Ex-Post Project Evaluation 2012:
Package III-7
(Seychelles, Madagascar)

September 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

VALUE FRONTIER CO., LTD

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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.

September 2013
Masato WATANABE
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

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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.

Seychelles

Ex-Post Evaluation of Japanese ODA Grant Aid Project

"Project for Construction of Artisanal Fisheries Facilities in Mahé Island"

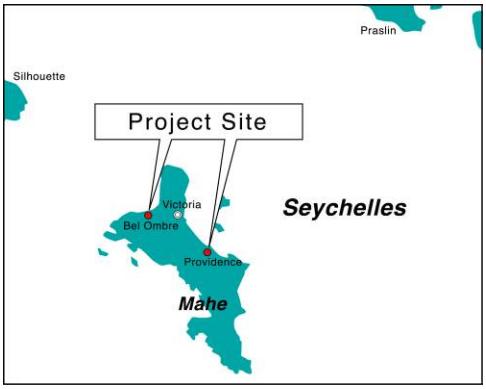
External Evaluator: Koichiro Ishimori, Value Frontier Co., Ltd

0. Summary

This project intended to ease congestion at Victoria Port by constructing artisanal fisheries facilities at Providence Port and Bel Ombre Port. The objective of the project was in line with the development policies and needs of Seychelles as well as the development policies of Japan. The project successfully achieved the objective of easing congestion at Victoria Port by diverting artisanal fishing ships concentrated at Victoria Port to Providence Port and Bel Ombre Port, and developing the Victoria and Bel Ombre ports. In addition, the project has created jobs and developed the regions around the ports. Therefore, the effectiveness and impacts of the project are high. Since the project cost and project period slightly exceeded the plan and some outputs were even incomplete, the efficiency of the project is low. However, there are no problems with the organizational, technical, and financial aspects of the Seychelles Fishing Authority (SFA); therefore, the sustainability of the project's effects is high.

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

1. Project Description



1.1 Background

Seychelles, located in the southwestern Indian Ocean, is an island country consisting of 115 islands; Mahé is the largest of the islands. In 1997, the Japanese government constructed a quay and a fish handling shed and contributed to the development of Victoria Port by implementing an ODA Grant Aid Project—a project for improving the Victoria artisanal fishing port in Seychelles. Ten years after the project, however, increases in artisanal fishing ships worsened congestion at Victoria Port. The Seychelles government initially tried to expand Victoria Port but was unable to do it since the quays of the port were situated between fish processing companies. Consequently, it made an alternative plan to construct artisanal fishing ports at Providence and Bel Ombre, and actually constructed reclaimed land and breakwaters. However, it had difficulty developing facilities such as quays and icemakers at the ports due to a lack of budget. Therefore, it asked the Japanese government to implement the project.

1.2 Project Outline

The objective of this project was to ease congestion at Victoria Port by diverting artisanal fisheries ships concentrated at Victoria Port to Providence Port and Bel Ombre Port, and to develop the Victoria and Bel Ombre ports.

Grant Limit / Actual Grant Amount	1,089 million yen / 1,088 million yen
Exchange of Notes Date	June, 2008
Implementing Agency	Seychelles Fishing Authority (SFA)
Project Completion Date	February, 2010
Main Contractor(s)	Penta-Ocean Construction Co., Ltd
Main Consultant(s)	ECOH Co., Ltd
Basic Design	"Project for Construction of Artisanal Fisheries Facilities in Mahé Island" , ECOH Co., Ltd, October 2006
Related Projects (if any)	"Project for improvement of Victoria artisanal fishing port in the Republic of Seychelles"

2. Outline of the Evaluation Study

2.1 External Evaluator

Mr. Koichiro Ishimori, Value Frontier Co., Ltd

2.2 Duration of Evaluation Study

The Ex-Post Evaluation Study was implemented according to the following schedule:

Duration of the Study: November, 2012 - October, 2013

Duration of the Field Study: February 18th - March 10th, 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 Seychelles

The national development plan, Strategy 2017 (2007–2017), aimed to double Seychelles's GDP, prioritizing tourism and fisheries as the two major pillars of the economy. It also aimed to make Seychelles the major fish processing center of the Indian Ocean. In addition, the sector policy, Fisheries Policy (2005), aimed to promote sustainable fisheries and maximize benefits for present and future generations; it prioritized the development of new ports and the improvement of existing ports as one of its 10 priorities, which included infrastructure development.

Strategy 2017 (2007-2017) and the Fisheries Policy (2005) were still valid at the time of the project's completion, and their priorities remained unchanged. Therefore, the project was in line with the development plan and the sector plan in Seychelles—at both the time of the project's

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

[2] ③: High, ② Fair, ① Low

planning and its completion—and is judged to be relevant.

3.1.2 Relevance with the Development Needs of Seychelles

At the time of the project's planning, congestion at Victoria Port, resulting from a higher number of artisanal fishing ships, had increased the risk of collisions between ships. In addition, ships were not able to go fishing in a timely manner since the capacity to supply ice flakes at Victoria Port was not high enough to meet the increasing demands[3]. Congestion was further worsened by ships from other ports coming to Victoria Port to unload fish and obtain ice flakes due to a lack of quays and ice makers at their original ports. By seeking to ease congestion at Victoria Port and develop artisanal fisheries at Providence Port and Bel Ombre Port, the project, therefore, met the development needs at the time of planning and is judged to have been necessary.

At the time of the project's completion, congestion at Victoria Port had been eased by successfully diverting ships from Victoria Port to Providence Port and Bel Ombre Port. The number of ships using Providence Port and Bel Ombre Port was also increasing. However, Victoria Port still faced congestion—albeit less than before—since the number of ships newly using that port was also increasing. Therefore, the project was still meeting development needs at the time of completion and is judged to still be necessary.

3.1.3 Relevance with Japan's ODA Policy

Before the implementation of the project, the Charter on Official Development Assistance (ODA) (2003) highlighted, as one of its four priorities, the importance of "infrastructure development and structure development" to promote sustainable growth. The Midterm Policy on ODA (2005), before the implementation of the project, highlighted the importance of "social and economic infrastructure development, including ports" as one of its four priorities. In addition, the basic policy on ODA for Seychelles (2008) emphasized that the Japanese government should assist the fishery industry so that Seychelles would not have to heavily depend on tourism, which is affected by changes in the external environment. The Japanese government has assisted the Seychelles government in developing the fishery industry for many years, as with the Project for Improvement of Victoria Artisanal Fishing Port (1997). Therefore, the project met Japan's ODA policy at the time of its planning and is judged to be relevant.

In conclusion, the project falls in line with the Seychelles development plan, with the country's development needs, and with Japan's ODA policy. Therefore, its relevance is high.

[3] Ships need to put loads of ice flakes into storage before going fishing so they can keep the fish they catch fresh during their travels, which may span two to three days or longer.

