management (PC 25 units)	30	1	77.8	77.8
Store room	Including teacher's room	2	1	25.9	25.9
3. Other					
Library	Open access (study room)	75	1	103.7	103.7
Store room		5	1	25.9	25.9
Multipurpose room	Meeting room, Indoor gym, store room	200	1	311.0	311.0
Management					
D6 office	Ministry of Health D6 office	6	1	25.9	25.9
Principal office	Including secretary room	1	1	38.9	38.9
Course head office	1 each for department head (5 rooms including store rooms)		1	51.8	51.8
Management office	General affairs, maintenance, cashier	20	1	64.8	64.8
Meeting room	30 person (available to separate in 2 rooms)	30	1	51.8	51.8
Nursery room	Health management	5	1	25.9	25.9
Other	Entrance hole, corridor, stairs, rest room, storeroom, machine room, other				1,553.8
Dormitory					
Male	Based on total capacity and male/female ratio	2	10	17.3	173
Female		2	50	17.3	864
Manager office		4	1	63.4	63.4
Guard office(M/F)	Guard entrance and exit	1	2	17.3	34.6
Dining	For meal service (Including kitchen)	60	1	207.4	207.4
Management office			1	17.3	17.3
Laundry			3	17.3	51.8
Study room (male)		16	1	25.9	25.9
Study room (female)		60	1	69.1	69.1
Other	Entrance hole, corridor, stairs, rest room, storeroom, machine room, laundry, other				956.2
Teacher's dormitory		4	6	60.5	362.9
Other	Corridor, stairs, rest room, other				146.9
Other					
Guard	Guard house	8	1	24.0	24.0
Electric room		-	1	34.6	34.6
Bus garage	3 buses	-	1	97.2	97.2
Waste storage room		-	1	19.4	19.4
Outdoor practice place		-	1	58.3	58.3
Total				7,057.68	

Source: documents provided by JICA

2) Equipment Plan

Table 2 Equipment Plan

Equipment	Unit	Specification	Purpose
Patient simulator for nursing care (both sexes)	2	Height: 170-80cm, Parts: head, eyeball, tracheostomy, chest, arm, abdomen, leg, Function: movable arm and leg with injection pad, Genital: changeable for both sexes	Practice to care, examine and treatment for patient. General purpose model (apply to all bellow)
Incubator	2	Open-close: closed, forced ventilation, Control: manual, Temperature heater: around 300, Temperature range: 24.9-38.0℃, Alarm: abnormal temperature set, stop fan motor, abnormal probe	Practice to care premature baby and to handle incubator operation
High pressure	1	Volume: more than 50L, Temperature range: 121℃ or	Practice to sterilize equipment and

steam sterilizer		135℃, Method: steam sterilizer	to handle operation
Binocular microscope (for teacher, with monitor)	2	(Total magnification:40-1000X, Lens: Eyepiece, with objective lens, Lightning: over 30W, Accessory: monitor, TV camera	Teach test method with microscope
Topography	1	Function: Horizontal angle, Altitude angle, Oblique distance, horizontal distance, Accessories: internal battery, charger, vinyl cover, tripod, with storage box	Learn survey methods and how to secure safe water (well water)。
PC	37	OS: Windows 7 or equivalent, CPU:Pentium4 or equivalent, HDD: over 250GB, Accessories: monitor over 17 inch, keyboard, mouse	Learn to operate PC for information processing of medical care
Copy machine	2	Method: Monochrome, Copy speed: 25 sheets/min or more, Function: with sorting function, Cassette: 1 piece for each size A4 and A3, total 2 or more, Model: floor stand type	Distribute teaching materials
Bus	3	Handle: left side, power assist, Capacity:25-30 person, Air-conditioner, Engine displacement: 3500 cc or more	Transport students to their field practicum safely and surely

Source: documents provided by JICA

Actual

Both facility construction and equipment provision were mostly implemented as planned. Actual site area and total floor area was 38,372.3m^2 and 7,328.4m^2 respectively. There were some minor revisions of facility and equipment actually procured by the project compared to what was planned at the time of the implementation. Almost all the changes were regarded as reasonable to improve convenience such as specification, shapes, placements of facility and equipment based on the necessity of usage and maintenance. During the construction period, unexpected procedures happened, namely removing underground objects, placing of concrete, and removing surface waste widely. Nonetheless, no trouble by above changes was reported.

The pre-implementation of the project undertakings of the Government of DRC were mostly implemented as planned, such as construction site preparation and demolition of existing facilities including removing illegal cultivated land, and fencing construction. Preparation of the electricity wiring and water supply and drain piping connection to the project site and closing of ex l'institut d'enseignement médical de Kinshasa (IEMK) were also implemented by the DRC side as planned.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project was implemented within the planned budget (82 percent against the plan). The project cost was planned as 1,852 million yen in total (85 million yen for detailed design and 1,767 million yen for main construction), which included around 12.6 million yen from the DRC side. The actual cost was 1,525 million yen from the Japan side including 85 million yen for detailed design and 1,440 million yen for main construction. The project did not spend

contingency funds. The actual cost from the DRC side was unavailable to obtain, therefore evaluated only the Japan side.

