Ex-Post Project Evaluation 2012: Package IV-5 (Bolivia, Paraguay)

December 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

KRI INTERNATIONAL CORP.

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2010, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2009. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

December 2013

Toshitsugu Uesawa
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Plurinational State of Bolivia

Ex-Post Evaluation of Japanese Technical Cooperation Project

"The Technological Center on Agriculture and Livestock in the Republic of Bolivia (CETABOL) Phase II Project"

External Evaluator: Masafumi Ikeno, KRI International Corp.

0. Summary

This project was implemented with the objective of strengthening the functions and enhancing the operation and management system for agriculture and livestock technology in order to facilitate self-reliant operations development by the Technological Center on Agriculture and Livestock in Bolivia (CETABOL).

Promotion of agriculture through the dissemination of sustainable technology matches the development policies in Bolivia aimed at promoting the development of agricultural communities by strengthening competitiveness, and the ODA policy of Japan which has a primary focus on regional economic development centered around agriculture and enabling farmers of Japanese descent to put down stable roots, and therefore has a high level of relevance.

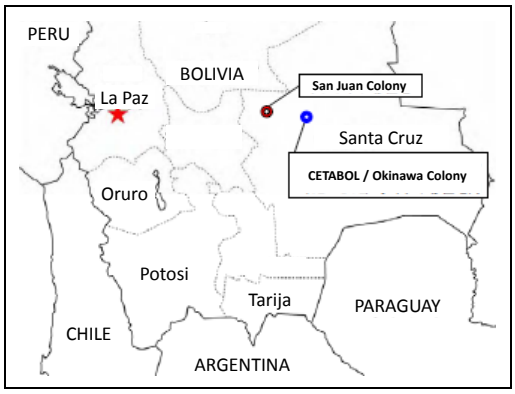
The desired original objectives concerning the strengthening of functions related to agriculture and livestock technology at CETABOL and upgrading its operations and management system were achieved. Regarding overall objectives, it was also verified that dissemination of technology by CETABOL helped stabilize agricultural and livestock production in the region, and contributed to boosting production capabilities by persons involved in agriculture, meaning that the project had a high level of effectiveness and impact.

The elements input for manifestation of the output were appropriate, and the period of cooperation was within the plan, but the provision of supplied equipment with the aim of enabling the organization to make a profit after the transfer of operation and management resulted in the amount of cooperation funds actually expended substantially exceeding the planned amount. Therefore, efficiency was fair.

There were no problems with the policy system, counterpart system, and the sustainability of the technology. The financial status of CETABOL was not particularly good for two years after transfer due to investments made to enable it to make a profit. However once the business started, the effects of investments have been manifested. Therefore, sustainability was fair.

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

1. Project Description



(Project Location)

(CETABOL Headquarters)

1.1 Background

The Technological Center on Agriculture and Livestock in Bolivia (Centro Tecnológico Agropecuario en Bolivia: CETABOL) is located in Santa Cruz Department which accounts for 80% of agricultural production in the Plurinational State of Bolivia (hereinafter referred to as "Bolivia"). CETABOL was an agricultural and livestock research and experiment facility created in 1985 to provide support for the stabilization of farming by farmers of Japanese descent (Nikkei farmers) that reorganized and integrated the San Juan Demonstration Farm (established in 1961) and Livestock Demonstration Farm (established in 1970, renamed Okinawa Livestock Demonstration Center in 1971). It was directly managed by the Japan International Cooperation Agency (JICA).

As of the beginning of the 21st century, in addition to helping stabilize farming by Nikkei farmers for 50 years since they migrated to Bolivia, CETABOL has also contributed to the development of farming technology used by Bolivian farmers. Judging from this track record, after discussions with the relevant authorities in Bolivia, JICA made the decision to transfer operations and management of CETABOL to Nikkei cooperatives which had been the target of technical support from JICA, with the objective of facilitating sustainable growth of agriculture in Santa Cruz Department and stimulate economic activity in the region.

Upon receiving the results of these discussions, JICA set an objective of the smooth transfer of operations and management of CETABOL from JICA to Nikkei cooperatives by 2010, and reached an agreement with the relevant authorities in Bolivia to implement the "Project of the Technological Center on Agriculture and Livestock in the Republic of Bolivia (CETABOL)" from fiscal 2001 to fiscal 2009 with the objective of the development of human resources at CETABOL and the upgrading of its organization.

The first phase of this technical cooperation project was implemented from fiscal

2001 to fiscal 2004, and the second phase of the project was implemented from fiscal 2005 to fiscal 2009. In the second phase which is the target of this evaluation in particular, the objective was to develop the system for operation and management to facilitate self-reliant business operation of CETABOL after transfer from JICA to CETABOL which was planned for 2010, as well as strengthening the functions related to agriculture and livestock technology.

1.2 Project Outline

Overall Goal		Dissemination of sustainable agriculture technology in the tropical humid area in Santa Cruz Department.
Project Objective		Development of the Technological Center on Agriculture and Livestock in Bolivia that serves as base for improvement and dissemination of farming technology in the tropical humid area in Santa Cruz Department in Bolivia.
Output(s)	Output 1	System developed for collection and review of agricultural technology/information.
	Output 2	System developed for actual dissemination of reviewed agricultural technology.
	Output 3	System developed that can perform review / analysis at the same level as official certified organization and foster development of human resources.
Inputs		Japanese Side: 1. Total of 8 experts dispatched (4 long term experts, 4 short term experts) 2. Total of 6 persons trained in third country 3. Equipment supplied: 81.18 million yen 4. Expenses for field operations: 184.46 million yen Bolivian Side: 1. Counterpart allocation 2. Loaning of land free of charge
Total cost		456.83 million yen
Period of Cooperation		April 2005 – March 2010
Implementing Agency		Ministry of Agriculture, Livestock and Rural Development (Current Ministry of Rural and Land Development), Santa Cruz Department, Agricultural and Livestock Cooperative of Okinawa Colony, Agricultural and Livestock Cooperative of San Juan

Cooperation Agency in Japan	None
Related Projects	JICA Technical Cooperation 1. "The Beef Cattle Improvement Project" (July 1, 1996 – June 30, 2001) 2. "Project for the Dissemination of High-Quality Rice Seeds for Small-Scale Farmers in Bolivia" (August 1, 2000 – July 31, 2005) 3. "The Improvement of Technical Extension for Small-Scale Livestock Farmers Project" (December 6, 2004 – December 5, 2008) 4. "Project of the Technological Center on Agriculture and Livestock in the Republic of Bolivia (CETABOL) (Phase 1)" (2001 – 2004) Other International Agencies, Aid Agencies, etc. 1. Project of the Technological Center on Agriculture and Livestock in the Republic of Bolivia (2011 – 2012), Japan International Cooperation Foundation

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of Overall Goal

Regarding the overall objective of "Boosting agricultural production (volume, amount) in the tropical humid area in Santa Cruz Department in 2010 and after so that it exceeds 2005 (base year) every year and maintaining stable production", it was determined by checking the transition in indicators in 2005 and after that dry-field crop production increased in spite of droughts, floods, economic slump, disease and insect damage epidemics and other such risks, and the number of head and amount of beef cattle production increased every year.

1.3.2 Achievement of Project Objective

Regarding the project objective of "Development of the Technological Center on Agriculture and Livestock in Bolivia that serves as base for improvement and dissemination of farming technology in the tropical humid area in Santa Cruz Department", a CETABOL operation and management plan after transfer was prepared by the time of ex-post evaluation, and it was determined that development of infrastructure that will serve as a base for dissemination of agricultural technology for Nikkei cooperatives as well as various other people involved in agriculture in Santa Cruz Department has nearly been completed.

1.3.3 Recommendations

The following four proposals were made during the thermal evaluation.

(1) Self-reliant growth of CETABOL after transfer

The organization should establish a solid position as a testing station that can respond to the overall needs of Santa Cruz Department after the project ends and make a contribution to the entire department.

(2) Acquisition of domestic certification concerning pesticide analysis and frozen semen production

Procedures for the acquisition of official certification from SENASAG (National Service for Agricultural and Livestock Sanitation) should be implemented at an early date for pesticide analysis and frozen semen production.

(3) Promotion of usage of various reviews concerning certification of service "Quality"

In order to acquire and maintain a high level of trust in the "Quality" of the service provided by CETABOL, the organization should implement an ongoing program of reviews of "quality" by domestic and international third party organizations.

(4) Considerations to secure and maintain effective human resources

A working environment that is as stable as possible should be provided, information on personnel relations should be promptly provided, and other considerations should be implemented that are focused on the convenience of employees to create a good relationship with employees.

2. Outline of the Evaluation Study

2.1 External Evaluator

Masafumi Ikeno (KRI International Corp.)

2.2 Duration of Evaluation Study

The following survey was conducted for this ex-post evaluation.

Study Period: December 2012 – December 2013

Field Study: February 19 – March 9, 2013, June 4 – June 13, 2013

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Bolivia

Bolivian agriculture development policy has positioned the following policies as

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

[2] ①: High, ②: Fair, ③: Low

priority issues: “National Agriculture, Livestock and Rural Development Plan” (January 2000) and “Promoting Rural Development by Strengthening Competitiveness” that was designated in the “Bolivian Strategy to Reduce Poverty” (July 2001), which were part of a national plan of the Bolivian central government when the project started, and “Boosting Productivity and Strengthening Competitiveness” that was part of a short- and mid-term agriculture policy by the Santa Cruz Departmental government. During and after the period of cooperation under the project, “Making Bolivia a Productive Country” was positioned as a core task in the “2006–2010 National Development Plan”, reflecting the focus the country is placing on promoting agriculture.

There was no change in the importance of promoting agriculture as a policy in the development policy of Bolivia from the start to the end of the project, with it always being positioned as a priority issue. Accordingly, the judgment can be made that the promotion of agriculture with the objective of facilitating the dissemination of sustainable agricultural technology implemented under this project matches the Bolivian side development policy needs.

3.1.2 Relevance with the Development Needs of Bolivia

Promoting the agricultural and livestock industries in Santa Cruz Department which account for approximately 80% of overall agricultural and livestock production was positioned as an important policy for the Bolivian government. In addition, the promotion of agriculture and livestock which are major industries in Santa Cruz Department contributes to the livelihood of farmers in Santa Cruz. Above all, Nikkei cooperatives that have succeeded in the stabilization of farming which are now striving to build an agricultural and livestock system capable of self-reliant growth voiced a strong desire for the functions of CETABOL to be strengthened in view of the fact that operation and management will be fully transferred from JICA in 2010.

Dissemination of agricultural technology and farming information that is provided by CETABOL under this project is contributing to Nikkei society as well as the promotion of agriculture in Santa Cruz Department as a whole, and can be judged to be relevant to the Bolivian side development needs.

3.1.3 Relevance with Japan’s ODA Policy

In the JICA operations implementation plan for various countries, assistance to facilitate the growth of the agricultural and livestock industries on a regional society level in Bolivia, and the reduction of poverty by increasing production/income (regional economic development centered around agriculture) have been positioned as

important issues. In addition, operations were also implemented to provide support to stabilize the livelihood for farmers of Japanese descent (Nikkei farmers).

Therefore, this project can be judged to be in line with the assistance policy of Japan.

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

3.2 Effectiveness and Impact[3] (Rating: ③)

3.2.1 Project Outputs[4]

3.2.1.1 Project Output

1) Output 1 "System Developed for Collection and Review of Agricultural Technology/Information"

The track record of activities outlined below allows the judgment to be made that a system for the collection and review of agricultural technology/information was developed at CETABOL as a result of implementing this project.

- By the time this project ended, approximately 70% of the farmers in the Okinawa colony and approximately 10% of the farmers in the San Juan colony that are members of the Nikkei agricultural cooperatives had prepared soil maps. Preparation of these soil maps upgraded the technical capabilities of CETABOL and the Nikkei cooperatives, enhanced the knowledge of soil improvement among ordinary Nikkei farms and their ability to deal with issues, and also strengthened the coordination system at CETABOL and Nikkei cooperatives and farmers in regard to sharing of agricultural technology/information.
- A joint implementation system between Nikkei cooperatives and CETABOL was established for the testing of pesticide effects by the time the project ended. Although the joint system with Nikkei cooperatives was suspended after the project ended/following transfer, CETABOL is independently formulating a system that is being implemented. This has resulted in certification being received from SENASAG September 2010 as an organization that is certified to perform pesticide effect tests.
- Fertilizer application contours were prepared for 70% of rice cultivation, 40% of soy bean cultivation and 50% of wheat cultivation by Nikkei farms by the time

[3] Sub-rating for Effectiveness is to be put with consideration of Impact.
[4] In this evaluation Effectiveness is evaluated on the achievement as of the time the project completed. However, some of the information after the project completion is mentioned for convenience in the section of Effectiveness.

the project ended, and this resulted in an implementation methodology for soil diagnosis and fertilizer application guidance in accordance with soil analysis by CETABOL being established for the most part. Data collection after the project ended has been sluggish, but work is continuing after the transfer of operation under a test plan following the receipt of guidance from a Brazilian expert in 2009.

2) Output 2 “System Developed for Actual Dissemination of Reviewed Agricultural Technology”

The track record of activities outlined below allows the judgment to be made that a system for the actual dissemination of agricultural technology reviewed by CETABOL was developed as a result of implementing this project.

- Reports on technology dissemination from CETABOL to Nikkei cooperative farmers were made in CETABOL correspondence and farming cooperative newspapers until fiscal 2007, and were made at Nikkei cooperative workshops in the summer and winter, at monthly cultivation committee meetings and at other meetings in fiscal 2008 and after. In addition, in recent years, improvements in the communication infrastructure consisting of mobile phones, internet and e-mail have led to a shift to these means of communication to provide information, creating a system under which information can be obtained from CETABOL and farming cooperative dissemination members in a timely manner when it is needed.
- The following reports on technology dissemination from CETABOL to Nikkei cooperatives, agricultural and livestock related organizations and agricultural equipment suppliers has been made: (1) Pesticide effect test reports submitted 40 times or more per year, (2) Technical manuals on disease and insects, weed control and soil fertilizer related to main cultivated crops (soy beans, wheat, sugar cane, rice, corn, macadamia) distributed/sold (updated every two years), (3) Soil fertilizer guidance reports submitted, as well as other reports.
- The following reports on technology dissemination from CETABOL to livestock farmers are being made: (1) Provision of service to introduce grade AA beef genetic improvement techniques to Nikkei cooperative farmers (loaning of grade AA lineage bulls, artificial insemination service, etc.), (2) Distribution of beef cattle technology manuals (beef breeding management, fattening cattle rearing management, calf rearing methods) and other materials are being distributed.
- The following reports on technology dissemination from CETABOL has been made: (1) Announcement of studies/test results at CETABOL open house that is

held every year between February and March, (2) Over 30 various workshops and other agricultural events such as “National Soy Bean Day”, “National Rice Day” and “National Wheat Day”.

3) Output 3 “System Developed That Enables Inspection/Review to be Performed as Official Certified Organization”

The track record of activities outlined below allows the judgment to be made that a system that enables inspection/analysis to be performed as an official certified organization was developed as a result of implementing this project.

- Due to the fact that it was judged more effective to have certification as an official certified organization in accordance with Bolivian domestic regulations or international criteria rather than an internal audit based on self-defined regulations in order to obtain technical trust from external involved parties. The original plan was changed so that the organization would be reviewed by a third party certification organization inside or outside Bolivia.
- Under the system that was developed by the time the project ended, the following certifications were obtained: Management of laboratory for soil/pesticide/fertilizer/organism tests after transfer (Bolivia SENASAG: 2010-), Pesticides (AAPCO[5] in United States: 2010-), Feed analysis/mineral analysis (Brazil EMBRAPA[6]: 2011-) Soil (PROINSA[7] in Argentina: 2012-). It is now widely recognized in Santa Cruz and surrounding regions as an official certified organization, and is contributing to its service business which is the core of operations to earn a profit.
- In order to improve and introduce the technology required as an official certified organization for various agricultural services, opportunities were provided to participate in technical training. While opportunities for technical workshops and training within Bolivia are limited, technical training was conducted by resident short term experts for this project (Experts from Brazil, Argentina and Paraguay), CETABOL staff were dispatched to a third country (Brazil) for training, and other training opportunities were provided such as a “National Soy Bean Day” held by a Santa Cruz agricultural related organization and “Tropical Agricultural Test Station (CIAT) Field Exhibition”.
- The above types of training opportunities has been provided on an ongoing basis after the project ended, for example the CETABOL engineers were dispatched to

[5] Association of American Pesticide Control Officials
[6] Empresa Brasileira de Pesquisa Agropecuária
[7] Programa de Interlaboratorios para Suelos Agropecuarios

the neighboring countries of Brazil and Argentina with the support of other donors, a self-financed Brazilian agricultural resident consultant, and other technical training opportunities has been being provided.

- Since a system to enable requests for inspection/analysis to be accepted as a certified organization was developed, the project objective of receiving 2,000 requests or more per year was achieved by the time the project ended.
- The number of requests received dropped somewhat temporarily due to some of the technicians quitting after the project ended/when operation was transferred, but there has been a tendency for the number of requests for analysis to increase in fiscal 2012 and after as a result of an expansion in the capability to accept requests brought about by increasing the number of analysis technicians, and spreading of recognition as a certified organization among people involved in agriculture in Santa Cruz.