3.2 Effectiveness[4] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

【Easing congestion at Victoria Port and promoting Providence and Bel Ombre Ports】

Table 1: Average number of ships mooring daily at Victoria Port, Providence Port, and Bel Ombre Port

Indicators (ships)	2008	2009	2010 (Plan)	2011	2012
Daily average number of ships mooring at Victoria Port	58	70	51 (40)	51	45
Daily average number of ships mooring at Providence Port	0	0	14 (12)	26	24
Daily average number of ships mooring at Bel Ombre Port	5	6	11 (11)	12	11

Source: SFA

With the development of Providence and Bel Ombre Ports, the average number of ships mooring daily at Victoria Port after 2010 was lower than in 2008. This indicates that congestion at Victoria Port was eased. The figures after 2010 did not, however, reach the planned target of 40; this was because the number of newly registered ships using Victoria Port was greater than the number of ships that had been diverted from Victoria Port to Providence and Bel Omber Ports. But while the project intended to divert 18 ships (58− 40) from Victoria Port, it actually diverted 19 ships (70− 51).

With the development of Providence Port, it became possible for ships to obtain ice flakes there in addition to Victoria Port. Also, it became easier for ships to unload fish. As a result, the average number of ships mooring daily at Providence Port in 2010 was higher than planned. The figures after 2011 were even higher, which indicates that Providence Port was more promoted than before.

With the development of Bel Ombre Port, it became possible for ships to obtain ice flakes there as well. The average number of ships mooring daily at Bel Ombre Port in 2010 was the same as planned. The figures after 2011 were similar, indicating that Bel Ombre Port was more promoted than before.

Table 2: Collisions between ships at Victoria Port

Indicators (ships)	2008	2009	2010 (Plan)	2011	2012
Collisions between ships at Victoria Port	0	0	0 (NA)	0	0

Source: SFA

There is no difference in the number of collisions between ships before and after the project. There were no collisions at all between 2008 and 2012.

[4] Subrating for effectiveness is to be put with consideration of impact.

Table 3: Annual volume of catch at Providence Port and Bel Ombre Port[5]

Indicators (tons)	2008	2009	2010 (Plan)	2011	2012
Annual volume of catch at Providence Port	0	0	319 (273)	592	546
Annual volume of catch at Bel Ombre Port	254	306	447 (447)	470	447

Source: SFA

The volume of catch at Providence Port in 2010 was higher than the planned figure of 273. The figures after 2011 were even higher, which indicates that Providence Port was more promoted than before. The volume of catch at Bel Ombre Port in 2010 was same as the planned figure of 447. The figures after 2011 were similar, indicating that Bel Ombre Port was more promoted than before.

【Operation status of the installed ice makers】

Table 4: Daily average production of ice flakes at Providence Port and Bel Ombre Port

Indicators (tons)	2008	2009	2010 (Plan)	2011	2012
Daily average production of ice flakes at Providence Port	0	0	2.5 (10)	6.4	7.6
Daily average production of ice flakes at Bel Ombre Port	0	0	1.5 (6)	1.5	2.3

Source: SFA

The figure in 2010 at Providence Port was 25% of the planned figure. This was because fishermen obtained ice flakes at Victoria Port based on a contract with fish processing companies at Victoria Port. However, the figures after 2011 increased because fishermen did not need to have a contract with the companies to obtain ice flakes at Providence Port, and the usability of Providence Port improved in the sense that the number of fish processing companies there increased from two to four. In particular, the figure in 2012—76% of the planned target—is considered relatively high since the ice makers had to be stopped during holidays and regular maintenance and inspection periods.

The figures for 2010, 2011, and 2012 at Bel Ombre Port were 25%, 25%, and 38% of the planned figure, respectively. Since Seychelles became a multiple external debtor in 2008, the International Monetary Fund (IMF) initiated an economic reform of the county that resulted in a freeze on all government projects until 2011. During the implementation period of the project, the Ministry of Land Use and Habitat (MLUH), which owned almost half of the land of Bel Ombre Port, was making a land-use plan for Bel Ombre Port, but it was forced to stop. Consequently, the SFA—which was making an overall land-use plan for Bel Ombre Port, including a land-use plan by MLUH—was not able to run a high-voltage cable to Bel Ombre Port and had to use a

[5] The SFA does not monitor the actual volume of catch. Therefore, the *ex post* evaluation study made a calculation using the same formula as B/D of multiplying the average volume of catch per ship (12.1 t for small-sized ships and 9.2 t for medium-sized ships) by the number of ships.

low-voltage cable to operate the ice makers[6]. Consequently, the SFA could not operate two ice makers simultaneously and had to take turns operating them[7]. According to a hotel owner who employs fishermen at Bel Ombre Port, the limited production of ice flakes at Bel Ombre Port prevents fishermen from going fishing and him from increasing the number of ships. Therefore, it would appear that Bel Ombre Port has more demand for ice flakes now, and the installation of a high-voltage cable—which will enable two ice makers to operate simultaneously—is expected to further promote Bel Ombre Port.

In summary, though the daily average production of ice flakes did not achieve the planned target, the project objective of easing congestion at Victoria Port and promoting Providence Port and Bel Ombre Port by diverting ships concentrated at Victoria Port to those two ports was achieved. Therefore, it is judged that the project has mostly realized its planned effects.

3.3 Impact

3.3.1 Intended Impacts

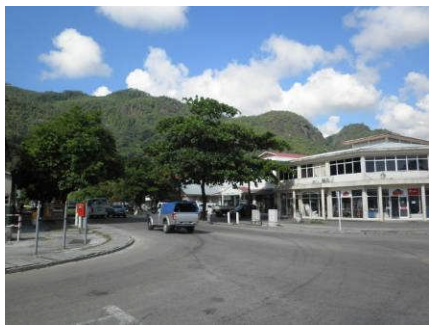
【Job creation by increases in fish processing companies near Providence Port and economic impacts】

At the time of the ex post evaluation study, four sea cucumber processing companies were in operation around Providence Port. Two companies had already begun operations before the project, and another two began operations either during or after the project. Currently, another 16 fish processing companies have applied to register their establishments. In the beneficiary survey administered to the four sea cucumber processing companies, all answered that the project was contributing to smooth operations in the way that they were now easily able to obtain ice flakes and unload the fish they caught. In addition, the survey confirmed that the four companies had created 78 new jobs (68 fishermen and 10 company staff members) and that sales income was increasing (though detailed financial data were not disclosed). Furthermore, the ex post evaluation study confirmed that over 30 shops—such as restaurants, groceries, and banks—had been established near Providence Port for the convenience of people around the area. This indicates that the project has had an economic impact on the development of the area.

6 In June 2013, MLUH's land-use plan for Bel Ombre Port was approved by the cabinet and then a high-voltage cable was run to Bel Ombre Port.

7 Since the production capacity of one ice maker is three tons per day, the operation rate for the ice makers in 2010, 2011, and 2012 was 50%, 50%, and 77%, respectively. Since a high-voltage cable was run to Bel Ombre Port in June 2013, it is now possible to operate two ice makers simultaneously.