3.2.2.2 Project Period

Project period was planned as 25 months including detailed design and bidding. However, it took actually for 31 months and was longer than planned (124 percent against the plan). The period exceeded the plan as unexpected removal of underground objects, placing of concrete, and removal of surface waste during the construction phase was needed. In addition to the above reasons, construction was delayed due to difficulty in acquiring concrete from shortage of crushed stones, closing the main road for having Summits, and strikes and congestions in the port.

Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness[18] (Rating: ②)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

Quantitative effects of the project were set following indicators 1) number of students for secondary HRH training per year, 2) number of IEM/ITM (school) to disseminate educational materials or curriculum for production of secondary HRH, 3) number of continuous trainees of IEM/ITM teachers and acting secondary health service provider, and 4) number of students from suburbs and outside of Kinshasa who commute more than 2 hours ｛. Additionally, “the number of students who use the training rooms” was added as an additional indicator. For this reason, before the project, IEMK trained students without using training room to produce secondary HRH. The project has installed training rooms with equipment and INPESS is able to train with using training room. Therefore, we added the indicator to assess human resource development aspect supplementary. Furthermore, for the evaluation, “number of users of the multi-purpose room” was set as a reference indicator. At the planning, one of the qualitative effect indicators, namely 3) number of continuous trainees of IEM/ITM teachers and acting secondary health service provider was set as 800 person per year based on the potential usage of the multi-purpose room to conduct teacher’s trainings and continuous trainings 200 person x 4 times per year. Based on the above, we assess the usage of the multi-purpose room additionally.

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

Table 3 Target and Actual Figures of Quantitative Indicator

Indicator	Baseline	Target	Actual			
	2010	2015	2013	2014	2015	2016
	Planned Year	2 Years After Completion	Completion Year	1 Year After Completion	2 Years After Completion	3 Years After Completion
No. of student per year	62	90	49	101	98	122
Nurse	42	30	18	29	33	46
Midwife	―	30	17	24	26	32
Pharmacy	17	10	14	19	18	19
Medical Technology	―	10	0	21	11	17
Sanitation Engineer	3	10	0	8	10	8
Additional indicator: No. of student to use training rooms	No training room	-	49	101	98	122
No. of IEM/ITM to disseminate material/curriculum	Trial in partial IEM/ITM	More than 200 IEM/ITM	-	-	-	Nurse 44 Midwife 14
No. of IEM/ITM's teacher to be trained	No record	800	-	-	-	Nurse 88 Midwife 12
No. of secondary health service provider to be trained for continuous trainings			-	-	5S[19] training: 152 Other*1: unclear	Nursing Council training: 150
Reference indicator: No. of person to use multi-purpose room	-	-	200-300*2 and school activities	200-300 and school activities	200-300 and school activities	200-300 and school activities
No. of student from suburb of Kinshasa	0	120/year	Dormitory 49	Dormitory 20	No record	Dormitory: 21 Other school: 12

Source: documents provided by JICA and Executing Agency
*1 The multi-purpose room (accommodating 200 people) has been used as a venue for trainings and workshops with participants from domestic and overseas, but the number of users has not been recorded.
*2 Number of examination takers for national unformal graduation. Every year students in the final grade of all secondary health professionals in Kinshasa City use the multi-purpose room for graduation examinations.

1) Number of students for secondary HRH training

This indicator has achieved the target number of 90 students since 1 year after the completion (101 in 2014). The number of students has changed from 49 at the first fiscal year of

[19] 5S is the initial letter of 'S' taken, Sort, Set, Shine, Standardize, and Sustain. It is a slogan used for maintenance and improvement at work environment such as manufacturing and service industries.

school opening, to 101, 98 and 122 students, after one, two and three years since completion, respectively. When INPESS opened in September[20], 2013, its students, teachers and staffs were renewed without taking over from IMKE. Since the project's planning, INPESS was decided as a model to be a national pilot school of secondary human resource training schools in the country, so the school was to be operated separately from former state IEMK including organizational structure. Thus, the name of the school was changed, and teachers were newly hired after exam and interview, and the students were accepted with examination. According to the plan, recruitment of faculty staff and preparations to open the school were decided to begin one year before the school's opening, but issuance of ministerial ordinance to open the school was delayed, so the recruitment of staff and admission of first term students was done immediately before the school's opening. INPESS started with three courses teaching 49 students. Even the number of students has achieved the target since 1 year after the project compilation (2014), a few came from the suburbs of Kinshasa and other areas because recruitment was inactive. A recruitment committee started to improve awareness by advertising in social media such as radio and advisement suggested by the Expert on the Management of Basic Training Institution since 2015. The committee started its activities to increase students from other areas in fiscal year of 2016.