Table 1 Number of Certified Analysis Results

Year	2008	2009	2010	2011	2012
No. of Requests Received	2,012	2,075	1,133	1,314	3,033

Source: CETABOL

4) Output 4 “Implementation System Developed for Provision of Technical Support Services to Facilitate Stable Agricultural Production”

The track record of activities outlined below allows the judgment to be made that an implementation system has been developed at CETABOL that enables the provision of technical support services to facilitate stable agricultural production as a result of implementing this project.

- Technical support services are available under which improved breed bulls and grade AA breeding cows are loaned to Nikkei cooperative farmers in order to facilitate stable livestock production. This has resulted in achieving the provision of service that is generally consistent during the project period and after the project ended.

Table 2 Breeding Cattle Loan Results

Year	2005	2006	2007	2008	2009	2010	2011	2012
Bulls	68	60	66	32	57	35	63	78
Cows	13	26	13	49	15	0	0	0
Total	81	86	79	81	72	35	63	78

Note: In 2010 and after, cows were not loaned since almost all Nikkei farms have grade AA breeding cows.
Source: CETABOL

- Various Nikkei colony auction places have been set up in order to secure sales

channels for cattle raised by Nikkei livestock farms and in order to provide support for operation and management of these farms.

- After the project ended, the respective auction places were taken over by Nikkei cooperatives, and CETABOL provides technical support as appropriate. As of June 2013, auctions are held at the Okinawa Nikkei cooperative (CAICO) every three months, and unscheduled auctions are held at the San Juan Nikkei cooperative once a year. Furthermore, due to the fact that a competing auction place was constructed after the project ended on the outskirts of Santa Cruz which is a large center of consumption, the number of sales brokers that wish to participate in the San Juan Cooperative (CAISY) auction place has decreased mainly due to the distance from Santa Cruz (approximately two hours by vehicle) which results in the expenditure of fuel costs and time.

Table 3 Number of Auctions Held

Year	2005	2006	2007	2008	2009	2010	2011	2012
CAICO	2	7	7	10	5	1	4	4
CAISY	0	0	1	2	1	1	1	1
Total	2	7	8	12	6	2	5	5

Source: CETABOL

- In order to facilitate the stable production of livestock, a system for the subcontracting of work involved with dairy and beef cattle has been established. Subcontracted work related to breeding and hygiene for dairy cattle was centered around the Okinawa 2nd colony. However the number of subcontracting of artificial insemination started from 2009 in San Juan colony increased because the Bolivian policy to lower the price of rice after the end of the project, then the need for livestock raising as a substitute product in the San Juan colony which had focused on rice production until now increased.

Table 4 Livestock Raising Related Subcontracted Service Results

Year	2005	2006	2007	2008	2009	2010	2011	2012
No. of Requests Received	193	182	301	433	256	1,299	1,168	862

Source: CETABOL

- By the time the project ended, an implementation system to provide technical support services in both the dry-field crop and livestock raising sectors, and in particular soil/pesticide certification analysis services and grade AA breed beef cattle breeding services to Nikkei farmers had nearly been established. This resulted in the planned objective value of subcontracting work for 500 hectares

or more being achieved every year during the project period.

Table 5 Work Subcontracted Area Results

Year	2005	2006	2007	2008	2009 (as of August)
Work Subcontracted Area (Hectares)	905	569	922	3,579	430

Source: CETABOL

3.2.1.2 Achievement of Project Objectives

Project Objective: “Development of the Technological Center on Agriculture and Livestock in Bolivia that serves as base for improvement and dissemination of farming technology in the tropical humid area in Santa Cruz Department in Bolivia”

By the time the project ended, upgrading of testing station facilities/equipment, development/demonstration of farming technology and development of human resources were completed, and work implementation regulations related to operation and management of CETABOL after transfer and an operation and management plan was formulated/approved, creating an implementation system that will serve as a base for technology dissemination in Santa Cruz Department.
A fiscal plan and other actions will be taken every year to confirm the status of progress after transfer, and efforts will be made to implement improvements as appropriate.

1) Indicator 1 “Formulate Work Implementation Regulations and an Operation and Management Plan (Organization diagram, personnel deployment plan, budget, income and expenditure account statement, etc.) for the Technological Center on Agriculture and Livestock in Bolivia”

Participation of Nikkei cooperatives and Nikkei farmers that will be involved with operations and management support after the transfer was obtained, and an organization operations system was formulated by the time the project ends that took into consideration the direction the testing station will take after transfer. This consisted of formulating work implementation regulations that included an organization diagram, personnel deployment plan, budget and income/expenditure account statement, as well as formulating a management and operation plan.

Furthermore, the “Early usage of elite bull frozen semen by CETABOL” and “Speeding up of soil analysis services” which were expected to contribute to the self-reliant profitability of CETABOL and incorporated in the operation and management plan after the transfer has become a central source of income for

CETABOL.

2) Indicator 2 “Above Regulations and Plan Approved by Transferee Organization”

Approval of the above work implementation regulations and operation and management plan by the Nikkei cooperatives and CETABOL foundation board of directors was obtained with the participation of the Nikkei cooperatives and Nikkei farmers that will be involved in operation and management support after transfer of operation.

As stated above, the expected effects resulting from implementation of this project for the most part achieved the level of objectives by the time the projected ended, and contributed to achievement of the project objectives. Therefore, the project can be judged to have had a high level of effectiveness as of the time the project ended.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

Overall Objective: Dissemination of Sustainable Agricultural Technology in the Tropical Humid Area of Santa Cruz Department”

1) Indicator 1 “Boosting Agricultural Production (volume, amount) in the Tropical Humid Area in Santa Cruz Department in 2010 and After So That It Exceeds 2005 (Base Year) Every Year and Maintaining Stable Production”

The scale of dry-field farming in Santa Cruz Department which mainly consists of grain production has increased in spite of drought and flood damage brought about by El Niño and La Niña, the impact of the global economic slump of 2008, epidemic of soybean “rust” and other such diseases, as well as other risk factors.

According to data from the Ministry of Rural and Land Development, the production volume of the main grains in Santa Cruz Department had grown dramatically in 2012 compared to 2005, and nearly stable grain production is being maintained.

Table 6 Main Crop Production Volume in Santa Cruz Department (Tons)

Crop	2005	2012	Increase
Soybeans	1,670,000	2,310,000	38%
Rice	400,000	480,000	20%
Corn	580,000	710,000	22%
Wheat	50,000	180,000	260%

Source: Ministry of Rural and Land Development

3.2.2.2 Manifestation of Effects after Project Ended

After the project ended and operations were transferred, within the limitations of not serving the role of being an official testing station in Santa Cruz Department, dissemination of technology by CETABOL itself has not grown into a structure that covers the entire region of Santa Cruz Department. However, the farming technology and farming information contained in the technical manuals and other materials created under this project that originated from CETABOL extends to remote areas in Santa Cruz Department, with two Nikkei colonies at its center. In addition, as stated in the section on Effectiveness, CETABOL is selectively expanding its soil/pesticide analysis and cow artificial insemination service business, these services are being used on an ongoing basis, and the certified analysis results have grown considerably as of the ex-post evaluation. It has been determined that these services provided by CETABOL (test results and agricultural technology) are being utilized by and disseminated to Bolivian farmers inside and outside Santa Cruz Department through the companies involved in agriculture that subcontract work to CETABOL. These Bolivian farmers are the customers of these companies.

The judgment can be made that dissemination of agricultural technology by CETABOL is helping to maintain stable production of the main grains in Santa Cruz Department.

3.2.2.3 Other Impacts

(1) Changeover to / dissemination of high class beef cattle breeds

Before this project, there were quite a few livestock farms in the Nikkei colonies that selected beef cattle breeds that were based on a judgment of breeding productivity, strategic marketing or other such factors. As a result, cross breeding took place among multiple breeds, resulting in a structure that did not produce high quality beef.

However, the outputs of this project were also disseminated to livestock farms in Nikkei colonies, and this resulted in the focused selection of the Nellore breed (a high class breed of cattle) by almost all farms breeding cattle in the Nikkei colony by the time the project ended. This contributed to an increase in income for livestock farms.

(2) Dissemination of agricultural technology through training of students

More than 100 students have been accepted from the School of Agriculture at René Moreno University in Santa Cruz Department for help in preparing dissertations and training while this project was being implemented, after the

project ended and after the transfer. This has resulted in increased recognition of CETABOL, and dissemination of the technology and information that is available from CETABOL by the trainees to farms inside and outside Santa Cruz Department.

(3) Dissemination to Santa Cruz Department farmers

According to the results of a beneficiary survey (100 farmers in Santa Cruz Department) that was conducted in February 2013, although the farmers in Santa Cruz Department have a high level of desire to upgrade their level of agricultural technology, there are limited opportunities to receive training in Bolivia that does not currently have a system in place to facilitate the dissemination of agricultural technology.

Under these circumstances, at least two thirds of the farmers in Santa Cruz Department are utilizing the farming technology and farming information that has been received from CETABOL or Nikkei cooperatives, and they have high expectations for CETABOL in the future.

Table 7 Beneficiary survey of Santa Cruz Department farmers

(a) Desire to Boost Level of Agricultural Technology	(b) Opportunities to Receive Training in Agriculture	(c) Utilization of CETABOL / Nikkei Cooperative Technology
1. High (75%)	1. Adequate (6%)	1. Use extensively (28%)
2. Low (20%)	2. Minimal (54%)	2. Use a portion (35%)
3. Not Needed (5%)	3. Almost none (40%)	3. Hardly use at all (11%)
		4. Do not know (26%)

(d) Future Expectations for CETABOL	
1. None in particular	(6%)
2. Do not know	(6%)
3. More seminars and other events	(31%)
4. Increase amount of information provided	(39%)
5. Increase services provided	(17%)
6. Other	(1%)

Source: Beneficiary survey conducted in February 2013 (Questionnaire of 100 Bolivian farmers randomly selected in areas surrounding Nikkei colonies in Santa Cruz Department)

(4) Negative Impact

This project has not had a negative impact on the natural environment, cause resettlement of residents or any problems involved with site acquisition during the project period or after the project ended.

As stated above, implementation of this project achieved development of an infrastructure that serves as a base for the improvement and dissemination of farming technology by CETABOL in Santa Cruz Department which was set as the project objective. In addition, it was verified that dissemination of sustainable agricultural technology by CETABOL in Santa Cruz Department which is an

overall objective is being performed. Therefore, this project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Inputs	Plan	Actual Performance
(1) Experts	● Long term experts: 3 ● Short term experts: 2 – 3 per every year	● Long term experts: 4 ● Short term experts: 4
(2)Trainees received	1–3 trainees every year (training in Japan and third country)	Total: 8 trainees
(3)Third-Country Training Programs	None	None
(4) Equipment	3 mil. yen/year (Total 15 mil. yen)	81.18 mil. yen
Total Project Cost	Total: 406 mil. yen	Total: 456.83 mil. yen
Total Local Cost	None	None

3.3.1.1 Elements of Inputs

(1) Japan side input

1) Dispatch of experts

The quality, quantity and timing of long-term and short-term experts dispatches were appropriate for the most part.

Work was handed over to a chief advisor (station manager) and assistant manager/coordinator which were dispatched as long term experts in two fields (two experts in each field), and these experts were in charge of operation and management of the overall project. During the hand-over process, the station manager was absent for 4 months, and the assistant manager was absent for 5 months. However these absences did not interfere with operation and management of the project in particular, since either the station manager or assistant manager was at the project site nearly all the time.

Four short-term experts (high-speed liquid chromatography maintenance and management, pesticide quality management, soil analysis, and plant nutrition science) were dispatched effectively. In particular, the short-term experts dispatched from the neighboring countries of Brazil and Argentina provided transfer of technology from similar farming environments, and this made it easy for

the counterparts to accept them, and resulted in a high level of utilization.

2) Acceptance of trainees

The content, period and timing were appropriate; the results of training were utilized in work after training, making this an effective input.

3) Provision of equipment

The types of equipment, quantity, quality and timing of provision were appropriate. Most part of the equipment provided was effectively utilized for project activities, contributing to the obtaining of approval as a certified organization for soil diagnosis, pesticides and other matters. Furthermore, due to the fact that a more advanced level of equipment was requested than the plan as the required environment to obtain approval as a certified organization, the actual cost of the equipment exceeded the budget allocated in the plan. The equipment related to certification work that was procured just before the project ended is a required input for CETABOL to continue self-reliant activities, and was being effectively used as of the ex-post evaluation.

In addition, JICA provided facilities and equipment to CETABOL when the project ended. However, regarding the vehicles (total of 13), although JICA and CETABOL completed the various procedures, changing of the title/registration were not completed due to various complicated internal procedures in Bolivia. This resulted in a situation in which these vehicles cannot be utilized for the subcontracting service business, dissemination business, test farm visits, and participation in periodic meetings/workshops after the transfer.

(2) Bolivia Side Input

1) Counterpart allocation

The respective Nikkei cooperatives deployed an appropriate number and quality of counterparts during the project period, and these counterparts made a large contribution to project activities as well as project operation and management.

2) Covering of local costs

The loaning of the land for the CETABOL facility and test station farmland which were to be covered by the Bolivian side was not a problem during the project period. CETABOL has obtained a 10-year free-of-charge lease until 2020 after the project ended/transfer was performed. Regarding the conditions for the loaning of land after 2020, plans call for coordination between the Okinawa 2nd colony which

is the land owner and CETABOL to be conducted from around 2015.

3.3.1.2 Project Cost

The actual cooperation sum was 456.83 million yen with respect to a planned cooperation sum of 406 million yen, slightly exceeding the planned amount (113% of planned amount).

The reason that the actual cooperation sum exceeded the planned cooperation sum consisted of upgrading the equipment provided with the goal of facilitating operation and management based on self-reliant profitability after the transfer (upgrading of experiment/testing related materials/equipment required to obtain approval as certified organization for various services from external organization).

3.3.1.3 Period of Cooperation

The actual cooperation period was 60 months with respect to planned cooperation period of 60 months (100% of plan).

As stated above, while this project was completed within the planned period, the cooperation sum exceeded the planned sum. Therefore, efficiency of the project was high.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy towards the Project

The agricultural policy of the Bolivian government and government of Santa Cruz Department did not change while this project was being planned, during the project period and at the time of the ex-post evaluation. The central government continues to consider promoting the expansion of agricultural and livestock production in Santa Cruz Department which accounts for approximately 80% of all agricultural and livestock production in Bolivia as an important issue. The government of Santa Cruz also continues to place priority on efforts to facilitate regional development of Santa Cruz Department centered on agriculture and livestock.

Although the need to strengthen the capability for learning agricultural technology with a focus on small-scale farms in other regions of Bolivia is high, the official agricultural dissemination system did not function during the project period and is currently not functioning.

Under this type of policy system, the sustainability of the farming technology/farming information provided by CETABOL and the sustainability of the project effects are guaranteed. In addition, the existence of CETABOL as a

semi-official agricultural technology dissemination organization is further increasing in importance.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

Based on the implementation system that was planned/developed during this project, CETABOL received certification as a corporate entity in Bolivia in March 2009, and operation and management were formally transferred to CETABOL from JICA in April 2010. CETABOL is collaboratively operated and managed by the following two Nikkei cooperatives located in the Nikkei colonies in Santa Cruz Department under the CETABOL Foundation: Agricultural and Livestock Cooperative of Okinawa Colony (CAICO) and Agricultural and Livestock Cooperative of San Juan (CAISY).

As of June 2013, the CETABOL consisted of the following 14 regular staff members: 1 station manager, 3 staff in clerical department, 7 staff in agriculture department and 3 staff in livestock department (the number of regular staff when the project ended was 9). In addition, 13 staff have been hired that work on farms to supplement efforts by the regular staff. Although some of the staff trained during the period of this project quit after the project ended, since technical personnel with suitable technical skills have been newly hired, there has not been a problem with the implementation system for the provision of testing and services.

As stated above, efforts are proceeding to keep and expand staff under a suitable operation and management system. Therefore, the judgment can be made that the sustainability of the counterpart implementation system is high.

3.4.3 Technical Aspects of the Implementing Agency

As described in the output for effectiveness, the various services which mainly consist of soil/pesticide analysis and cow artificial insemination services which were acquired during this project are continuing to be provided since the project ended. The required technological level as a certified organization has been secured through the acquisition/renewal of certification by an external certification organization.

The provision of high quality subcontracting services and technology has been recognized by Nikkei farms, as well as official organizations related to agriculture, agricultural materials/equipment suppliers, farmers and other people involved in agriculture inside and outside Santa Cruz Department. Simultaneously, in order to maintain and upgrade its technological level, experts are being sent after the project ended from Brazil, Argentina and other neighboring countries that are being self-financed or paid for by support from other donors, and CETABOL engineers are

undergoing unscheduled overseas training etc. on an ongoing basis. However, the funds for this type of opportunity to boost technical capabilities are limited, and securing these funds is an issue.

As stated above, the judgment can be made that CETABOL is adequately using the technology that was transferred during project implementation. Therefore, the technical sustainability is high.

3.4.4 Financial Aspects of the Implementing Agency

The important investigative research that has been accumulated over many years and significant social contribution to regional society made by the Nikkei immigrants are being utilized to perform operation and management as a private sector company with the objective of self-reliant profitability, although there remain some issues as a testing organization that make it difficult to become profitable after the transfer of operation.

The CETABOL incurred losses for the main following reasons for two years after operation was transferred. As a result, there is the issue of not being able to prepare adequate funds to update and newly procure facilities/equipment that are projected in the future.