Sea cucumber processing company

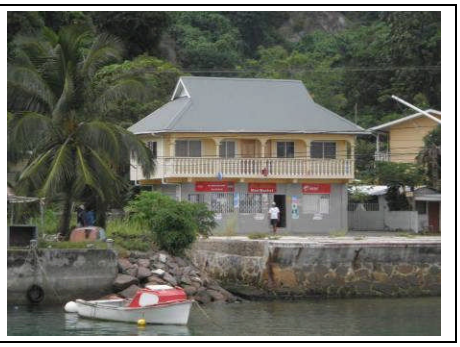


Providence area

【Indirect impacts on related industries near Bel Ombre Port and job creation】

Although there is a plan to establish fish processing companies near Bel Ombre Port, none exists at the time of the ex post evaluation study. However, one fishing company has been operating since before the project, contracting fishermen to catch fish. The owner of the company serves the fish to guests staying at a hotel he operates; he also sells the fish at a local market. In the beneficiary survey administered to the fishing company, the owner of the company answered that the project was contributing to smooth operations in the way that it was now easily able to obtain ice flakes. It also answered, however, that the number of employees and sales income were unchanged. Furthermore, the ex post evaluation study confirmed that one grocery store was established near Bel Ombre Port in 2010 for the convenience of the people—fishermen in particular—around the area.

Fish sold at a local market



Grocery store

3.3.2 Other Impacts

The SFA has used soil excavated by the project at Providence Port for expanding the port, and there has been no report on marine pollution. The port is reclaimed land, and there has been neither land acquisition nor resettlement.

In light of the above, it is judged that while the impact on the Providence area is significant, the impact on Bel Ombre is not.

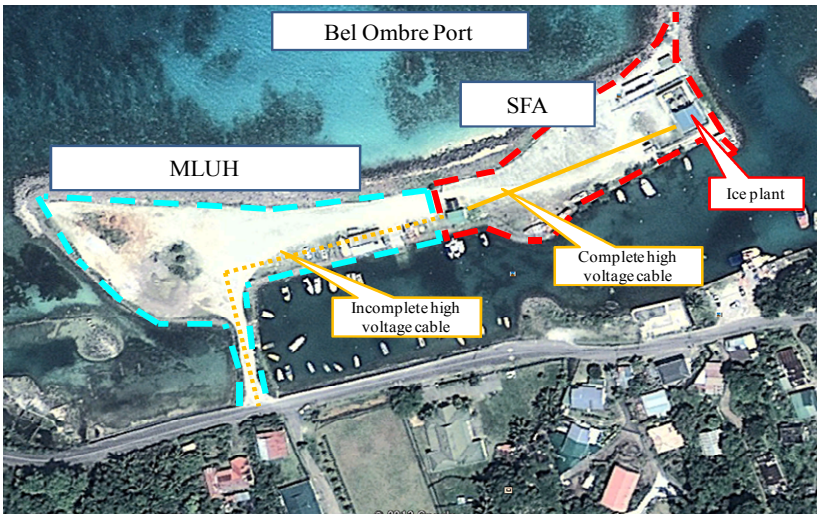
In conclusion, this project has largely achieved its objectives; therefore, its effectiveness is high.

3.4 Efficiency (Rating:①)

3.4.1 Project Outputs

Table 5: Outputs

Planed Outputs	Actual Outputs
Providence Port	
Construction of a quay	Same as planned
Construction of artisanal fisheries facilities (ice plant × 1; ice maker with a production capacity of 5 tons/day × 2), administration building × 1, fish handling shed × 1, storage × 1, and bunkering lay-by × 1)	Same as planned
Procurement of equipment (forklift × 1, container for fish × 20, and container for ice × 1)	Same as planned
Bel Ombre Port	
Construction of artisanal fisheries facilities (ice plant × 1; ice maker with a production capacity of 3 tons/day × 2)	An ice plant has been constructed. However, the Ministry of Land Use and Habitat (MLUH), which owned almost half of the land in Bel Ombre Port, was forced to stop making a land-use plan for Bel Ombre Port due to interventions by the IMF. Consequently, the SFA—which was making an overall land-use plan for Bel Ombre Port, including a land-use plan by MLUH—was not able to finish running a high-voltage cable to the ice plant at Bel Ombre Port. Therefore, the project is incomplete (see Picture 1 below).
Procurement of equipment (forklift × 1 and container for ice × 1)	A forklift and a container for ice have been procured. However, the SFA was not able to finish paving the roads in Bel Ombre Port due to the reason mentioned above. Therefore, the project is incomplete.



Picture 1: Bel Ombre Port

3.4.2 Project Inputs

3.4.2.1 Project Cost

【Japanese side】

While the planned project cost was 1,089 million yen, the actual cost was 1,088 million yen. Therefore, the project fell within the planned costs.

【Seychelles side】

While the planned project cost was SR 2,859,000 (approximately 51 million yen), the actual cost was SR 11,849,000 (approximately 211 million yen). The construction costs for utilities and fuel tanks quadrupled due to the devaluation of the SR[8] resulting from new introduction of the floating exchange rate system imposed by the IMF. In addition, a fuel tank required reconstruction due to cyclone damage, though the degree of cost overrun was not as high as the devaluation.

In summary, the actual cost on the Japanese side was within the plan. However, while the planned total cost of the combined Japanese and Seychelles sides was 1,140 million yen, the actual total cost became 1,299 million yen; this was slightly higher than planned (114% of the planned total cost) and was due to the 414% cost overrun on the Seychelles side.

3.4.2.2 Project Period

While the planned project period was 18 months (July 2008 to December 2009), the actual period was 20 months (July 2008 to February 2010). Detailed design and construction took six months and twelve months, respectively, as planned. However, land development that involved cutting trees and paving roads, which was necessary before starting construction, took an additional two months, resulting in a two-month delay.

In summary, the actual project period was slightly longer than planned (111% of the planned period). In addition, the outputs of running a high-voltage cable and paving the roads at Bel Ombre Port, for which the Seychelles side was responsible, are incomplete and will be realized after approval by the cabinet.

In conclusion, the actual project cost was slightly higher than planned. The actual project period, for which the Japanese side was responsible, was slightly longer than planned. The outputs for which the Seychelles side was responsible are still incomplete and experiencing significant delays. Therefore, efficiency is low.

8 USD 1 was equivalent to SR 5 at the time of the project planning, while USD 1 was equivalent to SR 15‐17 at the time of construction.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

In Providence Port, there are one port manager, one assistant port manager, one pier master, two ice plant operators, one maintenance manager, one cleaner, and two security guards. The planned activities of selling ice, transporting fish, driving a forklift, and operating gas/water facilities are done by the pier master and ice plant operators due to higher cost efficiency. Similarly, the SFA monitors the activities of illegal operations by dispatching enforcement officers from its headquarters due to higher cost efficiency. Meanwhile, the SFA does not deploy research officers who measure the size of fish and take fishery statistics to Providence Port. Therefore, the institutional aspects of operation and maintenance are not perfect. However, this is not a significant issue since it does not prevent the project from sustaining its effects.