Additional indicator: number of students who use the training rooms

The number of students who use training rooms equalled the number of students because all students used training rooms from first grade. According to an interview with faculty members, there were no training room and space for consultation training in the former school building, so practical exercises with real patients could only be in the 3rd and 4th grade at their first time. Compared to the former situation, some teachers felt that the quality of education remarkably improved. Specifically, there were restrictions in conveying the rotation of a baby, taught with flat screen pictures or verbal explanation, with no delivery model for nurse/midwife practice. By using a delivery model procured by this project, students could understand the rotation of baby in time sequence, having better knowledge and experience before facing a patient. It contributes for students to improve of facing with confidence. Also, some teacher expressed fulfilment that practical training after lectures, required by the new curriculum, could also be available conducted in the new practice rooms.

2) Number of IEM/ITM to disseminate educational materials or curriculum

Nursing and midwifery course introduced teaching materials and competency approach (APC) to other 58 IEM/ITM and shared experiences on education at INPESS. However, the numerical target of 200 schools has not been achieved. INPESS has developed a

[20] School year begins in September and ends in August the following year.

school administration manual, competency benchmarks for quality education of assistant pharmacy and medical technology, and course notes of assistant pharmacy, medical technology and sanitary engineering. However, despite the Ministry of Health requesting budget for dissemination towards the Ministry of Planning, no allocation was given. Thus, the budget for INPESS has not been allocated by the Ministry of Health. As a result, there is currently no budget for dissemination and reprint of teaching materials developed in INPESS. Furthermore, to apply for APC, training from 1st grade is needed, but other IEM/ITMs lack training facilities and equipment in their practice room. Some teachers also complain that even if it spreads, it is difficult to make use of it. Local security seemed to not affect the dissemination situation.

3) Number of continuous trainees of IEM/ITM teachers and acting secondary health service provider

Training of teachers at other IEM/ITM was conducted only in nurse and midwife courses while it was not conducted in other course. In addition, continuous education for secondary health service providers working in hospitals was not implemented. According to the Ministry of Health Department of Continuous Education, even the Department submitted plans of continuous education of teachers and secondary HRH, yet the Ministry of Planning had not approved and not allocated budget. Hence, they were not able to conduct continuous education. As for INPESS, it was heard that their hands were full in putting school administration of basic education on track. However, the reason for not conducting trainings for teachers of other IEM/ITM and continuous education for secondary HRH is more on not allocate ~~s~~ neither the plan nor the budget from the Ministry of Health. Because INPESS has no department and person in charge of continuous education since its planning, coordination with the Ministry of Health has not worked well.

On the other hand, according to the questionnaire answers, the multipurpose room that could accommodate 200 people has been frequently used by external organizations. For instance, the Nursing Council conducted continuous education trainings on diabetes and high blood pressure care to nurses. For 5S training by JICA, Ebola haemorrhagic fever, HIV / AIDS, yellow fever etc., the room was used by domestic and foreign participants. It has also been used for graduation exams from all public secondary health human resources schools in Kinshasa city every year. However, the number of users was not recorded in INPESS. Buses provided transport transferring students for outside training institution which is original purpose, additionally, Ministry of Health personnel for trainings and meetings when not used by students for outside training institution.

4) Number of students from suburbs of Kinshasa who commute more than 2 hours (Occupant of dormitory)

At the time of planning, former IEMK said there were many students who commuted more than two hours, with accepted students from abroad as well. The Ministry of Health had been preparing a scholarship system with local governments to increase the number of students from rural areas. They foresaw certain occupancy rate to be secured even the scholarships from Ministry of Health was not allocated. The occupancy of the dormitory set the capacity at 120 people. However, dormitory utilization rate has been low as scholarships for rural students from the Ministry of Health have not been implemented, and student recruitment from remote areas has not progressed. Forty-nine students were using government subsidy for dormitory expenses when the school opened, but after the first year, government subsidy was not given, so parents had to bear the dormitory fee, leaving the utilization rate at around 20%. Dormitory fee is USD 100 per month with 3 meals a day, including utility fee. At the time of the ex-post evaluation, the student's commuting time was investigated; dormitory: 21 people, less than 1 hour: 55 people, 1-2 hours: 32 people, and 2 hours or more: 1 person. The cost of transportation for students who travel 1 to 2 hours to school estimated to 2,000 to 3,000 Congo Francs a day on a round-trip (about 210 to 320 yen[21]). Although it cannot be said that the dormitory fee is set high, because parents can manage only daily transportation fee ($30-$46 per month (20 days)). The occupation of dormitory is low because most of parents struggle to afford the tidy dormitory fee[22].

3.3.2 Qualitative Effects (Other Effects)

The qualitative effect indicators are as in the Table. 4.