- Continued work such as basic investigative research as a testing organization from which no income is derived
- Investment for the procurement of new vehicles, and repair/updating of equipment/machinery with the objective of self-reliant profitability
- Delay in expansion of subcontracting services due to delay in registration of vehicles received during transfer, temporary stoppage of subcontracting service work while equipment was being repaired, drop in expected income due to slump in subcontracting service orders from Nikkei farms as a result of charges being levied for services

On the other hand, from the third year after operation was transferred, prospects for securing profitability began to emerge for the following main reasons, and it is expected that organization will remain in the black in the future.

- Increase in requests to provide testing/services for which there is a high level of need locally that consist of soil/pesticide diagnosis and cow artificial insemination services
- Increase in service requests from large customers such as agricultural materials/equipment suppliers that have hubs in Santa Cruz
- Decrease in expenditures due to choices made by departments that do not bring in income

As stated above, the organization had issues with its financial viability for two years after transfer upon ending of the project, but it has independently improved its business with the objective of achieving self-reliant profitability. Therefore, the judgment can be made that the certainty of sustainability is increasing.

Table 8 CETABOL Operating budget/Operating results (unit: bolivianos)

	Operating Budget			Operating Results		
Year	Income	Expenditures	(Balance)	Income	Expenditures	(Balance)
2010	343,135	474,025	-130,890	238,994	239,602	-608
2011	436,650	486,751	-50,101	393,517	405,684	-12,167
2012	598,347	561,408	36,939	539,920	527,246	12,674

Source: CETABOL

Since there have been moderate problems with the financial viability of this project, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented with the objective of strengthening the functions and enhancing the operation and management system for agriculture and livestock technology in order to facilitate self-reliant operations development by the Technological Center on Agriculture and Livestock in Bolivia (CETABOL).

Promotion of agriculture through the dissemination of sustainable technology matches the development policies in Bolivia aimed at promoting the development of agricultural communities by strengthening competitiveness, and the ODA policy of Japan which has a primary focus on regional economic development centered around agriculture and enabling farmers of Japanese descent to put down stable roots, and therefore has a high level of relevance.

The desired original objectives concerning the strengthening of functions related to agriculture and livestock technology at CETABOL and upgrading its operations and management system were achieved. Regarding overall objectives, it was also verified that dissemination of technology by CETABOL helped stabilize agricultural and livestock production in the region, and contributed to boosting production capabilities by persons involved in agriculture, meaning that the project had a high level of effectiveness and impact.

The elements input for manifestation of the output were appropriate, and the period of cooperation was within the plan, but the provision of supplied equipment with the aim of enabling the organization to make a profit after the transfer of operation and management resulted in the amount of cooperation funds actually expended substantially exceeding the

planned amount. Therefore, efficiency was fair.

There were no problems with the policy system, counterpart system, and the sustainability of the technology. The financial status of CETABOL was not particularly good for two years after transfer due to investments made to enable it to make a profit. However once the business started, the effects of investments have been manifested. Therefore, sustainability was fair.

In conclusion, this project was given a high evaluation due to the above factors.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Handling of short-term issues

- In order to further expand various service operations in a stable manner that are the core of business that earns income, securing the ability to move throughout the extensive area of Santa Cruz is indispensable. Regarding the transfer procedures for the vehicles (13) for which applications have been completed on the Bolivia side, these procedures should be closely supervised on an ongoing basis while receiving the support of the JICA Bolivia Office.

(2) Handling of mid- to long-term issues

- Taking the track record/transition of test station operation and service business after transfer into consideration, a mid- to long-term business strategy should be formulated and reviewed that has a future vision for CETABOL, with a focus on the future policy for the testing station non-profit work, as well as the profitability as a private sector organization that results from the scale of its service business in the future, staff plans and other such details. In addition, discussions should be held with the Okinawa 2nd colony from around 2015 on the continued usage of the CETABOL site and farm for which a free-of-charge lease agreement that lasts until 2020.
- In order for CETABOL to continue to maintain a high level of trust from external customers as a certified organization that can provide various agricultural services, securing and nurturing good quality personnel are indispensable. Providing good employment conditions for technicians and opportunities for enhancing their technical capabilities are important, and the required expenses for these should be allocated.

4.2.2 Recommendations to JICA

(1) Handling of short-term issues

- Regarding the transfer procedures for the vehicles (13) provided to CETABOL for

which applications have already been made in Bolivia, continuing cooperation / support should be provided to CETABOL as necessary to facilitate the completion of transfer procedures at the earliest point possible.

(2) Handling of mid- to long-term issues

- The level of trust in CETABOL from external parties as a certified organization that provides various services has increased based on the technology transferred during the project. However the opportunities for the staff to upgrade their technical capabilities after the transfer of operations are limited. Opportunities to upgrade technical capabilities that cannot be obtained in Bolivia, and in particular the dispatch of experts (including experts from third countries) in new fields (agriculture production technology utilizing GNSS/GPS, etc.), as well as supplemental support through training in Japan and other such activities should be considered.
- The high level of agricultural and livestock technology as well as the study/testing experience over many years should be utilized for agriculture promotion projects implemented by JICA inside and outside Santa Cruz Department in Bolivia, drawing upon the CETABOL staff and human resources that have been nurtured in the CETABOL project.

4.3 Lessons Learned

Before this project started, CETABOL had the base of being directly operated by JICA for a period of over 15 years as an agriculture and livestock testing station that provided support for the promotion of agriculture and livestock for Nikkei farmers. This technical cooperation project was aimed to formulate a system enabling self-reliant growth of CETABOL with a view to the full transfer of operations from JICA that was scheduled ten years after the project started, based on the accumulated technologies and existing organization.

For a technical cooperation project where the counterpart is an agricultural testing organization that has a relatively high level of technical capability before the project is implemented, it is important to clearly position the operation and management plan that includes the implementation system after the project ends, dissemination system and financial structure as one output, rather than only providing technical cooperation in specialized fields. In addition, when it is difficult to secure a stable official budget from the government or other source after the project ends, the formulation of an income structure that heightens sustainability and/or business plan is important for the creation of a self-reliant organization structure after the project ends.

Plurinational State of Bolivia

Ex-Post Evaluation of Japanese Technical Cooperation Project
"Mining Environment Research Center Project"

External Evaluator: Aya Iimura, KRI International Corp.

0. Summary

The purpose of this project was to enable the Mining Environmental Research Center (Centro de Investigatión Minero Ambiental) (hereinafter referred to as "CIMA") to function as a center that provides support for environmental administration on technical issues in order to strength monitoring activities on water pollution caused by mining operations in Potosi, and at the same time, the implementation basis of research and technology development for the reduction of pollution load is established in CIMA, and these outputs are reflected on Potosi administration. This goal was relevant to the development policy, development needs of the Plurinational State of Bolivia (hereinafter referred to as "Bolivia") and the ODA policy of Japan from the time of project planning through the time of ex-post evaluation. However, the definition of the "Position and role of CIMA" in environmental administration in the Department of Potosi remained unclear during the planning and implementation of this project and as well as the time of ex-post evaluation. This resulted in CIMA reaching a point that it can be independently operated and managed as a self-reliant growing research center that was part of the original plan. Therefore, the relevance of this project is fair.

In terms of input, the planned project purpose was not achieved due to a delay in the technology transfer and other factors caused by a delay on dispatch of Japanese experts and delay in the procurement of equipment on the Bolivian side, and the period of cooperation was extended for two years. In addition, the project cost exceeded the planned figure by a significant amount due to the extension of the cooperation period. Therefore, the efficiency of this project is low.

Eight outputs were set when this project was planned, but out of these, "establishment of center organization" and "proposal of environmental regulation guidelines" which were indispensable for achieving the project purpose were not achieved at the time of the project completion. Moreover, CIMA is not functioning as a research center that provides scientific support for mining environmental administration in Department of Potosi thought CIMA has archived the technology level that can afford the environmental administration. This is because it has not been defined the position of CIMA. Therefore, the effectiveness and impact of this project are low.

Regarding the sustainability of the outcome in this project, while CIMA attained a certain level of technical and financial capability, there are still administrative problems

related to the positioning of CIMA. Therefore, the sustainability is fair.

Consequently, this project is evaluated to be low.

1. Project Description

Project Location

CIMA Water Quality Chemical Testing Laboratory

1.1 Background

Mining in Bolivia has a long history that dates back to the Spanish colonial era, and it is still one of the major industries in Bolivia. Until the latter 1990s, the only focus was on the development of mining, and there was almost no interest in measures to alleviate pollution due to mining. The development study conducted by the Japan International Cooperation Agency (hereinafter after referred to as "JICA") entitled "Evaluation Study on the Mining Sector's Environmental Pollution in the Department of Potosi" implemented in 1997 – 1999 identified that water pollution was extremely serious in the Pilcomayo River.

Under these circumstances, the Government of Bolivia took the recommendations in the above development study into consideration which resulted in the conclusion being reached that CIMA needed to be newly established as a center to conduct studies/research in both the technical and administrative areas to determine the measures to prevent pollution caused by mining in Department of Potosi and the entire country of Bolivia, as well as to disseminate the result of research. The Government of Bolivia made a request for project-type technical cooperation to the Government of Japan, and the "Mining Environment Research Center Project" was implemented starting in July 2002.

1.2 Project Outline

Overall Goal	In the valley of the Pilcomayo River, environmental administrators, mining operators and communities promote the activities for the prevention of the water pollution caused by the mining industry.
Project Objective	Monitoring activities on water pollution caused by mining operations

		in Potosi, the implementation basis of research and technology development for the reduction of pollution control load is established in CIMA, and these outputs are reflected on Potosi administration.
Outputs	Output 1	The organization of the center is established.
	Output 2	Facilities and equipment required for the activities of the center are introduced and maintained properly.
	Output 3	Environmental chemical analysis skill is acquired by the counterparts.
	Output 4	Environmental research skill is acquired by the counterparts.
	Output 5	Wastewater treatment skill is acquired by the counterparts.
	Output 6	Environment regulation guideline for mining industries in Potosi is proposed.
	Output 7	Technology for mineral processing productivity is proposed.
	Output 8	Public relations and education for environmental conservation targeted at Potosi people who work for mining and concentration, and the people related to the mining activity are conducted.
Inputs		Japan Side: 1. Experts Dispatched: 35 Long-Term Experts: 9, Short-Term Experts: 26 2. Acceptance of Trainees: 15 (Training of counterparts in Japan) 3. Training in the Third Country: Total of 9 (Training in Chile) 4. Equipment Provided: 115.47 million yen 5. Cost for Work in Bolivia: 50.52 million yen Bolivia Side: 1. Deployment of counterparts: 16 (When project completed) 2. Provision of land/laboratory facilities 3. Laboratory building renovation work 4. Development of infrastructure 5. Procurement of reagents, materials and equipment 6. Covering of local costs (counterpart salary): Approximately 84 million yen
Total cost		990 million yen
Period of Cooperation		Main Project Period: July 2002 – June 2007 Extension Period[1]: July 2007 – June 2009
Implementing Agency		Main Project Period: Natural Resources and Environment Division in the Department of Potosi Extension Period: Departmental Government of Potosi and Autonomous University of Tomás Frías (UATF)
Cooperation Agency in Japan		Japan Mining Engineering Center for International Cooperation
Related Projects		[Technical cooperation] - Development study "Evaluation Study of the Mining Sector's Pollution of the Environment in Potosi Prefecture" (1997 – 1999) - Individual dispatch of short-term experts (ore processing/waste processing: 2 (2000)

[1] The results of the terminal evaluation implemented in February 2007 confirmed that the activities in the self-reliant growth plan and chemical analysis field and technology transfer have not been completed. Upon receiving the results of this evaluation, the decision was made to extend cooperation for two years from July 2007. Furthermore, in this ex-post evaluation, the "project period" is defined as July 2002 – June 2009, the "main project period" as July 2002 – June 2007 and the "extension period" as July 2007 – June 2009.

	[Projects by Other Agencies] - EU “Integrated Management and Master Plan for the Pilcomayo River Basin Project” (2000 – 2010) - World Bank “Small-size Tailing Dams Construction Project” (2002 – 2004) - Deutsche Kreditanstalt für Wiederaufbau (KfW) “San Antonio Project to Construct Sediment Dam for Mineral Ore Waste” (2004 – 2006) - Danish Development Agency (DANIDA) “Danish Cooperation Program in the Environment Sector (PCDSMA)” (2001 – 2006) - EU “Program to Support Sustainable Economic Development in the Impoverished Mine Areas in Western Bolivia II (APEMIN II)” (2004 – 2010)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of Overall Goal

In the terminal evaluation of the main project period in 2007, the judgment was made that if the technical capabilities and implementation structure were strengthened based on the established technical and informative institution at CIMA at the moment, it would be possible to contribute to the final outputs of strengthening the administrative system and policies.

In the terminal evaluation of the extension period in 2009, a concrete manifestation in the administrative system had not been identified. However, it was confirmed that the Departmental Government of Potosi and the Ministry of Mining and Metallurgy, Bolivia had stated to strengthen administrative guidance, and that this project had been participated in the basic design of an acidic mining waste water treatment plant in the Department of Potosi based on environmental monitoring data which was backed up by scientific verification provided by this project. In addition, the judgment was made that technical information developed by this project had been shared between the government and local communities by seminars and other events concerning the prevention of water pollution caused by mining.

1.3.2 Achievement of Project Objective

In the terminal evaluation of the main project period in 2007, although most indicators in the respective fields of environmental surveys, waste water treatment and environmental enlightenment were achieved, and the indicators in the chemical analysis field were not achieved. Furthermore, establishment of CIMA as a self-reliant growing research center which was originally planned to be achieved in four years after the project started was not completed. Accordingly, the judgment is made that the project purpose “was not achieved”.

In the terminal evaluation of the extension period in 2009, the technology transfer by

the dispatch of Japanese experts and training programs in third country during the extension period strengthened the chemical analysis capability of CIMA, and this resulted in achieving a certain level of capacity in the chemical analysis field, environmental survey field, waste water treatment field and environmental enlightenment field. The level of achievement for the respective indicators and an interview survey of persons involved in field studies resulted in the judgment being made that the project purpose "was mostly achieved".

1.3.3 Recommendations

Terminal Evaluation of Main Project Period (2007)

The following short-term recommendations were made to be implemented by the completion of the project. The recommendations to the Bolivia side were: (1) Prioritizing of technology transfer items in the chemical analysis fields; (2) Completion of chemical analysis laboratory expansion work; (3) Submission of self-reliant growth plan (First version of draft correction); (4) Initiation of self-reliant growth plan; and (5) Maintaining CIMA structure. The recommendations to the Japan (JICA) side were: (1) Review of support system to facilitate preparation of self-reliant growth plan; and (2) Review of expert dispatch plan for technology transfer in the field for which outputs had not been achieved.

Furthermore, the following mid-term/long-term recommendations were made to the Bolivia side for implementation after the project completed: (1) Strengthening of coordination with mining development sector; (2) Analysis/evaluation of market value of work conducted by CIMA; (3) Review of work conducted by CIMA to facilitate to secure budget; and (4) Strengthening capabilities of CIMA organization and strengthening of infrastructure.

Terminal Evaluation of Extension Period (2009)

The following recommendations to be performed by the completion of the project were made for the Department of Potosi, which were: (1) Implementation of procedures related to the establishment of a new CIMA organization; (2) Speeding up execution procedures related to the procurement of materials and equipment; (3) Extension of hiring term of counterpart staff; and (4) Renewal of contracts with technical staff.

The following recommendations to be performed by the completion of the project were made for the Autonomous University of Tomás Frías (hereinafter referred to as "UATF") which were: (1) Implementation of procedures related to the establishment of a new CIMA organization; and (2) Implementation of laboratory related construction work.

In addition, the following mid-term/long-term recommendation was made to involved

persons (Departmental Government of Potosi and UATF) after the completion of the project, which was: Establishment of new organization ("Bolivian Institute for Mining and Environmental Research") and establishment of organizational framework. In addition, the following recommendations were proposed that should be implemented on an ongoing basis by the new organization: (1) Implementation of material/equipment procurement; (2) Implementation of analysis by means of self-reliant efforts; and (3) Appropriate management control.

2. Outline of the Evaluation Study

2.1 External Evaluator

Aya Iimura, KRI International Corp.

2.2 Duration of Evaluation Study

Duration of the Study: December 2012 – December 2013

Duration of the Field Study: February 18th – March 10th and June 4th – 10th, 2013

2.3 Constraints during the Evaluation Study

The project implementing agencies were the Departmental Government of Potosi during the main project period, and the Departmental Government of Potosi and UATF during the extension period. However, there have been the changes of government and elections of governors and mayors during the project period and post project period, and frequent transfers of personnel in the Departmental Government of Potosi in unexpected moments during the project period and post project period. Therefore, at the moment of the ex-post evaluation, there were not any staff that could verify facts concerning this project in the Departmental Government of Potosi, and relevant information/material was not provided.

Therefore, this ex-post evaluation was basically carried out based on the interview surveys of involved persons at UATF and CIMA, and the review of information /material provided by UATF and CIMA.

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

3.1 Relevance (Rating: ②[3])

3.1.1 Relevance to the Development Plan of Bolivia

When this project started, a priority issue in the Five-year Plan of the Government of Bolivia was to achieve sustainable development in order to contribute to the reduction of

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

poverty. This project matched the development policy of the government of Bolivia due to the fact that its purpose was providing support for sustainable development in the mining sector in the Department of Potosi which is located in the Andean uplands where development lags behind other areas in Bolivia.