In Bel Ombre Port, there is one port manager (who holds the same post in Providence Port), one ice plant operator, and one security guard. Since there is no forklift, there is no forklift driver. However, once the roads are paved and a forklift is deployed in Bel Ombre Port, the ice plant operator will drive the forklift as he does in Providence Port.

In summary, there are no problems with the institutional aspects of operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

The SFA operates and maintains quays, facilities, and equipment for over 20 ports in Seychelles using its technical staff and external maintenance companies. It effectively operates and maintains the quays, facilities, and equipment that the project developed. It also provides its staff with national and international training on fisheries in short terms and scholarship training in long terms. In 2011, it sent its staff for leadership training on fishery management held by the University of Kagoshima; it also sent staff for training on coastal fishery management held by JICA. It continuously provides its staff with training every year; therefore, there is no problem with the technical aspect. The Basic Design Study and Implementation Review Study for the project selected appropriate construction methods adjusted to the regional environment and tried to procure as many materials as possible in Seychelles. Since the project was implemented with a perspective of sustainability, no particular skills and techniques are needed to operate and maintain the quays, facilities, and equipment that the project developed.

In summary, the SFA has sufficient technical capability to operate and maintain the quays, facilities, and equipment that the project developed, and it continuously provides its staff with training. Therefore, there is no problem with the technical aspects of operation and maintenance.

3.5.3 Financial Aspects of Operation and Maintenance

The Seychelles government provided the SFA with funds to partially cover its budget until 2009 and from 2010 provided funds to cover all of its budget. Therefore, the net balance for the past three years, including other revenues from renting ships and selling ice, is positive (Table 6). Therefore, there is no problem with the financial aspects of operation and maintenance.

Table 6: Profit and Loss Sheet for the SFA

Year	2009	2010	2011	2012
Government fund	2,550	35,578	23,654	32,706
Other revenues	11,021	20,766	9,384	12,913
Total revenues (1)	**13,571**	**56,344**	**33,038**	**45,619**
Personnel expenses	3,394	8,734	11,194	16,191
Office expenses	4,400	3,773	5,945	8,187
Maintenance expenses	1,436	1,128	1,700	1,649
Travel expenses	1,120	3,557	1,104	1,132
Research expenses	2,703	17,513	83	69
Other expenses	1,063	737	3,628	5,478
Total expenses (2)	**14,116**	**35,442**	**23,654**	**32,706**
Net balance (1)-(2)	**-545**	**20,902**	**9,384**	**12,913**

Source: SFA

3.5.4 Current Status of Operation and Maintenance

At the time of the ex post evaluation study, Providence Port was well operated and maintained. Although the floor of the cold store is damaged, the SFA plans to repair it by the end of June 2013 and resume operating it. Other facilities are well operated and maintained. One forklift procured for Bel Ombre Port is now in use in Providence Port, but other equipment are well operated and maintained.

Since a high-voltage cable was run to Bel Ombre Port in June 2013, the SFA is now able to operate two ice makers simultaneously and they are fully operational. Since the roads are not yet paved in Bel Ombre Port, a forklift procured for Bel Ombre Port is still in use in Providence Port. However, the SFA plans to deploy it to Bel Ombre Port once the roads are paved. The SFA also checks the operation status of facilities and equipment and takes appropriate measures, if necessary, by carrying out maintenance activities on a monthly and biannual basis

In summary, the facilities constructed and equipment procured by the project are well operated and maintained.

In conclusion, no major problems have been observed in the operation and maintenance system; therefore, sustainability of the project's effects is high.

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

This project intended to ease congestion at Victoria Port by constructing artisanal fisheries facilities at Providence Port and Bel Ombre Port. The objective of the project was in line with the development policies and needs of Seychelles as well as the development policies of Japan. The project successfully achieved the objective of easing congestion at Victoria Port by diverting artisanal fishing ships concentrated at Victoria Port to Providence Port and Bel Ombre Port, and developing the Victoria and Bel Ombre ports. In addition, the project has created jobs and developed the regions around the ports. Therefore, the effectiveness and impacts of the project are high. Since the project cost and project period slightly exceeded the plan and some outputs were even incomplete, the efficiency of the project is low. However, there are no problems with the organizational, technical, and financial aspects of the SFA; therefore, the sustainability of the project's effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

【Providence Port】

The SFA should repair the floor of the cold store as soon as possible.

【Bel Ombre Port】

Since the roads are not yet paved, the SFA still cannot deploy a forklift. And as soon as the roads are paved, the SFA should deploy the forklift that is now in use in Providence Port to Bel Ombre Port.

4.2.2 Recommendations to JICA

The JICA should monitor the situation related to pavement of the roads in Bel Ombre Port; it should then follow the activities of the SFA after approval.

4.3 Lessons Learned

The SFA was not able to develop outputs as planned since the land owned by the MLUH was not available to the SFA, which resulted in significant delays to the project. Therefore, when a project presumes the use of lands owned by another entity for its implementation, it is essential to have sufficient coordination and arrangements with the entity well in advance.

Madagascar

Ex-Post Evaluation of Japanese Technical Cooperation Project

"The Aquaculture development Project in the Northwest Coastal Region of Madagascar"

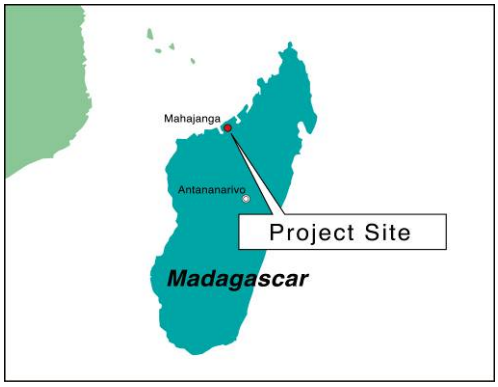
External Evaluator: Koichiro Ishimori, Value Frontier Co., Ltd

0. Summary

This project intended to develop shrimp aquaculture technologies at Shrimp Culture Development Center (CDCC) for the purpose of promoting the growth of small-scale[1] Penaeus Monodon aquacultures (i.e., the so-called black tiger shrimp). The objective of the project was in line with the development policies of Madagascar and Japan, as well as with the development needs of Madagascar at the time of the project's planning. However, it was not partially in line with the development needs at the time of the project's completion. Therefore, relevance is fair. The project improved CDCC's technical capabilities and successfully developed shrimp aquaculture technologies for small-scale farmers. However, because of a slump that occurred in international shrimp prices, all small-scale farmers withdrew from the shrimp market. In addition, both the project and the government of Madagascar struggled to continue the extension and promotion of shrimp aquaculture activities, resulting in no small-scale farmers entering the market. Consequently, no small-scale farmers are engaged in aquaculture activity. Therefore, none of the project's intended impacts was realized. Project cost exceeded the planed costs. The project period significantly exceeded the planned project period. Therefore, efficiency is low. The government of Madagascar still faces difficulties in extending or promoting small-scale shrimp aquaculture activities due to the slump of international shrimp prices. In addition, these activities are not well-supported by other policies. Therefore, sustainability of the project effects is low.