Table 4 Qualitative Effects

Indictor (target year: 2015)	Contents
Improve the quality of health care services	To produce highly educated personnel continuously, so that the quality of health care services in the Democratic Republic of Congo will improve.
Enjoy appropriate health and medical services	People will be able to enjoy appropriate health and medical services by producing secondary health human resource which so far has lacked of absolute numbers[23], especially nurses, midwives, assistant pharmacists, medical technologists, and sanitary engineers.
Improve of training level for	IEMK constructed by this project functions as a human

[21] Conversion using JICA rate in 2016. 1 Congo franc = 0.10681 yen.
[22] The monthly income of civil servants is about 70 dollars (heard from a teacher of INPESS)
[23] Nurses occupy 80% of all health service providers while production of other health professionals is small. (Health human resources census 2009)

health personnel	resource development model school, in accordance with the health human resource development plan. This is so that the educational model spreads to IEM/ITM nationwide, contributing to the improvement of health human resources training.

To assess the qualitative indicators, the following points were analysed through the existing data, interview survey, beneficiary survey[24] and questionnaire survey. Since there were no graduates at the time of ex-post evaluation, possible assumptions were made that the three indicators were to be achieved.

First, regarding “improve the quality of health care services: It will be possible to continuously produce quality educated personnel, so that the quality of health care services in the DRC will improve”, it is necessary to understand "what is quality education" as it lacks a concrete definition. It was assessed by the percentage of teachers and staff who satisfied the criteria required at the time of planning; whether the physical environment is suitable for education, whether classes are being carried out following the curriculum, measuring the quality of the curriculum.

Second, we analysed whether “continuous production is possible” from the following sustainability section described below and prospection to secure the admission of applicants continuously. From this situation, we evaluated the possibility of improving the quality of health care services.

1) Improve the quality of health care services

a. Percentage that satisfies the criteria required for teachers at IEMK at the time of plan (Table 5)

According to the questionnaire answers, the all assigned members met the criteria. Tests and interviews were required for employment of teachers and staff under the INPESS Operation Manual, and they were effectively implemented at the time of recruitment.

Table 5 Ministry of Health criteria and achievement required for teachers of IEM

Criteria			Actual (at ex-post evaluation)	
Occupation	Requirements	Work experience	Total number	Number fulfil requirement and experience
Principal	L2 or A1	5 years	1	1*

[24] We conducted an exhaustive survey (171 students, 26 teachers) for students from 1st to 4th year of INPESS and teachers in charge of subjects. We got responses from 137 students and 26 teachers. Questionnaire was consisted from quality of education, satisfaction with the curriculum, whether classes are being implemented according to regulations etc.

Course head	L2or A1(EASI)	3 years	5	5
Chief teacher	D6 Education major	3 years	5	5
Dormitory in charge	D6 Education major	2 years	1	1
Secretary	D6 or G3 Communication /Administration major	2 years	1	1
Accountant and management	D6 or G3 Commerce major	2 years	1	1

Source: JICA provided and questionnaire answer
* The current principal holds the Master of Public Health and Bachelor of Science in Nursing.

b. Whether the physical environment is suitable for education

According to the beneficiary survey of students and teachers, 87% of the students and 85% of the teachers were satisfied with the physical environment of the school, including facilities and equipment. Even during the surveying process, the inside of the school building was quiet without city noise, and the building was adequately kept clean.

c. Whether the class is being conducted as prescribed

According to the beneficiary survey, 75% of the students and 96% of the teachers answered that lectures and practical trainings are being carried out according to the decided program. The remaining 25% of the students' responses were “Not” (14%), “Not at all” (4%), and no answer (7%). The reason for the negative answer was that students of medical technologist did not have enough practical training and the teaching materials were not sufficient. Since the budget for 2016-2017 includes reagents for training in the department, practical training will be conducted if the budget is enforced.

d. The quality of curriculum

Competency approaches are used in all five courses. According to the beneficiary survey, 96% of the students and 100% of the teachers answered that the contents of the curriculum is good.

e. Evaluation at external /field practicum training place

The quality of education of all five subjects of INPESS has been highly appreciated according to interview from stakeholders and results of beneficiary survey. According to an interview with the Director of Basic Education Department, the Ministry of Health, INPESS teaches fewer students per class, compared to hundreds of students sitting in a class at other health professional schools. For example, according to an interview with all department heads, some third grade students of all 5 courses were highly evaluated at field practicum sites such as hospitals þ and external facilities. Those medical facilities showed interest to hire students after graduation. At the time of the ex-post evaluation, Nursing, Midwifery, and Assistant Pharmacy

jobs were offered to the students in the highest grade. Therefore, it is thought that INPESS makes a certain contribution to high quality human resources development.

f. Continuous production of human resources

The details for the continuous production of human resources has been described in "3.5 Sustainability", but on a general note, continuous production can be met if activities of Recruitment Committee are active and nearly all students hope for employment related to the course they belong to. The Recruitment Committee has started an activity to establish commitments for the recommendation and scholarships of students with the head of local governments, for the increase of students from rural areas. This activity will continue in the future. Also, in order to gather students widely, a survey of information channels that students knew about INPESS was conducted during the Recruitment Committee in May 2016. Based on the results, effective school introduction and public relations activities will be carried out with improvement, so that applicants who wish to enrol will be secured continuously.