In addition, as of the completion of the extension period of the project, “Productive Bolivia” was designated as one of the four important issues in the National Development Plan (2006 – 2010) that was formulated to facilitate “Dignified Bolivia”. The sustainable use of natural resources was included as one of the important issues. A support for environmental management capability designated as a goal of this project matches the National Development Plan of Bolivia, since it provides support for sustainable development.

Therefore, sustainable development and environmental measures for the sustainable usage of natural resources were constantly positioned as priority issues in the National Development Plan of Bolivia. Accordingly, the judgment can be made that the project purpose match the development policy of Bolivia, which was a technical cooperation with the goal of developing technology and establishing research implementation infrastructure in order to reduce water pollution caused by the mining sector which is a major industry in the Department of Potosi, and reflecting these outputs in the administration of Department of Potosi.

3.1.2 Relevance to the Development Needs of Bolivia

Mining has been a major industry in Bolivia since the 16th century. While there has been a focus on the development of mining, measures have not been implemented in the past for the pollution caused by mining. Due to the absence of measures to water pollution caused by mining, there was an incident of international river pollution (Pilcomayo River, headwaters of La Plata River) caused by washout of a tailings dam in 1996, which became an international environmental problem with neighboring countries. In the development study conducted by JICA entitled “Evaluation Study of the Mining Sector’s Pollution of the Environment in Potosi Prefecture” in 1997–1999, it became clear scientifically that water pollution due to mining was extremely serious in the Pilcomayo River. Furthermore, there was not an agency that conducted monitoring/analysis of water pollution caused by mining in or around the Department of Potosi where is a major mining production area in Bolivia.

Based on this background, this project matched the development needs of Bolivia throughout the project period, which started in order to newly establish a “Mining Environmental Research Center” that would conduct studies/research concerning measures to prevent pollution caused by mining in the Department of Potosi and the

entire nation of Bolivia. Therefore, the need for implementation of the project can be judged as high.

Midwater Area of the Pilcomayo River at Time of Ex-post Evaluation[4]

Ore Processing (Concentration) in Potosi City

3.1.3 Relevance to Japan's ODA Policy

The ODA priority areas in JICA Country Program for Bolivia when this project started consisted of three areas: (1) Human security; (2) Enhancement of productive capacity; and (3) Improvement of institutions/governance. This project was implemented to provide support for sustainable mining in Bolivia by means of technical cooperation from Japan that has the experience of overcoming water pollution caused by mining, and was expected to make a contribution to "(2) Enhancement of productive capacity". At the same time, the project matched the Japan's ODA Charter of "Addressing global issues" such as the environment and water issues.

Therefore, the judgment can be made that this project was relevant to the Japan's ODA policy.

3.1.4 Positioning of the Center

This project was designed to establish a mining environment research center that would carry out investigation and research on technology and policy for prevention of mine pollution, and divulgate the results of investigation and research in the Department of Potosi and other mine industry regions in Bolivia. It was expected that this research center would function with a board of directors consisting of the Departmental Government of Potosi and UATF, and a self-reliant growth plan was formulated as an integral part of the activities under this project.

However, a frequent personal replacement had occurred during the project period, and this made difficult for the personal of the Departmental Government of Potosi to

[4] According to the interviews of residents in the river basin and former counterparts, the river water was lead-colored in the early 2000s due to heavy metals, but currently, the river has returned to its normal reddish brown color.

comprehend the CIMA, and there were not enough discussion on how to take advantage of CIMA. Therefore, the draft law for establishment of this new research institute was not approved by the National Congress and the Presidential Palace during the project period, and it has not been established a new research institute. Under these circumstances, discussions were conducted between the Departmental Government of Potosi and UATF on the operation and management configuration of CIMA, and the decision was made to have CIMA tentatively continue activities as an affiliated organization of UATF.

Due to these circumstances, adequate discussion was not conducted on work to clarify the positioning of the responsibilities/role of CIMA as a new research institute in environmental administration in the Department of Potosi and the Government of Bolivia until the project completion.

Therefore, while this project matched the development policy and development needs of Bolivia, as well as the Japan's ODA policy, the project was closed without any clear definition of CIMA in environmental administration. As a result, CIMA has not been functioning as a research institute that provides technical support for environmental administration from the time the project completed until ex-post evaluation, which was a purpose of this project. Accordingly, the relevance of this project is fair.

3.2 Effectiveness/Impact[5] (Rating: ①)

3.2.1 Project Outputs

3.2.1.1 Project Output

1) Output 1: The organization of the center is established.

Achievement of *Output 1* is "inadequate".

The technical system at CIMA which consists of the personnel and equipment which allow it to perform research on environmental surveys, water quality analysis and waste water treatment was established for the most part by the time the project completed. However, the project completed without achieving the project object which was that CIMA serve the role/function as a center to reflect the results of monitoring and research in the environmental administration in the Department of Potosi.

- The counterparts which received technology transfers were allocated form both the Departmental Government of Potosi and UATF. Due to the impact of changes of government and other factors, various personal replacements were occurred in the Departmental Government of Potosi, which interfered with the technology transfer. In addition, the frequent personal replacement obstructed a continuous discussion on establishment of CIMA.

[5] Sub-rating for effectiveness is to be put with consideration of Impact.

- On the other hand, since the same counterparts from UATF maintained during the project period, technology transfer was conducted in a smooth and effective manner.
- The CIMA self-reliant growth plan which was scheduled to be formulated during the project main period was formulated during the extension period. However, while the formulated self-reliant growth plan conducted analysis on technical aspects, appropriate review concerning organizational and institutional aspects to reflect the outputs from CIMA in the administration of the Department of Potosi was not conducted.
- The Joint Coordination Committee (JCC)[6] which was made up of members from the Ministry of Mining and Metallurgy, Ministry of Rural Development, Agriculture and Livestock and the Environment (at that time), Ministry of Water Resources and the Vice-Ministry of Public Investment and External Financing, held discussions more than one time per year for a total of 16 times during the project period on a new CIMA which functions with a self-reliant growth. However, a conclusion was not reached on the concrete policies and methods, etc. to achieve establishment of a new CIMA.

2) Output 2: Facilities and equipment required for the activities of the Center are introduced and maintained properly.

Output 2 was "achieved for the most part".

There was a maximum delay of two years from the original plan in the procurement of the facilities and equipment required for CIMA activities, but the facilities and equipment required for the self-reliant growth of CIMA was completed by the time the project extension period completed.

- The facilities and equipment required for CIMA to function as a center that performs environmental surveys, chemical analysis and waste water treatment were procured until the project completion though there were some delay.
- Operation and maintenance manuals for the procured facilities and equipment were prepared during the project period, and the counterparts had been performing maintenance and management in an appropriate manner.

3) Output 3: Environmental chemical analysis skill is acquired by the counterparts.

Output 3 was "achieved".

The counterparts in the chemical analysis field received technical transfer from the

[6] JCC is the abbreviation of Joint Coordination Committee, which conducted discussion, review and approval of important issues related to the project.

Japanese experts, and learned techniques and other procedures for metal analysis of aqueous environmental samples, high concentration and low concentration ion analysis, heavy metal analysis, test wastewater treatment analysis, soil waste analysis and analysis of living environment items. When the project completed, the counterparts that had received the technology transfer had reached the level that they could provide instruction to colleagues and students.

In addition, technology transfer using the main analysis equipment (atomic absorption analysis, ion chromatograph, fluorescent X-ray analysis, UV/visible detector) was completed by the time the project completed, and the counterparts reached a level that they could independently perform analysis.

Technology transfer consisted of the following items:

- Chemical analysis: 69 items
- Analysis of wastewater standard items: 23 items (All discharge standards in Bolivia)
- Heavy metal analysis of minerals and tailings, rare metal analysis: 8 items
- Heavy metals in soil (leached): 9 items
- Total nitrogen/soil (content): 6 items
- Analysis of cyanide in mine wastewater: Free cyanide, total cyanide
- Wastewater treatment
- Water quality analysis: COD, BOD, DO etc.
- Microbiological analysis: Coliform bacteria

4) Output 4: Environmental research skill is acquired by the counterparts.

Output 4 was “achieved”.

During the main project period, the counterparts learned environmental survey techniques from the Japanese experts that mainly consisted of river water quality surveys, and only they reached a level that they could conduct specimen sampling and analysis independently by the time the project completed. During the extension period, hot spring water, drinking water sources and other general environmental water were added to mine wastewater as the target of environmental surveys.

- A biannual environmental monitoring system was established that consisted of 26 points in the Pilcomayo River basin, and the counterpart staff reached a level that they could independently perform specimen sampling and analysis. The results of monitoring were presented in the seminars and reports.
- A hydraulic structure model was established, and the results of simulation were managed with Geographic Information System (GIS) software.

5) Output 5: Wastewater treatment skill is acquired by the C/Ps.

Output 5 was “achieved”.

The counterparts utilized the mining wastewater treatment pilot plant, and reached a level that they could independently conduct research concerning mining wastewater treatment.

- Throughout the project period and extending to the time of the ex-post evaluation, studies (conceptual design, detailed planning) have been subcontracted to CIMA for the construction of an acidic wastewater treatment plant in Colquechaca City in the northern part of the Department of Potosi. The experience and skills acquired in this project have been utilized.
- The counterparts have performed operation and maintenance of the pilot plant (batch testing machine, continuous deacidification test equipment) themselves in accordance with the manuals prepared during the project.

6) Output 6: Environment regulation guideline for mining industries in Potosi is proposed.

Achievement of *Output 6* was “inadequate”.

During this project period, recommendations for mining environmental administration guidelines in the Department of Potosi were not prepared by CIMA. In periodic reports on project activities from CIMA, although it was stated that technical proposals were shared with the Environmental Direction in Departmental Government of Potosi and other parties, they were not utilized as specific administrative guidelines.

- While the counterparts learned administrative policies in Japan to prevent pollution caused by mining and technology that is used to prevent mine pollution through training in Japan and other efforts, the counterparts did not reach a level that they could reflect the knowledge acquired in the administration of Department of Potosi, due to the fact that a diverse range of laws are required for mine pollution prevention administration, and the range of mine pollution prevention technology is too extensive.
- Transfer of specific technology transfer related to the formulation of mining environmental administration guidelines was not planned as a project activity.

7) Output 7: Technology for mineral processing productivity is proposed.

Output 7 was “achieved”.

Measures to improve ore processing developed during this project were introduced to approximately 40 ore concentrators in Potosi city.

- Regarding technology transfer to boost ore processing productivity in order to

cope with environmental costs, technology transfer was performed by dispatching short-term experts three times.

- During the extension period, ongoing attempts were made to improve ore concentration using the ore flotation and other such methods.

8) Output 8: Public relations and education for environmental conservation targeted at Potosi people who work for mining and concentration, and the people related to the mining activity are conducted.

Output 8 was “achieved for the most part”.

Public relations and education to facilitate environmental conservation that included technology to enhance the productivity of ore processing were implemented during the project period. Relevant central government agencies, the Departmental Government of Potosi, mining sector in the Department of Potosi, universities and municipal government were the target of public relations and education activities. However, activities for the communities of the Pilcomayo River basin were limited.

- Public relations publications contained technical information were published.
  - 2004: 500 CDs for enlightenment activities
  - 2005: 500 CDs of website ver. 1 produced, 100 copies of Technical Information magazine No. 1 printed
  - 2006: 100 copies of Technical Information magazine No. 2
  - 2007: 100 copies of Technical Information magazine No. 3
  - 2009: Technical Information magazine No. 4
- A total of 15 seminars were held during the project period.
  - Introduction of CIMA facilities, results of environmental surveys, introduction of wastewater treatment technology, research results in chemical analysis field.
  - There was a particularly large amount of activities during 2008, which were: a seminar on cyanide wastewater for the ore processing business union; a presentation of a wastewater treatment plant for the Bolivian Mineral Corporation; the presentations on technical topics; TV record on CIMA activities; a mine wastewater treatment and monitoring training seminar with the University of Oklahoma (the United States); a technical seminar concerning water quality in Potosi; and etc.
- A project website was established that disclosed project activities and environmental technical information.
- The counterparts released environmental information and water quality data that they acquired themselves to television stations and local papers.

Therefore, of the eight outputs that were established for this project, the judgment can be made that the key to achievement of project purpose consisting of establishment of the center organization (*Output 1*) and reflection in administration (*Output 6*) were not adequately achieved as of the completion of the project although the outputs in the field of technology transfer concerning studies and research were achieved for the most part.

3.2.1.2 Achievement of Project Objective

The project purpose was "Monitoring activities on water pollution caused by mining operations in Potosi, the implementation basis of research and technology for the pollution control is established in CIMA, and these outputs are reflected on Potosi administration".

1) Indicator 1: Monitoring and analysis of water pollution in the Pilcomayo River are implemented.

Indicator 1 was "achieved".

A monitoring system for the Pilcomayo River did not exist before this project started, but through this project, CIMA established a system to implement monitoring of water pollution and chemical analysis of water quality in the Pilcomayo River basin. The counterparts learned basic techniques from the Japanese experts for monitoring of water pollution of the Pilcomayo River and analysis, and reached a level that they could perform sampling, various types of analysis and management of monitoring data themselves.

2) Indicator 2: Methodology of the effective concentration and water treatment of mines and concentrators is investigated.

Indicator 2 was "achieved".

Regarding improvement of ore processing technology, the technology transfer resulted in the counterparts independently obtaining a grasp of the current status of ore processing facilities, the capability to perform various ore processing tests, making proposals on measures to increase ore processing productivity, and the capability to perform financial analysis.

Regarding the treatment of seepage water from mines and ore processing wastewater, the technical transfer on wastewater treatment tests and bacteria oxidation tests were conducted. Moreover, the required data was obtained, an overview design and other materials were prepared. CIMA explained the results of research concerning treatment

procedures for acidic water discharged from mines and wastewater from ore processing to mining operators and conducted technology transfer. In addition, CIMA implemented design of a mine acidic water treatment plant and environmental monitoring in the Colquechaca City in the northern part of Department of Potosi.

3) Indicator 3: The administration sector considers results of the monitoring and research as feedback.

Achievement of *indicator 3* was judged to be "inadequate".

Feedback of the results of monitoring, analysis and research was performed by CIMA twice a year to the Departmental Government of Potosi during the project period. In addition, the results of CIMA activities were introduced to various institutions including national and departmental level government agencies at meetings and seminars so that the information could be shared.

However, the monitoring results fed back such as the ore processing technology and acidic water/wastewater treatment technology described in *Indicator 2* were not utilized in the administrative guidelines in the Department of Potosi. In other words, while the Departmental Government of Potosi appears to be receiving information from CIMA, it did not result in voluntary behavior by the Environment Direction in the departmental government.

4) Indicator 4: Environmental enlightenment and publicity on the prevention of the water pollution are promoted.

Achievement of *indicator 4* was judged to be "inadequate".

CIMA carried out education and public relations through seminars and magazine distributed to mining operators and Pilcomayo basin population. However, the contents of those activities focused on technical and academic themes which were useful for mining operators and universities and were difficult to understand for the local community, while "Community people become more environmentally conscious and pay enough attention to the prevention of the mining pollution" was established as one of the indicators of the overall goal of this project.

Furthermore, the problem of water pollution in the Pilcomayo River was the focus of global attention during this project period, and other donors and NGOs implemented similar activities. According to interviews of previous counterparts at the ex-post evaluation, NGOs were the main actors who implemented enlightenment and public relations activities at the river basin community level.

In conclusion, the judgment can be made that the project objective of "Monitoring

activities on water pollution caused by mining operators in Potosi, the implementation of basis of research and technology for the pollution control is established in CIMA" was achieved by the time the project completed.

However, due to the fact that "these outputs are reflected on Potosi administration" was not achieved and it is an extremely important part for the manifestation of the effectiveness of this project, the judgment can be made that the achievement status of the project objective was "inadequate".

It should be mentioned that the frequent personal replacement of the Departmental Government of Potosi gave serious negative impact on the achievement of project objective.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The overall goal of this project was "In the valley of the Pilcomayo River, environmental administrators, mining operators and communities promote the activities for the prevention of the water pollution caused by the mining industry".

1) Indicator 1: Administration of water pollution prevention is fortified in Potosi.

Achievement of *indicator 1* which is the most important to determine the achievement status of the overall goal is judged to be "inadequate".

After the project completed, CIMA started to be operated under a system that was different from the self-reliant growth plan formulated during the project period, which aimed an envisioned joint operation by the Departmental Government of Potosi and UATF. Rather than being operated under the Departmental Government of Potosi, CIMA is now being operated as an organization of the UATF. At the same time, due to the impact of changes of government and other factors, there were repeated changes in personnel from the departmental government, resulting in a low level of coordination between the Departmental Government of Potosi and UATF.

This resulted in the Departmental Government of Potosi not utilizing CIMA which has enough capacity as a technical support center for mining environmental administration, and specific actions have not been taken to prevent water pollution caused by mining. In addition, the Departmental Government of Potosi is not implementing enlightenment and public relations activities targeted at the local community concerning the prevention of health hazards caused by water pollution.

Accordingly, administration to prevent water pollution cannot be considered to have been "strengthened" by this project.

2) Indicator 2: The water pollutants from mining activities are reduced.

Indicator 2 is judged as "not having been achieved" in the manner envisioned for the project.

According to the results of water quality monitoring implemented on an ongoing basis from the project period by CIMA, its staff confirmed that the chemical water pollution load has been reduced, although the specific figures have not been disclosed.