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

1. Project Description



Project location

Aquaculture ponds

[1] The government of Madagascar classifies aquaculture scales less than 50 ha in size as small-scale and scales more than 50 ha in size as large-scale.

1.1 Background

Marine fishing of Penaeus Monodon in Madagascar contributed to the national and regional economy by providing opportunities to earn foreign currency and create jobs. However, its marine resource decreased because of excessive fishing. For this reason, the government of Madagascar attempted to develop Penaeus Monodon aquaculture but it lacked the facilities and technologies to succeed. Therefore, it requested assistance from the government of Japan to implement "the project for constructing Shrimp Culture Development Center in Madagascar" based on Grant Aid Assistance. CDCC facilities were constructed in 1996. However, it continued to lack required technologies. Therefore, it again requested that the government of Japan implement this technical cooperation project.

1.2 Project Outline

Overall Goal		Sustainable shrimp aquaculture by small-scale farmers is promoted in the northwest region of Madagascar.
Project Objective		CDCC's technical capabilities to develop aquaculture adjusted to the local environments and conditions are improved.
Outputs	Output 1 (original period)	Seed production technology is improved.
	Output 2 (original period)	CDCC staff can efficiently carry out seed productions.
	Output 3 (original period)	Shrimp aquaculture methods adjusted to local environments and conditions are indentified
	Output 4 (original period)	CDCC staff can carry out extension and promotion activities of shrimp aquaculture.
	Output 5 (original period)	CDCC's management is improved.
	Output 6 (extended period)	Pond management for small-scale shrimp aquaculture is developed.
	Output 7 (extended period)	Feed development for small-scale shrimp aquaculture is improved.
	Output 8 (extended period)	Epidemic disease prevention measures for small-scale aquaculture are improved
Inputs		【Japanese side】 1. 25 Experts (original period) 6 for Long-Term; 14 for Short-Term; (extended period) 1 for Long-Term; 4 for Short-Term 2. 11 Trainees received (original period) 11 trainees; (extended period) 0 trainee 3. 0 Trainee for Third-Country Training Programs

	4. Equipment 128.38 million yen (original period) 117.13 million yen; (extended period) 11.25 million yen 5. Local Cost 103 million yen (original period) 89 million yen; (extended period) 14 million yen 【Madagascar side】 1. 17 Counterparts 2. Local Cost 75 million yen (wages for counterparts, training, etc)
Total cost	917.1 million yen (original period) 813.15 million yen; (extended period) 103.95 million yen
Period of Cooperation	April 1998 – May 2006 (original period) April, 1998 – March, 2003; (extended period) December, 2003 – May, 2006
Implementing Agency	Shrimp Culture Development Center（Centre de Developpement de Culture de Crevette: CDCC）
Cooperation Agency in Japan	Ministry of Agriculture, Forestry, and Fisheries
Related Projects (if any)	The project for constructing Shrimp Culture Development Center in Madagascar (1996) of Grant Aid Assistance

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of Overall Goal

The terminal evaluation of the project in 2003 judged that it was too early to argue whether overall goal would be achieved. The terminal evaluation of the follow-up project in 2006 judged that it would be difficult to achieve overall goal in a short period because of the slump that occurred in international shrimp prices.

1.3.2 Achievement of Project Objective

The terminal evaluation of the project in 2003 judged that it was likely that the project objective would be achieved, though pond management, feed development, and epidemic disease prevention measures required fortification. The terminal evaluation of the follow-up project in 2006 judged that pond management, feed development, and epidemic disease prevention measures were fortified. Therefore, the project objective was achieved.

1.3.3 Recommendations

The terminal evaluation of the project in 2003 emphasized the importance of the

domestic development of inexpensive feed to promote small-scale aquaculture adjusted to the local environments and conditions because procurement costs for feed produced in foreign countries were major contributions to excessive total costs. Therefore, the follow-up project developed feed suitable for domestic production under output 7.

It also highlighted the importance of the extension of aquaculture technologies at the pilot farm and the establishment of a promotion system at CDCC that would provide continuous training related to extension and promotion. The follow-up project carried out extension activities related to aquaculture technologies at the pilot farm. However, it did not establish a promotion system because the project struggled to continue extension and promotion activities related to shrimp aquaculture because of the slump that occurred in international shrimp prices.

The terminal evaluation of the follow-up project in 2006 pointed out that CDCC should diversify the types of aquaculture it engages in. In particular, it recommended that CDCC engage in the production of tilapia to encourage maximum use of CDCC facilities and to meet local needs. CDCC has been working on tilapia aquaculture since 2011 with the assistance of a new technical cooperation project called "Rural Development Project through the Diffusion of Aquaculture of Tilapia in the Region of Boeny, Mahajanga".

2. Outline of the Evaluation Study

2.1 External Evaluator

Koichiro Ishimori, Value Frontier Co., Ltd

2.2 Duration of Evaluation Study

The ex-post evaluation study was implemented according to the following schedule:

Duration of the Study: November, 2012 – October, 2013

Duration of the Field Study：February 2nd, 2013 – February 17th, 2013

May 17th, 2013 – May 26th, 2013

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

3.1 Relevance (Rating：②[3])

3.1.1 Relevance to the Development Plan of Madagascar

The national development plan at the time of the project's planning, the Charter on Economic Policy of Madagascar Government (1992), aimed to develop socioeconomic environments suitable for aquaculture based on the development of socioeconomic

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

[3] ③: High, ② Fair, ① Low

environments and the promotion of private companies, as one of its 3 priorities. In addition, the sector plan at the time, the Plan for Aquaculture Development (1992), aimed to implement a project focused on the development of shrimp aquaculture as one of its 39 aquaculture projects. It prioritized the promotion of small-scale shrimp aquaculture by constructing facilities and engaging in the capacity building of aquaculture technologies at CDCC.

The national development plan at the time of the project's completion, the Madagascar Action Plan (2006), aimed to improve production technologies for agriculture, forestry, and fisheries industries under the section of rural development and a green revolution, as one of its 8 priorities. In addition, the sector plan at the time, the Master Plan on Aquaculture (2003), encouraged increased production of aquaculture, including shrimp aquaculture, for the purpose of providing opportunities to earn foreign currencies and create jobs. Therefore, the promotion of shrimp aquaculture was prioritized.

Ultimately, the project was in line with the development plan and sector plans in Madagascar—at both the time of the project's planning and its completion—and is judged to be relevant.