As mentioned above, it is difficult to directly evaluate whether the quality of health care services is improving because there have not been any graduates, but it is considered highly likely to improve by the continuous production of quality human resources.

2) Enjoy appropriate health and medical services

INPESS could produce high-quality human resources in areas where the country is in shortage, yet the proper placement is dependent on external condition[25]. Moreover, people's enjoyment of appropriate health and medical services is even further ahead, what the project could contribute to this indicator is only production of high-quality health human resources. Therefore, this qualitative indicator "Enjoyment of appropriate health and medical services" is considered to be beyond the range setting of the effect of this project as settled indicator. For that reason, we describe the possibility of enjoying appropriate health and medical services in the impact section below.

3) Improve of training level for health personnel

In the National Health Human Resources Development Plan (2011-2015), the following is mentioned regarding "INPESS functions as a human resource development model school according to the health human resource development plan".

[25] The Human Resources Department of the Ministry of Health has grasped the current number of secondary health workers in each province, but there is no placement plan. It seems there are public hospitals and health centers exceed the staffing standards or delay salaries and incentives, but the actual situation is only partially cleared. Technical cooperation "PADRHS 2" and the Ministry of Health has worked together to improve proper placement and treatment of health workers in some states.

1. Equipment of management offices, dormitories, libraries, and teaching materials
2. Internet maintenance
3. Internet subscription
4. Development of educational standards and new technologies as a pilot school
5. Arrangement of national workshops for adoption of pilot school standards
6. Administration of tests to recruit personnel
7. Re-education of instructors, teachers, and members of other IEM/ITM

INPESS is going to achieve 1, 2, 3, 4, and 6 of the above list. However, regarding 5 and 7, only the midwifery department contributed to dissemination by cooperation with PADRHS2, while other courses have not disseminated education materials developed and APC. This was due to INPESS not receiving any plans or budgets from the Ministry of Health for dissemination and due to other IEM/ITM lacking practical facilities and equipment.

Regarding continuous education for teachers and acting secondary health workers, neither plans nor budget from the Ministry of Health allocate to INPESS so there is no administrative form such as cooperating Ministry of Health and INPESS. Thus continuous education activities have not been implemented.

3.4 Impacts

3.4.1 Intended Impacts

At the time of the project plan, it was intended that high-quality secondary health workers were to be trained and dispatched in the necessary areas. Since there were no graduates at time of the ex-post evaluation, regarding the production of high-quality health professionals we assessed how much the project could contribute to the number of increasing the five kinds of health human resources against the one of nationwide increasing. According to the National Health Human Resources Development Plan (2016-2020), the trends in the number of production of secondary health workers which the project targeted five professionals in the country, are as follows (“Country” in Table 6). The expected number of prospects at INPESS is indicated by “INPESS” in the same table. In particular, INPESS highly contributes to the increase in Assistant Pharmacist and Sanitation Engineer.

Table 6 Prospects for the number of secondary health human resources trained nationwide and INPESS

		Unit	2017	2018	2019	2020
Nurse	Country[26]	Person	308	361	424	497
	INPESS	Person	7	10	21	46
	% of INPESS	%	2.3%	2.8%	5.0%	9.3%
Midwife	Country	person	40	75	100	145
	INPESS	person	5	11	13	32
	% of INPESS	%	1.3%	14.7%	13.0%	22.1%
Assistant Pharmacist	Country	person	33	32	31	32
	INPESS	person	8	11	17	19
	% of INPESS	%	24.2%	34.4%	54.8%	59.4%
Medical Technologist	Country	person	115	122	129	136
	INPESS	person	0	18	10	17
	% of INPESS	%	0%	14.8%	7.8%	12.5%
Sanitation Engineer	Country	person	8	10	15	25
	INPESS	person	0	4	7	8
	% of INPESS	%	0%	40.0%	46.7%	32.0%

In addition, in order to assess cooperation with PADRHS2, as a reference for impact, we observed the number of students who is applied with several criteria developed by PADRHS2. Results showed that all students in INPESS learned with new cubiculum based on the competency approach. Also, midwifery competency was mainly created in support of PADRHS 2, and the midwifery faculty members collaborated to spread to other schools. Hence, INPESS has contributed to improve the quality of human resource development on a national scale.

3.4.2 Other Positive and Negative Impacts

Benefit to target area and neighbouring community people

The area of the current INPESS site was squatter area before and it was depriving passers. The old IEMK ruins were also bad for the scenery, and were an area people kept away from. However, since the construction of INPESS, the landscape has improved and people are able to safely pass by and come to the school. In addition, although students entering INPESS belong to a class which is not generally affluent, this project has led to opportunities for employment as a result of creating educational opportunities for young people.