The project aimed originally to reduce water pollution by enforcement of environmental administration. However, regarding the approach to reduce water pollution load at the mining operator level, the original goal of facilitating guidance by the government to mining operators, coping with the cost of environmental measures to boost ore processing technology, and treatment measures for acidic water from mines have not been implemented. According to the interview of CIMA staff, the main factor that reduced the contamination of water was a physical measure, construction of tailing dam[7].

Furthermore, according to the results of a beneficiary survey[8] of the final beneficiaries of this project who are the residents of the Pilcomayo River basin, 65 of 73 respondents indicated that the perception of community of water pollution of the Pilcomayo River is still "Extremely polluted" or "Polluted". A visible change observed by the local community has not been archived though it is confirmed the reduction of contamination chemically.

[7] The status of water pollution of the Pilcomayo River was chemically clarified as a contributing factor to the reduction of water pollution load by the (1) JICA development study ("Evaluation Study of the Mining Sector's Pollution of the Environment in Potosi Prefecture" 1997 – 1999) which was the predecessor for this project. The necessity of urgently implementing physical measures was outlined (construction of tailings dam) and specific proposals for candidate sites for tailings dams were made. Based on the proposals in (1), (2) the Laguna Pampa I Tailings Dam (pond) was constructed in 2004, and the Laguna Pampa II Tailings Dam (pond) was constructed in 2006 by the Autonomous Administration for Sanitary Works and Mining Operators Union (union of 36 small to medium scale ore processors) in the Potosi city. The Laguna Pampa I Tailings Dam was full half a year after usage began, and the Laguna Pampa II Tailings Dam was full two years after usage began, and could no longer be used. (3) In 2007, the San Antonio Tailing Dam was constructed by the Mining Operators Union. At the time of ex-post evaluation, the 36 ore processors in the City of Potosi were using this tailings dam to discharge all ore processing wastewater. (4) As of June 2013, since the San Antonio Tailings Dam will be full in slightly over a year and can no longer be used, the Mining Operators Union is conducting a survey for the construction of a new tailings dam.

[8] The beneficiary survey was conducted for five days between February 18–22, 2013 in four villages in the Pilcomayo River basin in the Department of Potosi (Betanzos-Yamparaez-Yotala in meandering area of river, and Colquechaca-Oreo-Soroma, Tasapampa-Thuerto and Viñapampa-Sotomayor-Tacobamba). The plan called for the collection of 100 samples, but in addition to access to the villages being made difficult by the rainy season, some residents were concerned about the results of the survey being used and did not want to respond since the problem of river pollution has not been solved, resulting in only 77 responses being obtained. Furthermore, the population along the Pilcomayo River basin in the Potosi and the Department of Chuquisaca is slightly over 500 (Accurate data are not available. Figures provided by CIMA staff. Population of largest village in basin [Sotomayor] is approximately 200.).

Table 1 Result of Beneficiary Survey: 1

Water Quality of the Pilcomayo River (Status in 2002/2009 → Current Status)	Change in Perception	No. of Respondents
Extremely polluted → Extremely polluted	No	11 (15.1%)
Polluted → Polluted	No	18 (24.7%)
Extremely polluted → Polluted	Yes	36 (49.2%)
Polluted → Not very polluted	Yes	3 (4.1%)
Polluted → Not polluted	No	1 (1.4%)
Not polluted → Not polluted	No	1 (1.4%)
No response	-	3 (4.1%)
Total		**73 (100.0%)**

Source: Results of beneficiary survey at time of ex-post evaluation

3) Indicator 3: Community people become more environmentally conscious and pay enough attention to the prevention of the mining pollution.

Indicator 3 is judged to be "not having been achieved".

The fact that the subcontracting of water quality chemical analysis to CIMA financed by municipal governments in the Pilcomayo River basin since 2009 has been increased can be judged as a manifestation of increasing consciousness of the prevention of pollution caused by mining in the local administrations and among residents.

In addition, according to the results of the beneficiary survey, the observation can be made that consciousness of the prevention of health hazards caused by water pollution has increased compared to when the project started.

Table 2 Result of Beneficiary Survey: 2

Change in Consciousness of Environment Compared to 2002	No. of Respondents
1) Currently more interested in prevention of health hazards caused by water pollution	57 (78.1%)
2) Currently have lower level of interest in prevention of health hazards caused by water pollution	2 (2.7%)
3) Level of consciousness has not changed	11 (15.1%)
4) No response	3 (4.1%)
Total	**73 (100.0%)**

Source: Results of beneficiary survey at time of ex-post evaluation

However, the judgment cannot be made that this project had a direct impact on enhancing environmental consciousness among the river basin residents because education activities for river basin residents were limited under this project, while during the implementation period of this project, many projects concerning enlightenment activities by other donors and local NGOs were implemented at the same time in parallel. Moreover, the public relations and enlightenment activities have not

been implemented by CIMA or the Departmental Government of Potosi after the project completed.

3.2.2.2 Other Impacts

1) Impact on the Natural Environment

A negative impact on the natural environment by this project has not been manifested.

2) Resettlement and Land Acquisition

There has been no resettlement of residents or land acquisition under this project.

Therefore, regarding manifestation of impacts, any specific actions have not been manifested at the planned administrative level, among mining operators that received administrative guidance, or at the community level due to actions by the government.

Regarding the project objective, while monitoring of the Pilcomayo River was strengthened and the implementation infrastructure for technology development and research to reduce pollution load was established, these outputs were not reflected in the administration of the Departmental Government of Potosi. In addition, regarding the overall goal, the impact concerning specific actions at the administrative, mining operator and community level to prevent water pollution caused by mining have not been manifested. The frequent personal replacements gave serious negative impact on the definition of the position and role of CIMA, and the effectiveness and impact of the project.

In conclusion, the effectiveness of this project is low.

3.3 Efficiency (Rating: ①)

3.3.1 Inputs

The planned input for this project and results are outlined in the table below.

Table 3 Inputs to Project

Inputs	**Plan**	**Actual Performance** (At end of project)
Japan Side Inputs		
(1) Experts	• 5 long-term experts • About 20 short-term experts	• 9 long-term experts • 26 short-term experts
(2) Trainees received	Two trainees per year	Total of 15 trainees
(3) Third Country Training	Not specified	Total of 9 trainees

Inputs	Plan	**Actual Performance** (At end of project)
(4) Equipment	Approx. 120 million yen	Approx. 115 million yen
Total Project Cost	Total 520 million yen	Total 990 million yen
Bolivia Side Inputs		
(1) Counterparts	11 persons	14 persons
(2) Provision of Facilities	Existing facilities renovated and used	Land/facilities provided, laboratory building improvement work, infrastructure
(3) Project Operating Expenses	Approx. 160 million yen	Approx. 83 million yen
(4) Other	None	Procurement of reagents, materials and equipment

Source: Information provided by JICA

3.3.1.1 Elements of Inputs

(1) Dispatch of Experts

During the main project period, four long-term experts were dispatched in the fields of chief advisor, chemical analysis and environmental surveys, and 22 short-term experts were dispatched in the fields of environmental policies, chemical analysis, environmental surveys, wastewater treatment, and improvement of ore processing skills. As a result of the need to replace experts due to difficulty in adapting to the high altitude and delay of the dispatch of experts, the selection of equipment for chemical analysis delayed resulting in a delay in the transfer of technology in this field.

During the extension period, four short-term experts were dispatched in the fields of chemical analysis and self-reliant growth planning.

There was a concentrated dispatch of short-term experts in the chemical analysis field in which activities had been delayed in particular, and it is considered that the quality and timing of dispatch of experts during the extension period were both appropriate due to the fact that the transfer of the planned technology was completed.

(2) Acceptance of Trainees

A total of 15 trainees were sent to Japan. Trainings focused on the themes that could only be learned in Japan (mainly Japanese administration to prevent pollution caused by mines, technology to prevent pollution caused by mines). However, it was difficult for the trainees to use the knowledge and technologies learned in Japan in the practical operations, due to the diverse range of fields and differences in the environmental administration systems in Japan and Bolivia.

A total of nine trainees were sent to a third country for training (Chile) during the main project period and extension period. They participated in training on analysis of harmful components in solid specimens (mineral ore, tailings, and soil), analysis of water samples, cyanide analysis, and environmental administration seminar. In particular, since the analysis of harmful components in solid specimens was not a field to receive Japanese expert dispatch, CIMA learned the technology during training programs in the third country.

(3) Provision of Equipment

Delays in the dispatch of Japanese experts and delays in procurement procedures on the Bolivia side caused a delay in activities concerning the chemical analysis field. Furthermore, although the type and quality of equipment were appropriate for the most part, equipment did not function correctly due to the high altitude (Potosi is at an altitude of approximately 4,000m).

3.3.1.2 Project Cost

With respect to the planned project cost of 520 million yen, the actual project cost amounted to 990 million yen, exceeding the plan by a large amount (190% of plan). The reason of this exceed was that the project objective was not achieved as originally planned, resulting in the project period being extended for two years, and this caused an increase in various expenses due to the dispatch of more experts and acceptance of more trainees.

3.3.1.3 Period of Cooperation

With respect to the planned cooperation period of 60 months, the actual cooperation period was 84 months, exceeding the plan by a significant period (140% of plan). The reason the cooperation period exceeded was a delay in the dispatch of experts by Japan side and delay in the procurement of equipment on the Bolivia side. Because of those circumstances, transfer technology had not been completed in the established project period.

In the circumstances, the efficiency of this project is low since the amount of project cost and cooperation period both significantly exceeded the planned values.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy towards the Project

There have not been any changes in mining and environmental policies in Bolivia or

the Department of Potosi from the project planning, during the project period or as of ex-post evaluation. In the mining sector development plan of the Ministry of Mining and Metallurgy in the central government, “Reducing Environmental Load” continues to be positioned as an important issue. The Departmental Government of Potosi also continues to position “Prevention and Management of Environmental Pollution” as an important issue in its departmental development plan.

However, the fact that the responsibilities and role of CIMA have not been clearly positioned in the above stated policy system, and a policy system to support CIMA activities do not exist represented an impediment to securing the sustainability of CIMA.

Accordingly, the judgment can be made that the sustainability in terms of the policy system is low.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

The Departmental Government of Potosi and UATF made efforts to establish a new CIMA after the project completed based on the self-reliant growth plan that was formulated during this project for a new CIMA. However, coordination/agreement between the Departmental Government of Potosi and UATF, and the central government (Ministry of Mining and Metallurgy, Ministry of Water Resources, Ministry of Development Planning, and the Presidential Palace) could not be/reached on the identification of the responsible organization and other details required for establishing a new CIMA, and a new CIMA had not been established as of the ex-post evaluation.

As a result of these circumstances, discussions were conducted between the governor of the Department of Potosi and the president of UATF in May 2010 after the project completed that CIMA kept its name and started to be administrated by the UATF, taking into consideration the location of research facilities and equipment (within the Faculty of Mining Engineering at UATF) and the difficulty to allocate staffs continually from the departmental government side. Since then, CIMA has implemented a service system that provides services for environmental monitoring, chemical analysis of water quality, and the wastewater treatment plant with a budget allocated from UATF. A clear policy has not been put forth at CIMA, UATF, the departmental government and other organizations as to whether or not CIMA will continue in the future as a research organization of UATF, or whether it will be reorganized as a new organization capable of self-reliant growth that was an objective of this project.

Accordingly, the judgment is made that the sustainability of the implementing agency in terms of the implementation system is fair.

3.4.3 Technical Aspects of the Implementing Agency

After the project completed, CIMA has been conducting environmental survey and water quality analysis utilizing the technologies acquired during the project not only in the Basin of Pilcomayo River but also out of this basin.

- The Environment Division of the Departmental Government of Chuquisaca located downstream on the Pilcomayo River and the CIMA have been jointly implementing continued monitoring of water quality in the Pilcomayo River (twice a year in dry season and rainy season since 2010).
- CIMA has been carrying out a study at level of TESA (Technical, economical, social and environmental analysis) for Colquechaca Municipality. The project is called Integrate management of the Basin of Colquechaca mine. This basin is not a part of Pilcomayo River.
- Since 2009, municipalities inside and outside of the Department of Potosi and mining operators have subcontracted water quality analysis work (Water quality analysis of river water, well water and wastewater from ore processors and mines. Refer to Table 4 for the results of subcontracted work.)

Table 4 Record of Subcontracting Work Performed by CIMA

Client Breakdown	Municipality/ AAOPS *1	University Student *2	Mining Operator	Private Company Contracted by Mining Operator	Other	Total
2010 *3	2	0	4	2	5	13
2011	5	6	18	15	41	85
2012	19	9	8	14	34	84
2013 *4	5	3	0	1	10	19

Source: CIMA Activity Reports in 2010, 2011 and 2012, interviews of CIMA staff
*1: Potosi Waterworks Authority
*2: Use of chemical analysis laboratory to prepare scientific papers, etc.
*3: Between September – December 2010
*4: Between January – June 6, 2013

Due to the fact that CIMA has increased the number of requests to perform subcontracting of chemical analysis as shown in the table above, CIMA's technical level has been achieved at the level that can obtain certification as an officially certified center for chemical analysis of water quality. In addition, UATF made the decision in May 2013 to allocate the budget required for the procedures for approval of CIMA as a chemical analysis research institute.

Furthermore, the need for mineral ore analysis in the mining sector has increased in recent years, and in response to these needs, CIMA has been making efforts to enhance the level of skills, such as all of the chemical analysis laboratory three staff voluntarily attending training concerning usage procedure of equipment that has been procured from

equipment suppliers.

Regarding the field of mine wastewater treatment, design of an acidic water treatment plant for the Colquechaca City in the northern part of the Department of Potosi and water quality monitoring which were started during the project period have been performed on an ongoing basis after the project completed, and a portion of the skills and knowledge researched during this project is being utilized.

In addition, while basic data on environmental surveys in the mining sector in the Department of Potosi and the surrounding area was almost non-existent before this project started, environmental survey data has been accumulated by CIMA, UATF and the Departmental Government of Potosi through the project. It is expected that these data will be utilized in the future for mining environmental policies, the formulation/implementation of plans for environmental conservation projects and mining sector projects, as well as for environmental monitoring in the Department of Potosi.

Accordingly, the judgment is made that this project has a high level of sustainability in terms of technical capability at CIMA.

3.4.4 Financial Aspects of the Implementing Agency

In the self-reliant growth plan for a new CIMA formulated during this project, it was considered that a new CIMA will be operated and managed based on profits generated by service providing.

However, CIMA has continued to receive a budget allocation from UATF after the project completed as a research center under the jurisdiction of UATF. Accordingly, operation and management based on self-reliant profitability formulated under this project has not been achieved for now.

On the other hand, it is expected that CIMA will be approved as an officially certified research institute for chemical analysis of water quality in the near future, and efforts are being made to build a self-reliant operation and management structure by strengthening/expanding profit-making work in preparation for self-reliant profitability after approval obtained.

The financial status of CIMA since August 2009 is shown in Table 5. Income is derived from the provision of services (90% or more is from chemical analysis, and the remainder is from the collection of samples and measurement of noise).

Table 5 Actual of CIMA's Budget / Income / Expenditure Figures

Year	Budget [*1]	Income	Expenditure
2009[*2]	N/A	51,323	N/A
2010	1,906,953	9,174	1,320,552
2011	2,044,176	54,044	1,025,457
2012	1,027,140	104,944	817,103
2013	Expected to be 1,000,000 or more	N/A	N/A

Source: Materials provided by UATF Planning Office
*1: Amount provided (Excluding 2013)
*2: August and after
Note 1: Since CIMA staff salaries are directly paid from the UATF, they are not included in the budget in the table.
Note 2: Unit is Bs. (Dec. 2009 1Bs=¥12.432, Dec. 2010 1Bs=¥12.252, Dec. 2011 1Bs=¥11.321, Dec. 2012 1Bs=¥12.012, Jun. 2013 1Bs=¥14.742)

Accordingly, CIMA has not achieved self-reliant growing operation and management since the project completed until this ex-post evaluation, but CIMA shows signs of improvement in the operation and management status of the center in preparation for self-reliant profitability in the future. Therefore, the sustainability of the financial status of CIMA is judged to be fair.

CIMA has secured sustainability in terms of the skills for chemical analysis concerning water samples and solid samples as well as environmental surveys, and the sustainability of its financial status is fair. However, due to the fact that the positioning and role of CIMA as a research institute have not been clarified, there are still issues with respect to the policy aspect. Accordingly, the sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The purpose of this project was to enable the Mining Environmental Research Center (Centro de Investigatión Minero Ambiental) (hereinafter referred to as "CIMA") to function as a center that provides support for environmental administration on technical issues in order to strength monitoring activities on water pollution caused by mining operations in Potosi, and the at the same time, the implementation basis of research and technology development for the reduction of pollution load is established in CIMA, and these outputs are reflected on Potosi administration. This goal was relevant to the development policy, development needs of the Plurinational State of Bolivia (hereinafter referred to as "Bolivia") and the ODA policy of Japan from the time of project planning through the time of ex-post evaluation. However, the definition of the "Position and role of CIMA" in environmental administration in the Department of Potosi remained unclear during the planning and implementation of this project and as well as the time of ex-post

evaluation. This resulted in CIMA reaching a point that it can be independently operated and managed as a self-reliant growing research center that was part of the original plan. Therefore, the relevance of this project is fair.