3.1.2 Relevance to the Development Needs of Madagascar

Madagascar's marine products, and, particularly, natural Penaeus Monodon, were the largest type of export goods. They supported national and regional economies because they provided opportunities to earn foreign currencies[4] and maintain employment[5] at the time of the project's planning. However, many believed that the catchment volume of natural Penaeus Monodon had already reached its sustainability level. Therefore, an increase in Penaeus Monodon aquaculture was required to compensate for catchment volume that could no longer be expected. In addition, because the international price of Penaeus Monodon increased from $12.1/kg in 1992 to $14.5/kg at the time of project's planning in 1996, approximately 15 small-scale farmers had initiated procedures to gain approval of their aquaculture activities. Therefore, the project that aimed to promote small-scale shrimp aquaculture was in line with the development needs of Madagascar at the time, and is judged to have been necessary.

Madagascar's marine products, and, particularly, natural Penaeus Monodon, continued to be the largest type of export goods. They supported national and regional economies by providing opportunities to earn foreign currencies[6] and maintain employment[7] at the

[4] Marine products accounted for approximately $68 million and 15% of the total amount of exports in 1996.
[5] Approximately 8,200 people were employed in 1996.
[6] Marine products accounted for approximately $51 million and 5% of the total amount of exports in 2006.
[7] Approximately 8,800 people were employed in 2006.

time of the project's completion. The catchment volume of natural Penaeus Monodon reached its peak of 9,823 tons in 2002 and decreased to 6,385 tons at the time of the project's completion in 2006. Therefore, Penaeus Monodon aquaculture was required to support the economy. Meanwhile, the international price of Penaeus Monodon decreased from its peak of $17.4/kg in 2000 to $11.6/kg at the time of the judgment of whether the project should be continued or not in 2003. The price decreased further to $10.4/kg at the time of the project's completion in 2006. Because of decreasing international prices, existing small-scale farmers started withdrawing from the market. Newcomers who had obtained approval for their aquaculture activities started avoiding entry into the market in the middle of the project around 2004. Consequently, when the project was completed, there were only three small-scale farmers and their promotion activities were limited. This situation differed significantly from the expected situation where aquaculture technologies developed by the project were fully utilized[8]. Therefore, the project that aimed to promote small-scale aquacultures through the development and promotion of aquaculture technologies was not partially in line with the development needs of Madagascar at the time of the project's completion.

In sum, while the project was meeting the development needs at the time of the project's planning, it was not partially meeting them at the time of the project's completion, and therefore the necessity of the project was judged to be fair.

3.1.3 Relevance to Japan's ODA Policy

The Charter on Official Development Policy (ODA) (1992) at the time of the project's planning highlighted, as one of its five priorities, the importance of "providing research cooperation leading to the building of technical capabilities of developing countries in research and development and applications" to encourage efforts to build technical capabilities including human resources development and research. In addition, the Policy Dialogues between Madagascar and Japan (1997) highlighted, as one of its four priorities, the importance of "promoting fisheries" to support agriculture, fisheries, and the environment.

In conclusion, this project was partly irrelevant with the country's development needs, and therefore its relevance is fair.

3.2 Effectiveness and Impact[9] (Rating:①)

[8] By 2009, the remaining three small-scale farmers had also withdrawn from the market. At the time of the ex-post evaluation study, no small-scale farmer remained (see Impact for details).

[9] A sub-rating for Effectiveness is considered in conjunction with Impact.

3.2.1 Effectiveness

3.2.1.1 Project Output

1） Output 1 (Original period): Seed production technology is improved

①Production volume and the production rate for postlarva Penaeus Monodon

Table 1: Production volume and the production rate for postlarva Penaeus Monodon[10]

	Plan	1999	2000	2001	2002	2003	2004	2005	2006
Production volume (10,000)	1,000	504	1,191	1,782	1,292	332	628	87	22
Production rate (%)*	100	50	119	178	129	33	62	8	2

*Actual production volume / Planned production volume (10 million/year) ×100
Source: CDCC

While the planned production volume of postlarva Penaeus Monodon at the time of the project's planning in 2006 was 10 million, the actual production was 0.22 million. Between 1999 and 2002, foreign-owned, large-scale companies and local small-scale farmers placed orders for postlarva Penaeus Monodon with CDCC. Therefore, actual production volumes exceeded the planned production volumes. After 2003, however, foreign-owned, large-scale companies started producing it at their own seed production facilities and did not place orders with CDCC. In addition, the total volume demanded by local small-scale farmers was small. Consequently, after 2003, actual production volume was lower than the planned production volumes. Hence, the planned production rate and actual production rates were similar. Therefore, ① is judged to have been partially achieved.

②Survival rates for postlarva Penaeus Monodon

Table 2: Survival rates for postlarva Penaeus Monodon

	Plan	1999	2000	2001	2002	2003	2004	2005	2006
Survival rate	>55%	43%	46%	56%	73%	56%	62%	35%	32%

Source: CDCC

While the planned survival rate of postlarva Penaeus Monodon at the time of the project's planning in 2006 was 55% or higher, the actual survival rate was 32%. Between 1999 and 2002, the average actual survival rate was 55% for the same reason mentioned above and similar to the reasons stated for planned survival rates. After 2003, however, foreign-owned, large-scale companies did not place orders with CDCC. Local small-scale farmers continued to place orders, but their orders were primarily placed during the rainy season that extends between

[10] The project has separately set indicators of "production volume" and "production rate", but they mean the same thing in essence. Therefore, this ex-post evaluation study integrated them into one indicator.

January and April. This seasonal concentration contributed to the decline in the actual survival rate. Sea water brought to the facilities for the production of postlarva Penaeus Monodon at CDCC was qualitatively inappropriate for its production because it contained significant amounts of red clay that had drained from the rivers into the sea as well as sea water that had less salinity due to freshwater that had drained from the rivers into the sea. Consequently, the actual survival rate was lower than the planned survival rate. Therefore, ② is judged to have been partially achieved.

③Development of manuals and related documents

As the output related to seed production, the project produced "A manual for seed production" to be used by CDCC counterparts. CDCC produced seed based on the manual as planned during the project period. Therefore, ③ is judged to have been achieved.

In conclusion, it is judged that the project improved CDCC's seed production technology because, on average, it produced 11.92 million seeds, a 119% production rate and a 55% survival rate, albeit temporarily. However, the achievement rates for these three indicators at the time of the project's completion in 2006 were all low. Therefore, output 1 is judged to have been partially achieved.

2) Output 2 (Original period): CDCC staff can efficiently carry out seed production.

①Improvement of seed production technology for promotion

CDCC staff acquired knowledge and skills related to seed production for small-scale farmers through their OJT and manuals created by the project. Consequently, on average, they achieved a 119% production rate and a 55% survival rate, albeit temporarily. However, as mentioned above, the production and survival rates at the time of the project's completion in 2006 were lower than planned rates. Therefore, ① is judged to have been partially achieved.