Impacts on the Natural Environment:

There was no disposal of medical waste from the practice rooms. The waste water from school buildings and dormitories was properly treated in the septic tank. The maintenance

[26] The number of nurses in 'Country' showed only the one applied of competency approaches.

section regularly checks and maintains the septic tank.

When the school opened, rainwater was flowing into the neighbouring elementary school from the INPESS school grounds and the elementary school classroom was being submerged whenever it rained. Thus, INPESS made money to repair and buried a pipe underground to drain the water, and the issue was solved.

Land Acquisition and Resettlement:

IEMK was originally a construction site but illegal occupants lived in the planned construction site at the time of planning. Resettlement of illegal occupants has been carried out smoothly by the government of DRC, no problems have occurred during and after the construction period. Number of resettlement was not known but the resettlement process was correctly carried out based on domestic lows with discussion and agreement with illegal occupants.

In summary, regarding effectiveness, the number of students has reached the target figure one year after the start of operation. On the other hand, the number of students from other areas has not achieved the target, but there is a high possibility that recruitment committee's activities would increase this value. High quality education has brought good reputation for students from external practitioners, users and community people, and the advantage of employment has begun to be seen, so the foundation as a model school of basic education has been effectively established. Meanwhile, continuous education and dissemination of curriculum are low in achievement because there are problems in establishing systems and plans for coordination with each department of the Ministry of Health. To solve them, INPESS has started communication with each department of the Ministry of Health and has planned to set up a continuous education department inside INPESS. In terms of facility utilization, although the number of people who use such infrastructure is not clear, the multi-purpose room is actively used for workshops and international conferences sponsored by other organizations. Additionally, buses are also used not only for INPESS students to travel to external training places but also to transport related persons of Ministry of Health to trainings. Qualitatively, both students and faculty highly evaluate the quality of education and the educational environment, satisfied highly with the outcome. Since there are no graduates, the impact cannot be confirmed directly, and the proper placement of health workers is up to external factors, so the onset of the impact is unknown.

Overall, this project has achieved its objectives to some extent. Thus the effectiveness and impact of the project are fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

Preparation for the opening of the school was not procced by the Ministry of Health. PADRHS1 supported the establishment of the Opening Preparation Committee and advised the ministerial ordinance and INPESS opened in September 2013. The current operational chart is as shown in Fig 1.

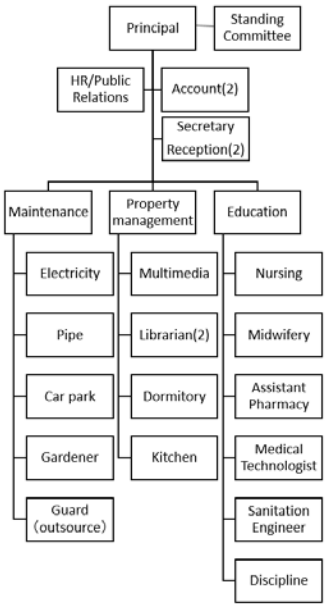


Fig. 1 Organizational Structure of INPESS

Since there were many problems managing INPESS even after the school opened, a follow up on PADRHS2 was necessary. Short-term operation experts was dispatched twice, namely 5S and accounting. However, because further continuous support is in need, and a long-term operation expert has been dispatched (October 2015 - October 2017).

Improvement of operation systems of INPESS has been underway by cooperation with the operation expert at the time of ex-post evaluation and activities for improvement are implemented. For example, an annual activity plan has been prepared, implementation and self-evaluation are being carried out through problem analysis, problem trees created by teachers and staff, and learning exchanges with the National Health and Social Development School of Senegal (ENDESS[27]). In addition, multiple organization charts are undergoing modifications as teachers and staffs have expressed problems in decision making. One other problem is that there is a lack of midwifery and medical technology teachers, with currently a total of 26 teachers carrying out lectures and practical trainings without delay. The maintenance section is comprised of 4 personnel namely manager, electricity, piping worker, and assistant and a gardener that maintain buildings and vehicles. Property management department registers and manages all equipment and materials of INPESS including purchase and management of use of expendable supplies. A dormitory mother manages the entire dormitory including the residence. Regarding the management of facility and equipment, if there is a problem in maintenance management of the facility, they contact the Ministry of Infrastructure and Public Works which is the implementing agency for grant aid, and in the case of equipment, they contact external equipment suppliers.

Regarding the institution between INPESS and Ministry of Health, exchanging reports and advice between INPESS and the Basic Education Department, Ministry of Health, which is the upper jurisdiction of INPESS, has been smooth because required for the first year since its opening by the current ministry ordinance (Decret). Since then, it has been difficult. In addition, although the current standard of school regulations (Statut) is for traditional human resource

[27] Ecole Nationale de Développement Sanitaire et Social

training schools, the actual management system is an independent administrative corporation. The previously described reasons made reporting and communicating with the minister of Ministry of Health, vice minister, Basic Education Department, Continuous Education Department, and INPESS, complicated. At the time of the ex-post evaluation, Basic Education Department took initiative to review the "Statue" for the transition to an independent administrative corporation type[28] collaborate with the Ministry of Health's Department of Secretariat (Inspecteur Général), the principal of INPESS, JICA DRC Office, the JICA advisor of Department of Health Ministry and PADRHS2 experts. If it is transferred to "Etablishment Publique", the management system can be expected to strengthen as more autonomy will be enhanced.