In terms of input, the planned project purpose was not achieved due to a delay in the technology transfer and other factors caused by a delay on dispatch of Japanese experts and delay in the procurement of equipment on the Bolivian side, and the period of cooperation was extended for two years. In addition, the project cost exceeded the planned figure by a significant amount due to the extension of the cooperation period. Therefore, the efficiency of this project is low.

Eight outputs were set when this project was planned, but out of these, “Establishment of center organization” and “Proposal of environmental regulation guidelines” which were indispensable for achieving the project purpose were not achieved at the time of the project completion. Moreover, CIMA is not functioning as a research center that provides scientific support for mining environmental administration in the Department of Potosi thought CIMA has archived the technology level that can afford the environmental administration. This is because it has not been defined the position of CIMA. Therefore, the effectiveness and impact of this project are low.

Regarding the sustainability of the outcome in this project, while CIMA attained a certain level of technical and financial capability, there are still administrative problems related to the positioning of CIMA. Therefore, the sustainability is fair.

Consequently, this project is evaluated to be low.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Approval as Chemical Laboratory

In order to secure a position as an officially certified research institute that can perform chemical analysis of water quality, CIMA has been proceeding with qualification procedures to become a chemical laboratory since January 2013. It is recommended that CIMA will obtain approval as soon as possible.

(2) Clarification of Responsibilities/Role of CIMA and Proactive Utilization

In order to develop a system in which CIMA can be effectively used as a research institute to implement measures to deal with pollution caused by mining in Bolivia, it is essential that the central government, the Departmental Government of Potosi and UATF review, share and clarify the future positioning of the responsibilities/role of CIMA (whether it remains as a center under UATF or it strives to become incorporated, namely, a new research institute, etc.).

In addition, once CIMA has received approval as an officially certified center for chemical analysis, it is recommended that CIMA being proactively utilized as a technical support center for environmental administration by the Departmental Government of Potosi.

4.2.2 Recommendations to JICA

None in particular.

4.3 Lessons Learned

(1) Clarification of Policy Positioning at the Executing Agency

This project was implemented without the responsibilities/role of CIMA being clearly positioned in the national policy of Bolivia or policy of the Department of Potosi from the time the project was planned until the project completed. As a result, vulnerabilities in the policies/organization/system on the Bolivia side with respect to CIMA interfered with the implementation of the project plan.

Therefore, when newly establishing an official research institute like CIMA in a technical cooperation project, it is essential to ensure that the project be started after the responsibilities/role of the said official organization clearly positioned in the policy of the counterpart government.

(2) Project Formation considering Government Policy/Organization System

When the detailed plan for this project was formulated, the administrative policy and legal system in Bolivia for the cooperation field for this project (environment) were in the process of development. In addition, the project was implemented without adequate discussion of improving administrative guidance on pollution caused by mining, which was the project purpose. As a result, there was not a basis for reflecting the outputs of this project in the administration of the Department of Potosi, and since the conditions were not at the stage of forming the mechanism, manifestation of the project purpose was not achieved until current point of time after the project completed.

When a technical cooperation project are planned for cooperation fields which the administrative policy and organization system are not mature, it is necessary to adequately review the potential for achieving the project purpose at the time of the detailed planning for the project.

In addition, when implementing a technical cooperation project when the administrative policy and organization/system of the counterpart government have as yet to be developed, it is essential to include all activities for enhancing the administrative capacity and improving the organizational system of the counterpart government into a

PDM.

(3) Adequate Provision of Equipment for Geographical/Climate Conditions of Project Area

One equipment provided for this project in the Andean uplands where the altitude exceeded 4,000 meters did not functional normally, since the atmospheric pressure was too low.

Therefore, it is essential that the geographical and climate conditions of the project area should be taken into consideration.

Republic of Paraguay

Ex-Post Evaluation of Japanese Technical Cooperation Project

"The Technological Center on Agriculture in the Republic of Paraguay (CETAPAL) Phase II Project"

External Evaluator: Masafumi Ikeno, KRI International Corp.

0. Summary

This project was implemented with the objective of strengthening the functions and enhancing the operation and management system for agricultural technology in order to facilitate self-reliant operations development by the Technological Center on Agriculture in Paraguay (CETAPAR).

Promotion of agriculture in the eastern region of Paraguay through the dissemination of sustainable technology matches the development policies in Paraguay aimed at promoting the development of agricultural communities by strengthening competitiveness, and the ODA policy of Japan which has a primary focus on regional economic development centered around agriculture and enabling farmers of Japanese descent (Nikkei) to put down stable roots, and therefore has a high level of relevance.

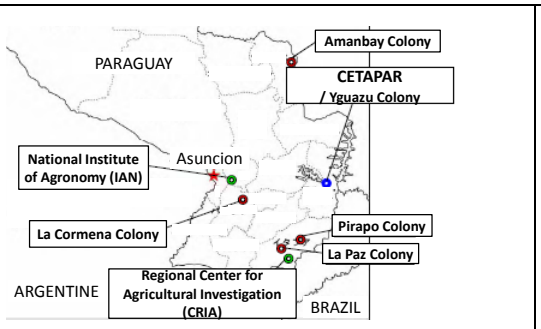
Implementation of this project achieved the prescribed objectives of strengthening the functions of CETAPAR related to agricultural technology and development of an operation and management system. In regard to the overall goal, technology dissemination by CETAPAR contributed to the dissemination of agricultural technology in the eastern region of Paraguay, and it was confirmed that this helped stabilize agricultural production by Nikkei farmers as well as Paraguayan farmers as a whole, and helped boost production capabilities. Therefore, the project had a high level of effectiveness and impact.

The elements input for manifestation of the output were appropriate, and the period of cooperation was within the plan, but the provision of equipment and facilities with the aim of enabling the organization to make a profit after the transfer of operation and management resulted in the amount of cooperation funds actually expended substantially exceeding the planned amount. Therefore, efficiency was fair.

There were no problems with the institutional aspect in related policy, counterpart system, and sustainability of the technology. The financial status of CETAPAR was not good due to investments made with the goal of self-reliant profitability by the third year after the transfer of operation, but improvements in operations are proceeding as a result of the manifestation of investment effects and reorganization of the implementation system. Therefore, the sustainability is fair.

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

1. Project Description



(Project Location)

(Agricultural Engineer in Laboratory)

1.1 Background

The Technological Center on Agriculture in Paraguay (Centro Tecnológico Agropecuaria en el Paraguay: CETAPAR) is located in the Yguazu Nikkei Colony in Alto Paraná Department which is the grain growing region in the eastern part of the Republic of Paraguay (hereinafter referred to as "Paraguay"). CETAPAR integrated demonstration farms in Nikkei colonies that were established in the 1950s, and has provided support over many years by disseminating farming technology to Nikkei farmers as a research and experiment station that has been directly managed by the Japan International Cooperation Agency (hereinafter referred to as "JICA") since 1962.

Efforts have been made to stabilize farming by Nikkei farmers during the 50 years since they immigrated, and as of the beginning of the 21st century, these activities have contributed to the development of agricultural technology for Nikkei farmers, as well as for research institutes under the jurisdiction of the Ministry of Agriculture and Livestock in Paraguay and other Paraguayan farmers. Based on this track record, after discussions with related organizations in Paraguay, JICA made the decision to transfer operation and management of CETAPAR to Nikkei cooperatives in order to facilitate sustainable growth of agriculture in the eastern region of Paraguay and stimulate regional development.

Upon receiving the results of these discussions, JICA reached an agreement with related organizations in Paraguay to implement the Project on "Technological Center on Agriculture in Paraguay (CETAPAR)" from fiscal 2001 to fiscal 2009 with the objective of human resource development at CETAPAR and developing a system of organization that will enable the smooth transfer of operation and management from JICA to Nikkei cooperatives.

The first phase of this technical cooperation project was implemented from fiscal 2001 to fiscal 2004, and the second phase of this technical cooperation project was implemented

from fiscal 2005 to fiscal 2009. In particular, in the second phase which was the subject of this evaluation, actions were implemented with the objective of developing a system for the operation and management of CETAPAR and nurturing of personnel in order to facilitate self-reliant operation of CETAPAR after transfer of operation from JICA to Nikkei cooperatives.

1.2 Project Outline

Overall Goal		Sustainable agricultural techniques are disseminated in the eastern region of Paraguay.
Project Objective		CETAPAR is prepared as foundation of the core center for agricultural development in the eastern region of Paraguay.
Output(s)	Output 1	Sustainable and appropriate techniques of upland crops cultivation will be established for eastern region of Paraguay.
	Output 2	The technical services on stable agricultural production are implemented.
	Output 3	The Center which can provide tests and analyses is registered as a certificated institution.
	Output 4	The management structure to implement new CETAPAR after the transferring is prepared.
Inputs		Japan Side 1. Total of 10 experts dispatched (5 long-term experts, 5 short-term experts) 2. Total of 4 trainees accepted 3. Total of 3 persons trained in third country 4. Provision of equipment: 74.3 million yen 5. Land (Located in Yguazu Colon, Main facility: 115 ha, Branch facility: 56 ha) 6. Facilities: Main building, garage, research wing, greenhouse, seed silo, dormitory, etc. 7. Project personnel: Fiscal 2005: 16 persons, Fiscal 2006: 16 persons, Fiscal 2007: 13 persons, Fiscal 2008: 13 persons, Fiscal 2009: 10 persons 8. Field work expenses: 392.11 million yen Paraguay Side 1. Counterpart allocation 2. Project expenses: 3.47226 billion guaraní (Covered by Central Nikkei Cooperative)

	3. Provided special exemption for dispatched experts and equipment that they brought
Total cost	647.32 million yen
Period of Cooperation	April 2005 – March 2010
Implementing Agency	Direction of Agricultural Extension/ Ministry of Agriculture and Livestock, Central Nikkei Cooperative/Nikkei cooperatives, National Institute of Agronomy (Instituto Agronómico Nacional: IAN), Regional Center for Agricultural Investigation (Centro Regional de Investigación Agrícola: CRIA)
Cooperation Agency in Japan	Ministry of Agriculture, Forestry and Fisheries
Related Projects	JICA Technical Cooperation • "The Project for the Improvement of Vegetable Production Techniques for Small Scale Farmers in Paraguay" (1997 – 2002) • "The Research Project on Soybean Production in Paraguay" (1997 – 2002) • "Project of the Technological Center on Agriculture in the Republic of Paraguay (CETAPAR) (Phase 1)" (2001 – 2004) • "Identification of Soybean Germoplasm with Resistance to the Soybean Cyst Nematode: FENIX" (2005 – 2008) • "Project of Reinforcing Small Scale Farm Co-ops in the Southeast of Paraguay" (2007 – 2010) Other International Agencies, Aid Agencies, etc. • "Comprehensive Studies on the Development of Sustainable Soybean Production Technology in South America" by Japan International Research Center for Agricultural Sciences (JIRCAS) (February 1998 – Continuing as of 2013) • "Technical Support for Improvement of Dairy Skills in Eastern Edge Upland Farming Area in Paraguay (PROMELE)" by Obihiro University of Agriculture and Veterinary Medicine (JICA Partnership Program (Partner Type): June 2011 – Five years)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of Overall Goal

Regarding the overall goal of "Sustainable agricultural techniques are disseminated

in the eastern region of Paraguay.", the evaluation was made that while the increasing usage of CETAPAR can be expected to contribute to the achievement of the overall goal, and there is an upward trend for productivity of the main farm products, there still remains the possibility of decreased output due to the impact of natural disasters.

1.3.2 Achievement of Project Objective

Regarding the project objective of "CETAPAR is prepared as foundation of the core center for agricultural development in the eastern region of Paraguay.", the evaluation was made that the framework for the CETAPAR implementation system had been determined as of the terminal evaluation, and it can be expected to serve as a base of dissemination of agricultural technology to Nikkei cooperatives as well as other persons involved in agriculture in Paraguay, but specific operational rules and procedures need to be formulated.

1.3.3 Recommendations

The following two proposals were made during the ex-post evaluation.

(1) Self-reliant growth of CETAPAR after transfer

Efforts should be made to strengthen the self-reliant growth of CETAPAR to become financially viable after the transfer of operations, as well as continue to flexibly respond to the needs in the eastern region of Paraguay by providing support for technological development, nurturing of human resources, technology dissemination and regional/social contributions, and in turn establish a solid position as an organization that makes a contribution to the region as a whole.

(2) Approach to maintaining and upgrading technology

Due to the fact that it is difficult to secure useful personnel again after they have left, it is important to implement measures to retain personnel to which technology has been transferred, and to have an ongoing human resource development program in order to maintain and upgrade the level technology that has been established, and to promote coordination of efforts with related organizations.

2. Outline of the Evaluation Study

2.1 External Evaluator

Masafumi Ikeno (KRI International Corp.)

2.2 Duration of Evaluation Study

The following survey was conducted for this ex-post evaluation.

Study Period: December 2012 – December 2013

Field Study: March 9 – March 26, 2013, May 27 – June 4, 2013

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Paraguay

When the project started at the beginning of the 21st century, the Paraguay government had a national policy of positioning "Economic development through the strengthening of competitiveness" as a priority issue. During and after the period of project cooperation, "Boosting Agricultural Productivity" and "Upgrading Technical Services" were positioned as priority issues in the "2009 – 2018 Strategic Framework for Agriculture" in order to promote agriculture.

There was no change in the importance of the development policy of Paraguay from the start to the end of the project, with promotion of agriculture always being positioned as a priority issue. Accordingly, the judgment can be made that the promotion of agriculture with the objective of facilitating the dissemination of sustainable agricultural technology implemented under this project matches the Paraguayan side development policy needs.

3.1.2 Relevance with the Development Needs of Paraguay

The government of Paraguay positioned the promotion of agriculture in the eastern region of Paraguay where grain is grown as an important issue. In addition, the promotion of agriculture which is a major industry in the eastern region of Paraguay contributes to improving the livelihood of farmers in this region. Above all, for Nikkei farmers who are striving to establish a system that facilitates the self-reliant growth of agriculture after reaching the stage where farm operation has stabilized, there have been strong requests for the functions of CETAPAR to be strengthened for which operation and management will be fully transferred from JICA in 2010.

Under these circumstances, the judgment can be made that the farming technology and dissemination of farming information provided by CETAPAR which have been the goals of this project contributed to the promotion of agriculture in the eastern region of Paraguay, and matched the development needs of Paraguay.

3.1.3 Relevance with Japan's ODA Policy

"Strengthening the economic competitiveness to adapt to the age of competition inside and outside the Mercosur region" which was stipulated in the Country Assistance

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

Plan for Paraguay from Japan has been a priority area in Japan's ODA policy for Paraguay. In addition, support was implemented as part of the project to stabilize and solidify the livelihood of Nikkei immigrants.

Consequently, the judgment can be made that this project matches Japan's ODA policy.

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

3.2 Effectiveness and Impact [3] (Rating: ③)

3.2.1 Project Outputs[4]

3.2.1.1 Project Output

(1) Output 1 "Sustainable and appropriate techniques of upland crops cultivation will be established for eastern region of Paraguay."

As shown by the activity track record outlined below, implementation of this project can be judged to have developed/demonstrated techniques of upland crops cultivation suited to the characteristics of each area in the eastern region of Paraguay.

- There are differences in the cultivation environments in the five regions where the respective Nikkei cooperatives are located (soil characteristics, cultivated breeds, agro-meteorological conditions, etc.), making it difficult for farmers in the other four regions where the Nikkei cooperatives are located to utilize all technology developed/demonstrated in the Yguazu Colony where CETAPAR is located. However, technology/information that can be utilized taking the agricultural environment (weather, soil characteristics, cultivated crops, breeds, etc.) and operation environment (cultivation scale, costs, amount that can be invested, etc.) into consideration is being used by farms.
- No-till farming has been a cultivation technology that was established in the Yguazu Colony by the JICA migration project since before this project was started, and the demonstration/dissemination activities conducted during this project have spread throughout Paraguay. According to the Federation of Production Cooperatives (FECOPROD) that integrates 33 cooperatives in Paraguay, no-till farming has been adopted by over 90% of farms.
- According to a survey of recipients (Conducted in March 2013: 100 randomly selected

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

[4] During evaluation of this project, the effectiveness is judged by the level of achievement when the project ends, but for convenience purposes, information on items after the project ends may also be described.

Paraguayan farmers in region surrounding Yguazu), opportunities for agricultural training are available in Paraguay to a certain extent, and Paraguayan farmers have a high amount of desire to enhance their farming technology. Under these circumstances, two thirds or more of farmers in the Yguazu region are utilizing the farming technology and farming information received from CETAPAR or Nikkei cooperatives.

Table 1 Beneficiary survey in Region Surrounding CETAPAR

(a) Desire to Boost Level of Agricultural Technology	(b) Opportunities to Receive Training in Agriculture	(c) Utilization of CETAPAR/Nikkei Cooperative Technology
1. High (88%)	1. Adequate (41%)	1. Use extensively (68%)
2. Low (11%)	2. Minimal (41%)	2. Use a portion (26%)
3. Not Needed (1%)	3. Almost none (18%)	3. Hardly use at all (3%)
		4. Do not know (3%)

Source: Beneficiary survey conducted in March 2013 (Questionnaire of 100 farmers in areas surrounding CETAPAR)

(2) Output 2 “The technical services on stable agricultural production are implemented.”

As shown by the activity track record outlined below, implementation of this project can be judged to have enabled the provision of farm support services to facilitate stable agricultural production in the eastern region of Paraguay.