②Development of manuals and related documents

As the output related to seed production for small-scale farmers, the project produced seed production manuals to be used by CDCC counterparts (e.g., "A manual for the use of aquaculture technologies for small-scale farmers" and "A manual for the development of Penaeus Monodon aquaculture with low stocking density for small-scale shrimp farms in northwest coastal region of Madagascar"). CDCC produced seed for small-scale farmers based on theses manuals and related

documents as planned during the project period. Therefore, ② is judged to have been achieved.

In conclusion, it is judged that CDCC counterparts were able to efficiently carry out seed productions because they acquired knowledge and skills related to seed production for small-scale farmers and created manuals. However, production and survival rates at the time of the project's completion in 2006 were lower than planned rates. Therefore, output 2 is judged to have been partially achieved.

3) Output 3 (Original period): Shrimp aquaculture methods adjusted to local environments and conditions are indentified

①Level of seed production and shrimp aquaculture technology achieved by counterparts and technicians

Counterparts and technicians conducted five times of extensive shrimp aquaculture, seventeen times of semi-incentive shrimp aquaculture, five times of grow-out shrimp breeding, and one time of grow-out shrimp intermediate breeding. As a result, they identified that profitability of semi-incentive shrimp aquaculture was higher than that of extensive shrimp aquaculture, and that semi-incentive shrimp aquaculture methods were suitable for local environments and conditions.

The terminal evaluation of the project (2003) pointed out the importance of the local development of inexpensive shrimp bait to promote small-scale shrimp aquaculture because the procurement costs for overseas shrimp bait accounted for a large part of the total costs of shrimp aquaculture. Therefore, the project worked on the local development of inexpensive shrimp bait as output 7 during the extended period and successfully developed it by the end of the project. Therefore, ① is judged to have been achieved.

②Development of manuals and related documents

As the output related to small-scale shrimp aquaculture methods adjusted to the water and habitat environments in Mahajanga, the project produced manuals and related documents to be used by CDCC counterparts (e.g., "A handbook of Phytoplankton collected in Mahajanga waters" and "A handbook of harmful fish found in the shrimp aquaculture ponds"). CDCC performed aquaculture based on these manuals and related documents as planned during the project period. Therefore, ② is judged to have been achieved.

In conclusion, it is judged that small-scale shrimp aquaculture methods adjusted to

local environments and conditions were indentified because the project identified semi-incentive shrimp aquaculture as a more profitable method than extensive shrimp aquaculture and produced manuals and related documents after it conducted numerous tests. In addition, the project worked on the local development of inexpensive shrimp bait as output 7 during the extended period because overseas shrimp bait was expensive. Thus, it was deemed inappropriate for local conditions. Therefore, output 3 is judged to have been achieved.

4) Output 4 (Original period): CDCC staff can carry out extension and promotion activities of shrimp aquaculture.

①The number of trainings

CDCC staff conducted four trainings for fisheries bureau staff and eight trainings for small-scale shrimp farmers, in total 12 trainings between 2000 and 2002. The four trainings provided for fisheries bureau staff focused on general aquaculture for the duration of one week. The six trainings provided for small-scale shrimp farmers focused on seed production and aquaculture conducted in ponds for the duration of four weeks. The two trainings provided for small-scale shrimp farmers focused specifically on aquaculture conducted in ponds for the duration from eight weeks to twelve weeks. The number of trainings provided appeared to be sufficient. Therefore, ① is judged to have been achieved.

②The number of trainees

45 fisheries bureau staff and 143 small-scale shrimp farmers, in total 188 people participated in trainings on aquaculture. Because five small-scale shrimp farms that already existed in 2003 hired approximately 300 employees, the number of trainees who participated in trainings equaled more than half of the total target. Therefore, ② is judged to have been achieved.

③Training quality

One trainee who participated in one of the trainings developed an aquaculture pond and obtained approval to engage in aquaculture. Therefore, training quality was considered as high.

Meanwhile, the terminal evaluation of the project (2003) noted the importance of not only conducting the above-mentioned trainings, but also carrying out extension activities at aquaculture ponds and developing a promotion system to provide continuous training related to pond management, bait development, and epidemic disease prevention to achieve training objectives (i.e., to promote shrimp

aquaculture technologies). During the extended period, the project carried out extension activities at an aquaculture pond. However, it did not develop a system to provide continuous training because the project struggled to promote small-scale shrimp aquaculture due to the slump that occurred in international shrimp prices at the time. Therefore, ③ is judged to have not been achieved.

④Development of manuals and related documents

As the output related to promotion of small-scale shrimp aquaculture, the project produced manuals and related documents to be used by CDCC counterparts (e.g., "A manual for preparation of aquaculture ponds" and "A manual for water control at aquaculture ponds"). CDCC carried out extension activities at a pilot farm based on the manuals and related documents as planned during the project period. Therefore, ④ is judged to have been achieved.

In conclusion, the project carried out extension activities at a pilot farm, but did not develop a system to provide continuous training because it struggled to promote small-scale shrimp aquaculture because of the slump that occurred in international shrimp prices at the time. Therefore, output 4 is judged to have not been achieved.

5) Output 5 (Original period): CDCC's management is improved

①Activity plans of CDCC and their performance

At a joint coordinating committee held in November 2005, it was decided that a steering committee comprised of Secretary General of Ministry of Agriculture, Livestock, and Fisheries (MALF), Director of Direction of Fisheries and Halieutic Resources of MALF, Director of Rural Development in Mahajanga, Director of Fisheries in Mahajanga, and Director of CDCC was created to support CDCC's activities at central and local levels. Consequently, CDCC started making activity plans and monitoring their performances on a yearly basis. With respect to uncompleted activities, CDCC attempted to complete them later. In this way, CDCC's Management was improved. Therefore, ① is judged to have been achieved.

In conclusion, output 5 is judged to have been achieved

6) Output 6 (Extended period): Management of ponds for small-scale shrimp aquaculture is developed.

①A market analysis of small-scale shrimp aquaculture

The international shrimp price was going down after 2000. Therefore, the project analyzed the domestic market for small-scale shrimp aquaculture and discovered that an additional study was required. However, the project continued to develop strategic Penaeus Monodon that grew out within 150 days, weighed 25 g at the time of harvest, and achieved survival rates higher than 55% as well as conversion rates lower than 2.5[11]. Production continued because the analysis highlighted the possibility that CDCC might be able to sell them at domestic markets if it successfully developed large and inexpensive Penaeus Monodon aquaculture. Therefore, ① is judged to have been achieved.

②Selection of a pilot farm from the area of CDCC

The project team visited five small-scale farms located in Mahajanga and then chose one to serve as a pilot farm for the following two reasons. First, the small-scale farm had the most experience because it had the longest history of aquaculture among the five farms. Second, it had idle land available that was located near CDCC, and the project team was able to obtain an agreement with the farm to use the land during a pilot activity. The way to choose a small-scale farm to serve as a pilot farm was reasonable and therefore ② is judged to have been achieved.