Thus, although the institution of operation and maintenance is being improved for resolution, there were some problems at the time of ex-post evaluation.

3.5.2 Technical Aspects of Operation and Maintenance

Teachers are hired by evaluation according to the INPESS operation manual such as holding degrees, years of experience, tests and interviews. Therefore, we believe that the level of teachers for operation of school has been maintained. According to the beneficiary survey, almost all the 5 of course heads and the 5 of chief teachers are veterans who have over 10 years of experience in their field. In addition, a teacher in charge of Discipline is aiming to improve the environment in which adolescent students can concentrate on studying, gives guidance when necessary.

Since the manager of property management (Intendant) and the manager of maintenance department received the medical equipment maintenance training in Japan, they have adapted the contents learned to daily maintenance and management. For example, they provided 5S training to INPESS staffs and it was said that the staff's conscious of maintenance was kept high. They introduced used books as an inventory for equipment in every practice room, to early detect any abnormality of equipment by user's operation check, in addition to periodic inspection by the maintenance department. It was said that they are possible to contact external equipment agencies, if personnel inside INPESS cannot deal with items requiring maintenance of equipment and facilities procured by the project.

Therefore, INPESS is deemed to have sufficient technical level of education and maintenance management of facilities and equipment.

3.5.3 Financial Aspects of Operation and Maintenance

There are three sources of income for INPESS: budget from the Ministry of Health,

[28] The independent administrative corporation type is under the jurisdiction of the prime minister's office. Therefore, the advantage is that 1) it is easy to coordinate between ministries and agencies, 2) autonomy is high, 3) it can mobilize other budget resource to a certain extent not only the national budget.

student's tuition, and lending of conference room. However, since opening, there is no budget allocation from the Ministry of Health, thus income depends on tuition and room lending (Table 7). The reason for this is that the proportion of health in the national budget is small[29] and the execution rate of the budget is low. On the internal financial aspect of INPESS, transparency is expected to be improved with improvement of financial management by activities of the accounting audit committee consisting of accounting section (accountant and casher), secretary, principal, and the dispatched operation expert from JICA. Utility expenses including bus fuel costs are directly payed by the government. Because teachers and staff are civil servants, salaries are to be paid by the government, but payment has been delayed most of the time. INPESS keeps track of each individual who has not been paid, and requests the government for approval regularly. No allocation of budget from the Ministry of Health for continuous education has also been an impediment factor to implement activities financially.

Regarding the financial aspect of operation and maintenance, it is judged that there is a problem.

Table 7 Financial balance of INPESS

(Unit: Yen)

Items		2014	2015	2016
Income	Tuition	1,857,839	3,259,514	3,794,377
	Commercial income (room income)	6,778,995	-	3,725,042
	Government grant	-	3,557,917	-
	Loan from the government	-	-	-
	Other Income (Counterpart Fund)	24,093,475	32,388,486	-
Income total		32,730,282	39,205,916	7,519,419
Outcome	Employee salary	1,416,919	2,607,611	3,338,506
	General administrative management	239,038	4,183,260	543,478
	Maintenance expenses	4,807,040	-	3,526,325
	Real Estate Investment	-	-	-
	Liquidity investment	-	-	-
	Payment	-	-	-
	Other payment (Counterpart Fund)	24,093,475	32,388,486	
Outcome total		30,515,997	39,179,356	7,408,309
Balance		2,214,290	26,559	111,111

Note: As the questionnaire answer was written with Congo franc and dollar, figures were converted to yen using JICA exchange rate (1 Congo franc＝0.07683yen, 1dollar＝112.185yen) as of July, 2017.

[29] It is reported that the proportion of health in the government budget from 1998 to 2009 was in the range of 1%-7%, and the average execution rate of the budget was 70% (Health Sector Analysis Report p.5-4 JICA, 2013). According to an interview from stakeholders, the administration budget of public schools is not allocated by the government.

3.5.4 Current Status of Operation and Maintenance

Most of the facilities and equipment are maintained and managed with no problem. Management of equipment in training rooms is carried out by practitioners in each course. Each equipment has a used book attached and the user is required to record it on date, practitioner's name and, whether there are problems or not. It was observed equipment is used. A variety of maintenance and management forms was introduced by the JICA Expert on the Management of Basic Training Institution in April 2014 and almost all of the forms have been continuously used for inventory management and maintenance. The bus operation form was also filled every time it was used. Periodic inspections were carried out according to the mileage and the next inspection time was planned. Regarding the management of the dormitory, the dorm mother managed the life of students while the property management section managed dormitory equipment.