- Regional traveling instruction in line with the regional characteristics of each Nikkei cooperative and needs of farmers was periodically implemented as part of the farm support services. Traveling instruction was suspended after the end of the project due to inadequate funds and personnel, but a service system has been created under which CETAPAR engineers can respond to inquiries from Nikkei farms made by mobile phone or e-mail.

Table 2 Times Regional Traveling Instruction Implemented

Nikkei Cooperative	2005	2006	2007	2008	2009
Yguazu	5	9	13	9	7
Pirapo	3	12	10	9	6
Amambay	2	1	4	-	1
La Paz	3	11	10	9	6
Colmena / Asunsena	1	3	3	4	3
Total	14	36	40	31	23

Source: CETAPAR

- Agricultural technology workshops were conducted periodically in accordance with the production characteristics and needs of farmers in each Nikkei cooperative as one farm support service.

  In the period after the project ended, workshops have been held twice a year (summer crop and winter crop) on an ongoing basis at the CETAPAR facility. Basically, the system consists of the engineers/extension workers coming to workshops at CETAPAR,

and these individuals relaying the knowledge they have acquired to the members of each cooperative. Work on rotation of agriculture and livestock has been handed over to the PROMELE project (JICA Partnership Program (Partner Type)). Work on growing of vegetables and fruit has been suspended due to insufficient CETAPAR funds/personnel, but high expectations have been voiced for the resumption of the workshops by the Colmena/Asunsena Nikkei Cooperative and small-scale horticultural farms which mainly grow vegetables and fruit.

Table 3 Workshop Items and Participation Results for Each Nikkei Cooperative

Nikkei Cooperative	Summer Crop	Winter Crop	Vegetables	Agriculture/ Livestock Rotation
Yguazu	○	○	-	○
Pirapo	○	△	-	△
Amambay	○	△	-	○
La Paz	○	○	-	-
Colmena / Asunsena	-	-	○	-

Note: ○: 30% or higher participation, △: 25% participation, X: 20% or lower participation, -: Not applicable
Source: Project Completion Report

- Opportunities/various means such as regional traveling instruction, workshops, provision of services, test result reports, publications by each Nikkei cooperative and the internet were utilized during the project and are being utilized after the end of the project to periodically provide farming technology/farming information acquired by CETAPAR to the members of the respective Nikkei cooperatives.

  In addition, the trend for mobile phones and e-mail to be utilized as the dissemination means to relay the information has been increasing in recent years. Thus, technology/information originating at CETAPAR that is disseminated to Nikkei cooperative members such as application of fertilizer and soil improvement based on soil diagnosis/analysis is being put into practice by many Nikkei cooperative members (usage ratio of soil diagnosis service among Nikkei cooperative members during the project period reached approximately 90%).
- As part of CETAPAR project activities, organizations related to the Ministry of Agriculture and Livestock, producer’s associations and other organizations in the area surrounding CETAPAR periodically held technical training for small-scale farms. In addition, Paraguayan technology extension workers and small-scale farmers visited CETAPAR on a daily basis to receive the technical instruction as appropriate.

  After the project ended, the dissemination activities were reduced due to insufficient CETAPAR budget/personnel, and technology dissemination activities for small-scale farms in the surrounding region have been suspended.

Table 4 Workshops Held for Paraguayan Farmers

Fiscal Year	No. of Workshops
2005	4
2006	4
2007	8
2008	4
2009	4

Source: Project Completion Report

(3) Output 3 “The Center which can provide tests and analyses is registered as a certificated institution.”

As shown by the activity track record outlined below, under the system that was created by the end of this project, CETAPAR was certified as an officially certified organization that can provide various services before/after the transfer of operation/management, and this has contributed to the expansion of the service business which is the core of operations that earn a profit. Therefore, the judgment can be made that CETAPAR has the capability as an officially certified organization to perform testing/analysis, and been registered as such.

- By the end of the project, CETAPAR acquired official certification in the seed testing, fertilizer component analysis, breed registration testing, crop disease and pest testing and insecticide effect testing fields.

  The level of technology acquired during this project was further upgraded by technical follow-up by JICA senior volunteers and other efforts after the project ended, resulting in the acquisition of official certification for agricultural chemical component analysis, soybean seed recombinant gene mix rate testing and virus testing.
- As a result of the transfer of the appropriate technology to multiple engineers deployed for each type of testing/analysis work, a technology system was created under which various types of official certification can be acquired.

  While some of the engineers that were trained during the project period left after the project ended, new engineers have been hired, and the technological level as an officially certified organization is being maintained.
- During the project period, the preparatory committee of Nikkei-CETAPAR Foundation served a central role in the preparation of the operation and management plan related to certification work, as well as in the preparation of work implementation manuals related to seed testing, fertilizer component analysis, breed registration testing, crop disease and pest testing and insecticide effect testing, creating a system that clearly indicated the procedure for the implementation of certification work.

  In addition, revision and modification have continuously been performed after the

project ended, and plans have been made for work implementation manuals to be newly prepared for agricultural chemical component analysis, soybean seed recombinant gene mix rate testing, seed virus testing and other such fields.

(4) Output 4 “The management structure to implement new CETAPAR after the transferring is prepared.”

As shown by the activity track record outlined below, with the cooperation of the preparatory committee of Nikkei-CETAPAR Foundation, CETAPAR for the most part created a work implementation system for operation and management with the goal of self-reliant profitability after the transfer of operation, but the judgment can be made that a more detailed review of the profitability plan than completed during the project period should be conducted.

- The preparatory committee of Nikkei-CETAPAR Foundation played a central role until the end of the project in the formulation of profitability plans and annual plans related to seed production, analysis work and certification work. The CETAPAR Foundation has continued to formulate these plans every year after the project ended.

  In addition, with respect to strengthening of cooperation with other cooperatives in Paraguay which was proposed in the above plan, following a period of observer status, the decision was made to have a federation of three cooperatives (consisting of the Central Nikkei Cooperative, FECOPROD (Federation of Production Cooperatives) and UNICOOP) jointly perform operation and management of CETAPAR. During the ex-post evaluation, the articles of incorporation, plans and other document were changed, and work is proceeding on the preparation of an implementation system under the new framework. Furthermore, in regard to seed production which was positioned as one of the profit making businesses for the organization after the transfer of operation, the judgment was made that it was not possible for operations to be profitable when services are only provided to Nikkei farms (difficulty in securing seed sales channels, high cost of seed silo operation, etc.) during the three years of experience after the transfer of operation, and seed production has been implemented for both Nikkei farms and Paraguayan farmers from April 2013 under the new framework.
- With respect to engineers for certified fields other than described above, there was a temporary backlog in work due to the resignation of some seed production engineers, but the required personnel have been secured by hiring personnel after this, and work has been implemented after that without any problems.
- During the project period, the preparatory committee of Nikkei-CETAPAR Foundation played a central role in the preparation of the operation and management plan for

operation after transfer, as well as in the preparation of work implementation manuals related to seed production and soil analysis, creating a system that clearly indicated the procedure for the implementation of work after the transfer of operation.
In addition, revisions and other changes have been made continuously after the project ended, and work is proceeding for feed analysis under the PROMELE project.

3.2.1.2 Achievement of Project Objectives

Upgrading of facilities/equipment at CETAPAR, development/demonstration of faming technology and nurturing of human resources were completed by the end of the project, the operation/management and technology dissemination systems for CETAPAR after transfer were formulated, achieving for the most part the project objective of “CETAPAR is prepared as foundation of the core center for agricultural development in the eastern region of Paraguay”.

(1) Recognition

Indicator 1: “CETAPAR is recognized as an agriculture promotion organization in the eastern region of Paraguay.”

As the only agricultural testing organization in Paraguay that is capable of providing impartial high-quality services, it is widely recognized as an agriculture promotion organization in Paraguay that is promoting project activities by concluding mutual cooperation agreements with related official organizations in Paraguay (National Service for Plant and Seed Quality and Health (SENAVE), School of Agricultural Sciences at the National University of Asuncion, etc.) and related organizations (Chamber of Producers and Exporters of Cereals and Oilseeds (CAPECO), etc.), implementing testing on consignment by persons involved in agriculture, acquiring various types of official certification, implementing various analysis/testing work, and implementing small farm support activities.

Indicator 2: “Effectiveness of CETAPAR after transfer is recognized by 50% or more of Nikkei cooperative members.”

During this project, activities tailored to CETAPAR operation were started in the second year after the project commenced. In addition to concerned personnel at CETAPAR, the participation of the members of the respective Nikkei cooperatives was obtained, and the effectiveness of these activities was widely recognized in the operation plan presented at the respective Nikkei cooperative general meetings that were held in February 2010 before the project ended as a result of transfer preparation work that was performed, and the approval of CETAPAR was obtained after the transfer

of operation.

(2) Functionality

Indicator 1: “25% or more Nikkei cooperative members use some type of CETAPAR service.”

Farms that used only soil analysis service exceeded 88% as of the evaluation at the end of the project.

Indicator 2: “Number of Times Technical Services Provided to Farms Other Than Nikkei Cooperative Members”

By the time the project ended, CETAPAR had provided service to farms other than Nikkei farms for analysis work a total of 6,196 times.

Table 5 Times Service Provided to Farms Other Than Nikkei Farms

Analysis Item	By Time Project Ended (From Latter 2007)
Soil Analysis	2,268
Fertilizer Component Analysis	1,478
Seed Testing	1,256
Lime Analysis	12
Feed Analysis	574
Disease Diagnosis	225
Protein Content	66
Root Nodule Bacterium	15
Total	6,196

Source: CETAPAR

(3) Institutional Arrangements

Indicator 1: “Operational rules and procedures after transfer”

Operational rules and procedures for after the transfer of operation were drafted as part of the activities conducted during this project, and when the transfer application was submitted to JICA in May 2008, a basic operation and project plan proposal for after the transfer of operation was submitted to JICA at the same time. The “preparatory committee of Nikkei-CETAPAR Foundation” was started up in June 2008 to take over these activities, and began concrete preparation of specific proposed operational rules and procedures to facilitate self-reliant operation and management based on the organization making a profit. Although the operational rules and procedures had not been formulated by the time the project ended, work is proceeding on the formulation of operational rules and procedures since the project ended/after transfer of operation.

In addition, in consideration of the strengthening of cooperation with other cooperatives in Paraguay which was proposed in the above plan, following a period of

three years of observer status, operation and management was transferred to joint operation by a federation in April 2013 that included the FECOPROD and UNICOOP cooperative federations in Paraguay, and the operational rules and procedures are being revised.

Indicator 2: “Operation and management plan (organization diagram, personnel positioning, budget)”

The preparatory committee of Nikkei-CETAPAR Foundation served a central role in the formulation of an operation and management plan. An annual operation plan has been formulated every year after the transfer of operation, and approval of the plan is obtained at the annual general meeting.

Indicator 3: “Above indicators approved by organization to which operation has been transferred”

Approval for ongoing CETAPAR business was obtained from the Nikkei cooperatives at the respective annual general meetings of the Nikkei cooperatives in February 2010.

As stated above, the expected effects resulting from implementation of this project for the most part achieved the level of objectives by the time the projected ended, and contributed to achievement of the project objectives. Therefore, the project can be judged to have had a high level of effectiveness as of the time the project ended.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

Overall Goal: “Sustainable agricultural techniques are disseminated in the eastern region of Paraguay.”

(1) Indicator 1 “Productivity of main agricultural and livestock products is consistently maintained in the eastern region of Paraguay at or higher than the base year level of 2010.”

Limited to the three years after the project ended, due to the fact that there was a drop in yields due to droughts and other abnormal weather, it is difficult to compare the transition using 2010 as the base year, but compared to productivity before the project (Data from Ministry of Agriculture and Livestock), it was confirmed that soybean yield per unit area which is a core agricultural product in eastern region of Paraguay increased from 2,020 kg/hectare in 2004 to 2,962 kg/hectare in 2011. In particular, no-till farming technology for soybeans which has been developed/promoted by

CETAPAR / Nikkei cooperatives has been accepted by farms throughout Paraguay, and has been recognized among people involved in agriculture in Paraguay as having made a large contribution to increasing soybean productivity.

3.2.2.2 Manifestation of Effects After Project Ended

Due to the limitation that CETAPAR is not an organization that serves the role of an official testing station in the eastern region of Paraguay after the end of the project/transfer of operation, CETAPAR itself does not have a system for the dissemination of technology throughout the eastern region of Paraguay.

However, the test result reports, technical manuals and other farming technology/farming information originating from CETAPAR is being disseminated throughout the eastern region of Paraguay. In addition, various services such as soil/agricultural chemical analysis that are being selectively expanded by CETAPAR through persons involved in agriculture from which work is consigned, and CETAPAR testing results/agricultural technology are being indirectly disseminated to farms in the eastern region of Paraguay which are their customers.

The main effects of business are being manifested as described below.

(1) Technical Instruction as High-Quality Officially Certified Organization

The level of technology acquired during the project has been further upgraded by technical follow-up by JICA senior volunteers and other efforts after the project ended, resulting in the acquisition of official certification for agricultural chemical component analysis, soybean seed recombinant gene mix rate testing and virus testing. According to persons involved in agriculture in Paraguay, CETAPAR is recognized as a certified organization with a high level of trust that performs certification with one of the highest levels of accuracy out of the various certification organizations in Paraguay. Thus, sustainable growth as an officially certified organization has been widely recognized by persons involved in agriculture in Paraguay, and the number of times service is being provided to persons involved in agriculture in Paraguay is increasing.

Simultaneously, persons involved in agriculture in Paraguay that have subcontracted analysis services to CETAPAR are receiving instruction on farming technology such as application of fertilizer and pesticide application based on the certification results in addition to receiving certification services from CETAPAR. In other words, persons involved in agriculture are receiving the advice on the appropriate agricultural technology in accordance with the individual farming environment and putting it into practice on farms as a result of the services provided by CETAPAR.

Table 6 Number of Times Service Provided to Paraguayan Farmers

Analysis Item	Until Project Ended (Total Number in 2-1/2 Years from Latter 2007)	After Project Ended (Total Number of Times Service Provided, Including Nikkei Farms)	
		Fiscal 2011	Fiscal 2012
Soil Analysis	2,268	2,905	1,664
Fertilizer Component Analysis	1,478	497	565
Seed Testing	1,256	2,449	2,192
Lime Analysis	12	58	62
Feed Analysis	574	64	31
Disease Diagnosis	225	228	184
Protein Content	66	447	230
Root Nodule Bacterium	15	486	597
Total	6,196	7,134	5,525

Note: According to CETAPAR, due to the fact that the details of service provision results in each fiscal year until the project ended and service provision results for Nikkei farms / Paraguayan farms respectively are not known, the following inferences were made.

- When the service provision results until the project ended were simply annualized, service provision results for Paraguayan farms amounted to a yearly average of 2,478 times.
- According to CETAPAR, due to the fact that the ratio of service provision results to Paraguayan farmers in fiscal 2011 and fiscal 2012 exceeded a majority of the total number of times service was provided, the service provision results for Paraguayan farms amounted to a minimum yearly average of over 3,567 times (fiscal 2011) and over 2,763 times (fiscal 2012).
- Therefore, the inference can be made that service provision results to Paraguayan farmers increased after the project ended.

Source: CETAPAR

(2) Growth of Agriculture through Analysis Services

During the project period, as an official testing station, CETAPAR implemented activities to promote growth of agriculture such as traveling instruction and model farm fields, with the objective of boosting the technological level of specific farm groups, with a focus on Nikkei farms.

On the other hand, after the project ended, during the process of transitioning to an operations system where there is a focus on analysis service to facilitate self-reliant profitability of CETAPAR which became a private sector company, a portion of the dissemination techniques established in the project were continued, and an approach was implemented where there is a focus on the dissemination of agricultural technology through the provision of analysis services as an officially certified organization.

Although there has been this type of changeover, as stated above, the number of persons involved in agriculture that are receiving instruction on agricultural technology from CETAPAR through the provision of high quality analysis serves as an officially certified organization is increasing, and it continues to contribute to the

growth of agriculture in Paraguay.

(3) Dissemination to Paraguayan Farmers

According to the results of the recipient survey (of 100 farmers in area surrounding CETAPAR) that was conducted in March 2013 as part of this ex-post evaluation, while Paraguayan farmers in the area surrounding CETAPAR have an extremely high level of desire to boost their level of agricultural technology, the majority of farmers do not have access to an agricultural technology dissemination system that consists of training and other activities.

Due to these circumstances, 90 percent of more of the farmers in the area surrounding CETAPAR utilize farming technology and farming information received from CETAPAR or Nikkei cooperatives. Furthermore, they have high expectations that CETAPAR will hold an increased number of seminars and other such events to provide more opportunities to learn agricultural technology.

Table 7 Beneficiary survey in Region Surrounding CETAPAR

(a) Desire to Boost Level of Agricultural Technology	(b) Opportunities to Receive Training in Agriculture	(c) Utilization of CETAPAR / Nikkei Cooperative Technology
1. High (88%)	1. Adequate (41%)	1. Use extensively (68%)
2. Low (11%)	2. Minimal (41%)	2. Use a portion (26%)
3. Not Needed (1%)	3. Almost none (18%)	3. Hardly use at all (3%)
		4. Do not know (3%)

(d) Future Expectations for CETAPAR	
1. None in particular	(2%)
2. Do not know	(1%)
3. More seminars and other events	(74%)
4. Increase amount of information provided	(5%)
5. Increase services provided	(18%)
6. Other	(0%)

Source: Beneficiary survey conducted in March 2013 (Questionnaire of 100 Paraguayan farmers randomly selected in areas surrounding CETAPAR)

Thus, the dissemination of agricultural technology by CETAPAR helped maintain stable production volume of the main grains in the eastern region of Paraguay, and the joint operation and management system with two cooperative federations in Paraguay which was implemented from April 2013 is starting to result in further direct and indirect dissemination to these cooperative members and farmers in the surrounding areas.

3.2.2.3 Other Impacts

(1) Growth of Agriculture through Training

During implementation of this project, and after the project ended/operation was

transferred, CETAPAR which is located in Alto Paraná Department has accepted students from the schools of agriculture at universities inside and outside the department for help in preparation of their dissertation, as well as persons from Nikkei cooperatives, successor members and other persons for training. This has resulted in increased recognition of CETAPAR, and dissemination of the technology and information that is available from CETAPAR by the trainees to farms inside and outside Alto Paraná Department.

(2) Negative Impact

This project has not had a negative impact on the natural environment, cause resettlement of residents or any problems involved with site acquisition during the project period or after the project ended.

As stated above, CETAPAR was prepared as foundation of the core center for agricultural development in the eastern region of Paraguay, which was set as the project objective. In addition, it was verified that sustainable agricultural techniques were disseminated in the eastern region of Paraguay, which was the overall goal. This project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Inputs	**Plan**	**Results** (At End of Project)
(1) Experts	• Long term experts: 2 • Short term experts: 2-3 per every year	• Long term experts: 5 • Short term experts: 5
(2) Trainees Received	1–3 trainees every year	• Total: 4 trainees
(3) Third-Country Training Programs	1–3 trainees every year	• Total: 4 trainees
(4) Provision of Equipment	3 million yen/year (Total 15 million yen)	63.98 million yen
Total Project Cost	Unknown	Total: 647.32 million yen
Total Local Cost	None	Total 3.4 billion guaraní

3.3.1.1 Elements of Inputs

(1) Japan side input

1) Dispatch of experts

The number of long term experts was increased by one in accordance with progress of the project, but this did not represent a problem in particular for project operation and management. The quality of the long term experts and timing were nearly

appropriate.

Dispatch of short term experts was also performed in an effective manner.

2) Acceptance of trainees

The content, period and timing for training in Japan and third country training were appropriate, and the results of training were utilized in work after training, making this an effective input. Due to these effects, one trainee more than planned was added for each type of training.

3) Provision of equipment

The types of equipment, quantity, quality and timing of provision were appropriate, and for the most part the equipment was effectively utilized for project activities, contributing to the obtaining of approval as a certified organization for soil diagnosis, pesticides and other matters. Furthermore, due to the fact that facilities/equipment needed to be updated/new equipment procured in order to obtain approval as a certified organization, such as gas chromatograph related equipment for agricultural chemical component analysis and equipment for a produced seed silo, the actual cost of the equipment exceeded the budget allocated in the plan.

In addition, transfer of facilities and equipment from JICA to CETAPAR when the project ended was conducted in a smooth manner. However, the seed production facilities did not meet the planned profitability projections. Therefore, the usage methods in fiscal 2013 and after are being reviewed under the new CETAPAR system.

(2) Paraguay Side Input

1) Counterpart allocation

The respective Nikkei cooperatives deployed an appropriate number and quality of counterparts during the project period, and these counterparts made a large contribution to project activities designed to provide the necessary capabilities after the transfer of operation after the project ended, as well as to project operation and management.

2) Covering of local costs

The Central Nikkei Cooperative and respective Nikkei cooperatives made investments to cover expenses not covered by the plan, making a large contribution to project activities designed to provide the necessary capabilities after the transfer of operation after the project ended, as well as to project operation and management.

3.3.1.2 Project Cost

The actual cooperation sum was 647.32 million yen with respect to a planned cooperation sum of 400 million yen, significantly exceeding the planned amount (162% of planned amount).

The reason that the actual cooperation sum exceeded the planned cooperation sum for the project consisted of increased expenses for the provision of equipment and construction of facilities with the goal of facilitating operation and management based on self-reliant profitability after the transfer of operation.

3.3.1.3 Period of Cooperation

The actual cooperation period was 60 months with respect to planned cooperation period of 60 months (100% of plan).

As stated above, while this project was completed within the planned period, the cooperation sum exceeded the planned sum. Therefore, efficiency of the project was fair.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy towards the Project

The agricultural policy of the Paraguay government did not change while this project was being planned, during the project period and at the time of the ex-post evaluation. The government continues to consider promoting the expansion of agricultural production in the eastern region which is the breadbasket of Paraguay an important issue.

On the other hand, according to Nikkei cooperatives and members of other agricultural cooperatives in Paraguay, while an official agricultural technology dissemination system and certified organizations exist in Paraguay, the level of trust in the technology and analysis results is not high among Nikkei farmers and Paraguayan farmers.

Under this type of policy system, the effects of the dissemination of farming technology/farming information and the project implemented by CETAPAR will boost sustainability. In addition, people have even high expectations for the important role that CETAPAR serves as a semi-official agricultural technology dissemination organization and certified organization.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

Based on the implementation system that was planned/developed during this project, operation and management of CETAPAR was formally transferred to the CETAPAR Foundation that was established/is supervised by the Central Nikkei Cooperative from JICA in April 2010. CETAPAR has been operated and managed under the CETAPAR Foundation for three years since the transfer, and operation and management of the

CETAPAR Foundation was transferred from independent management by the Central Nikkei Cooperative to joint operation and management by three cooperative federations in April 2013, including the FECOPROD and UNICOOP cooperative federations in Paraguay. This change in the organization structure is expected to strengthen operation and management by increasing the sources and amount of funds, increase revenue from subcontracted services by increasing the number of members, strengthen cooperation with agricultural related organizations in Paraguay, and bring about other benefits. In addition, expectations for CETAPAR from cooperative federations in Paraguay consist of the provision of highly reliable agricultural services and strengthening of dissemination services. Due to the increase in the opportunities for Paraguayan farms other than Nikkei farms to receive CETAPAR services as a result of this change in the operation and management structure, it is expected that this will increase the productivity of farms in Paraguay in the future, and contribute to an improvement in the income level of farms.

As of June 2013, CETAPAR had 22 formal employees, consisting of one station manager, two assistant managers, four clerical staff, one person in the technology/project division, six staff in the laboratory, six staff working at the farm and two staff in charge of PROMELE issues (There were 19 staff when the project ended). Although some of the staff that were trained during this project quit after the project ended, new technical staff with the appropriate technical skills have been hired, maintaining the implementation system for testing/service work without any problems. However, the cost of personnel expenses for work that does not generate revenue is high, making it an issue that should be reviewed in the future.

As stated above, efforts are proceeding to keep and expand staff under a suitable operation and management system. Therefore, the judgment can be made that the sustainability of the counterpart implementation system is high.

3.4.3 Technical Aspects of the Implementing Agency

In regard to effectiveness, various service works centered around soil/agricultural chemical analysis that were nurtured during this project are continuing to be provided after the project ended, as described in the output section. Some of the engineers that were nurtured during the project quit (salaries/other treatment conditions that were pointed out at the time of ex-post evaluation after the transfer of operation were improved, but the poaching of personnel/changing of jobs by talented agricultural engineers in Paraguay is common and is not limited to CETAPAR), which led to a period when there was a backlog in subcontracting services such as soil analysis, but the hiring of new personnel and other measures have enabled the same level of services to be provided as during the project. Acquisition/renewal of certification by an external certification organization has secured a

certain technological level as a certified organization.

The ability to provide high quality subcontracting services and technological level are recognized by Nikkei farms, as well as agricultural research institutes, agricultural administration agencies, agricultural equipment companies, famers and other persons involved in agriculture in the eastern region of Paraguay. Simultaneously, in order to maintain and upgrade its technological level, equipment is being updated/maintained, experts are being sent after the project ended from Brazil, Argentina and other neighboring countries, and CETAPAR engineers are undergoing unscheduled overseas training etc. on an ongoing basis.

As stated above, the judgment can be made that CETAPAR is adequately using the technology that was transferred during project implementation. Therefore, the technical sustainability is high.

3.4.4 Financial Aspects of the Implementing Agency

The important investigative research that has been accumulated over many years and significant social contribution to regional society made by the Nikkei immigrants are being utilized to perform operation and management as a private sector company with the objective of self-reliant profitability, although there remain some issues as a testing organization that make it difficult to become profitable after the transfer of operation.

According to CETAPAR/the Central Nikkei Cooperative, the balance of income and expenditures for three years after the transfer of operation consisted of 23.37 million guaraní in income (approximately 60.41 million yen) and 30.48 million guaraní in expenditures (approximately 78.79 million yen), resulting in a negative balance of 7.11 million guaraní (approximately 18.38 million yen). Operations have been in the red for the following main reasons, but investments/contributions by the Central Nikkei Cooperative and Nikkei cooperatives have been made to compensate for the loss.

- Continuing expenditures for work as a testing organization that does not generate income, such as basic investigative research.
- Investments for updating/procurement of facilities/equipment/machines in preparation for self-reliant profitability.
- Reduced income due to bad year for seed production as a result of a drought.
- Decrease in actual income compared to expected income due to temporary suspension of work that generates revenue when engineers in charge were absent/while equipment was being repaired.

On the other hand, after the transition from independent operation and management of CETAPAR by the Central Nikkei Cooperative to joint operation and management by three cooperative federations that started in April 2013, a review has commenced of a more

detailed implementation system for the future/operation and management system and other such details. Implementation of the following main measures has provided a path to securing income, establishing a structure where the organization will achieve self-reliant profitability.

- Under the new management framework of three cooperative federations, the Nikkei cooperatives as well as two farming cooperative federations in Paraguay have each expressed their intention to make investments for the updating/new procurement of facilities/equipment in order to boost the level of service to each of their members (the decision has been made that each of the farming cooperative federations will invest approximately 3 million yen in fiscal 2013, for a total of approximately 9 million yen that is to be used as operating capital). As an accounting measure for starting operation under the new framework, the Central Nikkei Cooperative will cover the entire loss of approximately 18 million yen that was accrued during the three years after the transfer of operation, and plans call for the investment of approximately 9 million being made this fiscal year under the new framework to be used as operating capital to conduct business.
- Reduction in expenditures by choosing to suspend work by divisions that do not generate revenue.
- In order to ensure profitability, plans call for implementation of updating of old equipment in laboratory which is main source of income generating work, and procurement of multiple equipment units/other such measures to enable work volume to be expanded in fiscal 2013 (Increase in related members under the new framework is expected to increase volume of subcontracting service requests).

Table 8 Status of CETAPAR Support Cooperatives (As of June 2013)

Cooperative Federation	Central Nikkei Cooperative	FECOPROD	UNICOOP
No. of Cooperatives	5 cooperatives	33 cooperatives	8 cooperatives
No. of Members	Approx. 400	Approx. 22,000	Approx. 2,000

Source: Respective cooperative federations

Thus, while CETAPAR had problems in terms of its financial status during the three years after the transfer of operation when the project ended, the cumulative debt has been settled in 2013, and investments have been made in preparation for activities conducted by three cooperative federations in fiscal 2013 and after. However, the organization is still at the stage that its financial status has been improved for the time being, and the actual achievement of self-reliant profitability under the new framework will depend on how the organization is managed.

Thus, due to the financial issues that confront the organization, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented with the objective of strengthening the functions and enhancing the operation and management system for agricultural technology in order to facilitate self-reliant operations development by the Technological Center on Agriculture in Paraguay (CETAPAR).

Promotion of agriculture in the eastern region of Paraguay through the dissemination of sustainable technology matches the development policies in Paraguay aimed at promoting the development of agricultural communities by strengthening competitiveness, and the ODA policy of Japan which has a primary focus on regional economic development centered around agriculture and enabling farmers of Japanese descent (Nikkei) to put down stable roots, and therefore has a high level of relevance.

Implementation of this project achieved the prescribed objectives of strengthening the functions of CETAPAR related to agricultural technology and development of an operation and management system. In regard to the overall goal, technology dissemination by CETAPAR contributed to the dissemination of agricultural technology in the eastern region of Paraguay, and it was confirmed that this helped stabilize agricultural production by Nikkei farmers as well as Paraguayan farmers as a whole, and helped boost production capabilities. Therefore, the project had a high level of effectiveness and impact.

The elements input for manifestation of the output were appropriate, and the period of cooperation was within the plan, but the provision of equipment and facilities with the aim of enabling the organization to make a profit after the transfer of operation and management resulted in the amount of cooperation funds actually expended substantially exceeding the planned amount. Therefore, efficiency was fair.

There were no problems with the institutional aspect in related policy, counterpart system, and sustainability of the technology. The financial status of CETAPAR was not good due to investments made with the goal of self-reliant profitability by the third year after the transfer of operation, but improvements in operations are proceeding as a result of the manifestation of investment effects and reorganization of the implementation system. Therefore, the sustainability is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Handling of short-term issues

- Starting in April 2013, operation and management of CETAPAR was transferred from the Central Nikkei Cooperative to joint operation and management by three cooperative federations, including two cooperative federations in Paraguay. It is hoped that the experience gained during the project period and three years after the transfer of operation will be used to establish a new framework for sound operation and management. In addition, since it is expected that the organization will be able to establish closer relations with Paraguayan farmers by coordinating efforts with the cooperative federations in Paraguay, it is hoped that CETAPAR will be able to further contribute to the overall goal of this project of the sustainable dissemination of agricultural technology in the eastern region of Paraguay.

  Furthermore, in preparation for establishment of a system that enables this, due to the fact that there are problems in particular with the self-reliant profitability of the organization, measures to make a plan for the improvement of operations should be deliberated and implemented at the earliest point possible.

(2) Handling of mid- to long-term issues

- In order to enable the stable expansion of the various services provided by CETAPAR that are the core of revenue generation, the various certifications acquired by CETAPAR need to be renewed, and certification needs to be obtained in new fields (Export Food Standard for the United States and Europe, etc.). In order to achieve renewal of certification and acquisition of certification in new fields in the future, it will be necessary to update equipment that has been used before and during the project and procure new types of equipment. Therefore, equipment updating/procurement plans need to be deliberated.
- In order for CETAPAR to continue to maintain a high level of trust from external clients (Nikkei cooperatives/farms, organizations involved in agriculture in Paraguay, companies involved in agriculture, etc.) that it has acquired over many years, the securing/nurturing of human resources that can provided high quality services are indispensable. In Paraguay where the poaching of talented personnel/changing of jobs by talented agricultural engineers is normal, it is important to provide good employment conditions and opportunities for enhancing their technical capabilities. The support/expenses needed for securing/human resource development should be incorporated in the new framework that started in April 2013.
- Regarding testing work in the vegetable/fruit fields, traveling instruction, workshops and other such training opportunities that were suspended due to lacks of funds/personnel after the transfer of operation, Nikkei cooperatives (in particular, Colmena/Asunsena cooperative) and small-scale Paraguayan farms in region

surrounding Yguazu and other areas have voiced high hopes for these activities to be reinstated, and it is hoped that they will be recommenced from the perspective that one of the objectives of the project was to have the organization serve the role as a base for the promotion of agriculture.

4.2.2 Recommendations to JICA

(1) Handling of short-term issues

- Based on the technology that was transferred during the project, CETAPAR has enhanced the level of trust from external parties as an organization that is certified in various fields, but the opportunities for personnel to increase their level of technology have been limited after the transfer of operation. It is hoped that supplemental support will be provided to increase opportunities to enhance the level of technology that are not available in Paraguay, and in particular dispatch of experts (including experts from third countries) in new up and coming certification fields for which external certification is required (Export Food Standard for the United States and Europe, etc.), training in Japan, and other areas will be performed.

(2) Handling of mid- to long-term issues

- In the territorial approach[5], the small-farm self-reliant support program and other such agriculture promotion programs/projects which are being implemented by the JICA Paraguay Office together with the government of Paraguay, it is hoped that the high level of farming technology/farming information of CETAPAR and experience accumulated over many years in the eastern region will be utilized to contribute to the overall goal of this project of boosting agricultural production in the eastern region of Paraguay.

4.3 Lessons Learned

Before this project started, CETAPAR had the base of being directly operated by JICA for a period of over 40 years as an agricultural testing station that provided support for the promotion of agriculture for Nikkei farmers in the eastern region of Paraguay. This technical cooperation project was aimed to formulate a system enabling self-reliant growth of CETAPAR with a view to the full transfer of operations from JICA that was scheduled

[5] In order to correct the problems of poverty and disparities in income, the government of Paraguay is proceeding with a conversion from a sectoral (vertical) top-down development approach to a regional unit development approach, and in accordance with this policy, has designated development target “territories” that are thought to have a high level of commonality from four perspectives: policy/system, economy/production, society/culture and environment. While focusing on each territory, it is providing support with the objective of creating an implementation system with a new farming village development approach that is suited to the “territorial approach” being implemented across sectors in accordance with the respective development needs and priority.

ten years after the project started, based on the accumulated technologies and existing organization.

Thus, for a project with a counterpart implementation organization for which it is expected to be difficult to secure financial support from the government, related organization or other source after the project ends, in addition to the transfer of technology in specialized fields, it is important to clearly position one output of the project as establishment of a self-reliant organization structure, including in terms of implementation capacity, dissemination process and financial soundness after the project ends. Furthermore, the formulation of an income structure that heightens sustainability and/or business plan is important for the creation of a self-reliant organization structure after the project ends.