It is judged that there is no problem on the status of operation and maintenance as maintenance is carried out on a daily basis.

In sum, some minor problems have been observed in terms of institutional and financial aspects. Thus, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented for the Institute of Medical Education Kinshasa, to improve facilities and equipment devastated by conflict. As a national model school, the project aimed (1) to train high-quality secondary health human resources, (2) to develop educational model for secondary health human resource, (3) to conduct training for teachers of nationwide secondary health professional schools, and (4) to conduct continuous education for secondary health workers, contributing to their quality training, and placing them in necessary regions. Consistent with the development policy and needs of the Democratic Republic of the Congo and ODA policy of Japan, relevance was high. This project was implemented efficiently, fair to the project content planned. However, despite the project cost kept within the plan, the project period was exceeded. Regarding the project effectiveness, the number of students has increased and the quality of education has been highly evaluated by external practice partners and community people so the foundation as a model school of basic education has been established. Nonetheless, the number of students from rural areas was minimal and dormitory occupancy did not achieve the target. Continuing education and dissemination of curriculum also did not reach the target value. Qualitatively, both students and teachers had satisfaction in the quality of education and the educational environment, meeting their expectations. At the time of the

ex-post evaluation, there were no graduates, so it was not possible to confirm the onset of the impact. Therefore, the effectiveness and impact is fair. Institutionally and financially, there were some issues regarding the operation and maintenance of this project thus sustainability of the effect is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

1) Creating a framework for continuous education by the Ministry of Health

In effort to maintain continuous education for teachers of IEM/ITM and secondary health workers in the country, there is a lack of national policy on health sector strategies and the absence of clear standards and guidelines. Though, the continuous education policy and standards were planned with support of PADRHS2 in 2014, they were not approved as of February 2017[30]. Therefore, in order to conduct continuous education in INPESS as a national pilot school, the Continuous Education department, Ministry of Health should take leadership to work for the proposed policy and standards to be approved and to make a concrete continuous education plan in INPESS. Additionally, it is advised that the budget allocation from the Ministry of Health must be made for continuous education.

2) Implementation of continuous education in INPESS

INPESS should implement continuous education as a national pilot model collaborating with the Continuous Education department, Ministry of Health and donors. INPESS should arrange the implementation system, setting a department and personnel in charge of continuous education which currently not present in INPESS. Then the department in charge would be able to lead working and consultation with relevant organizations and present concrete implementation plans to realize it.

4.2.2 Recommendations to JICA

1) Support for creating a framework of continuous education

In order to implement continuous education for INPESS as it is found in their role as a national pilot school, it is recommended that JICA provide technical support necessary to conduct the implementation of continuous education policy and standards formulated by PADRHS2. For example, in cooperation with the person in charge of continuous education of INPESS deployed in the future, it is recommended that JICA set up consultation with relevant organizations such as the Continuous Education department, Ministry of Health and identifies necessary work items for implementation in INPESS. It is also considered that JICA would

[30] Democratic Republic of the Congo, Health Sector Analysis Report (JICA, May 2017)

provide technical support for monitoring and evaluating whether INPESS executes of continuous education as planned.

4.3 Lessons Learned

Examine the effectiveness of existing government ordinance and national development plan to set indicators

Even though national government ordinances and health development plans exist, only conceptual explanation is given and targets are not accompanied by effective executions especially in developing countries. Even detailed ministerial ordinances exist, flows and systems related to concrete implementation at the field may be missing. At the time of this project plan, priority was given to the development of health human resources through continuous education at a national level such as PRGSP. However, clear standards and guidelines were lacking, and budget shortage and uncertainty of effectiveness was one of the main issues revealed as a result. Therefore, although continuous education was set as an indicator based on policy, the policy was ineffective so continuous trainings at INPESS were not conducted. Furthermore, the function of INPESS was indicated in ministerial ordinance, but it was not carried out because the concrete implementation flow at the field level and the system were not formed. Thus, it is necessary to first thoroughly examine the actual effectiveness of existing policies and institutions. Next, it is important to analyse the factors which are insufficient in its effectiveness and to include counter activities against the factors at the field level in the project scope within its feasibility. If there is a limit on the scale and cannot be included in the project, it should be supplemented by related projects.

On the other hand, an indicator to assess effectiveness in the project was set based on the function of past IEMK (in order to adapt to the equipment introduced in the project), namely dissemination of curriculum to other schools. However, the ministerial ordinance which defines its role at the field level did not include the function of dissemination of curriculum etc. developed in INPESS even it was set in the indicator of the project. Additionally, when disseminating developed curriculums, you need to consider the process and certain time of finalizing them before dissemination. Therefore, when setting indicators, if the contents are not included in the existing ordinance, it should be included in future ordinance showing its roles of the target organization (INPESS in this case). Alternatively, a function not described in the existing ordinance may not be included in the scope of the project and may not be selected as an indicator.