③Provision of a technical assistance for the pilot farm located near CDCC

CDCC provided the pilot farm and its three employees with a technical assistance related to aquaculture pond management and bait production. These skills were required to raise Penaeus Monodon larva provide by CDCC until they developed into grow-out Penaeus Monodon. As a result, the pilot farm succeeded in developing strategic Penaeus Monodon that grew out in 112 days, weighed 25.4 g at the time of harvest, and achieved survival rates higher than 97% as well as conversion rates lower than 0.74. Therefore, ③ is judged to have been achieved.

④ Development of manuals and documents related to aquaculture pond management for small-scale shrimp farmers

The project produced manuals and documents related to aquaculture pond management to be used by CDCC counterparts (e.g., “A manual for the preparation of ponds for small-scale shrimp aquaculture”). CDCC managed

[11] Conversion rate is an indicator to measure the efficiency of bait based on the knowledge that certain kilograms of bait are required to grow 1 kilogram of grow-out fish. Smaller amounts are better. Conversion rates lower than 2.5 kilograms imply that less than 2.5 kilograms of bait are required to grow 1 kilogram of grow-out fish.

aquaculture ponds based on the manuals and related documents as planned during the project period. Therefore, ④ is judged to have been achieved.

In conclusion, CDCC provided the pilot farm with a technical assistance to raise Penaeus Monodon larva provided by CDCC until they developed into grow-out Penaeus Monodon. The pilot farm succeeded in developing strategic Penaeus Monodon. Therefore, output 6 is judged to have been achieved.

7） Output 7(Extended period): Feed development for small-scale shrimp aquaculture is improved

①Research on locally-available materials required to produce bait

The project team performed chemical analyses of locally-available materials required to produce bait. As a result, it discovered that materials such as dried shrimps, dried mysidae, dried small fish, fishmeal, rice bran, and flour were good ingredients for bait. In addition, it discovered that yam worked well as a material to ensure that ingredients adhered to each other. Therefore, ① is judged to have been achieved.

②Improvement of CDCC equipment used to produce bait

An improved hammer mill enabled CDCC to produce micronized materials. A new big granulator enabled CDCC to produce 50 kg of bait per day. These improvements were sufficient to develop bait at CDCC. Therefore, ② is judged to have been achieved.

③Development of effective production technology of bait

Based on the use of locally-available materials, the project developed three kinds of bait. The conversion rates ranged between 1.9 and 2.8. All of these rates were lower than the planned conversion rate of 3.0. In addition, the sales prices for bait amounted to $1.07/kg. This price was lower than the $2/kg price for overseas bait, as well as the $1.8/kg break-even price for small-scale shrimp farmers. Therefore, ③ is judged to have been achieved.

④Training on development of bait for small-scale shrimp farmers

The project provided two separate one-day practical trainings for four CDCC staff and seven small-scale shrimp farmers who possessed, respectively, some knowledge of and experience with aquaculture. It also provided two separate two-day practical trainings for three students and six students at Mahajanga

University, respectively, who possessed limited knowledge of and experience with aquaculture. As a result, the knowledge on bait development was disseminated. Therefore, ④ is judged to have been achieved.

⑤Development of manuals and documents related to bait development for small-scale shrimp farmers

The project produced manuals and documents related to bait development to be used by CDCC counterparts (e.g., "A manual on bait production for small-scale shrimp farmers"). CDCC produced bait based on the manuals and related documents as planned during the project period. Therefore, ⑤ is judged to have been achieved.

In conclusion, CDCC succeeded in developing bait that used locally-available materials for small-scale shrimp farmers and disseminated its knowledge. Therefore, output 7 is judged to have been achieved.

8） Output 8 (Extended period): Epidemic disease prevention measures for small-scale aquaculture are improved

①Improvement of epidemic disease prevention at CDCC

The project intended that pathological examination techniques focused on bacterial diseases and epidemic disease prevention techniques that relied on the control of water quality at hatcheries and ponds would be improved. Both of them were realized as planned. CDCC improved epidemic disease prevention measures by letting its counterparts receive training on pathological examination techniques at the Pasteur Institute and developing a manual of diseases and their prevention for Penaeus Monodon. It is considered that such improvements were sufficient, because no epidemic disease occurred when the project completed in 2006. Therefore, ① is judged to have been achieved.

②Training focused on epidemic disease prevention for small-scale shrimp farmers

The project provided a one-day practical training for 25 trainees from MALF, CDCC and small-scale shrimp farmers who possessed some knowledge of and experience with aquaculture. It also provided a one-day practical training for 16 students at Mahajanga University who possessed limited knowledge of and experience with aquaculture. In addition, it provided a presentation on epidemic disease prevention measures in Japan for 75 people drawn from small-scale shrimp farms and Mahajanga University. In so doing, it disseminated knowledge on

epidemic disease prevention. Therefore, ② is judged to have been achieved.

③Development of manuals and documents related to epidemic disease prevention for small-scale shrimp farmers

The project has produced manuals and documents related to epidemic disease prevention to be used by CDCC counterparts (e.g., "A manual on diseases and their prevention for Penaeus Monodon"). CDCC took epidemic disease prevention measures based on the manuals and related documents as planned during the project period. Therefore, ③ is judged to have been achieved.

④ Consideration of introducing a new shrimp with disease resistance for small-scale shrimp farmers

The project considered the introduction of seawater and freshwater shrimps, and selected Macrobrachium a highly disease-resistant freshwater shrimp. When the project completed in 2006, CDCC staff were able to produce 0.1 million Macrobrachium. These production methods were incorporated into "A manual for seed production". Therefore, ④ is judged to have been achieved

In conclusion, CDCC succeeded in improving pathological examination techniques and epidemic disease prevention techniques by controlling water quality at hatcheries and ponds. It also disseminated knowledge on epidemic disease prevention. Therefore, output 8 is judged to have been achieved.

3.2.1.2 Achievement of Project Objectives

Project Objective: CDCC's Technical capabilities to develop aquaculture adjusted to the local environments and conditions are improved

Indicator: Development of Penaeus Monodon that grows out within 150 days, weighs 25 g at the time of harvest, achieves survival rates higher than 55%, and conversion rates lower than 2.5.

The Pilot farm developed Penaeus Monodon that grew out in 112 days, weighed 25.4 g at the time of harvest, and achieved survival rates higher than 97%, and conversion rates lower than 0.74. In addition, CDCC achieved higher than planned production volumes, production rates, and survival rates of Penaeus Monodon, though these rates fell when large-scale companies ceased ordering Penaeus Monodon from CDCC.

In conclusion, this project has largely achieved its objectives.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

Sustainable shrimp aquaculture by small-scale farmers is promoted in the northwest region of Madagascar

1) Indicator 1: The number of small-scale shrimp farms and the areas of aquaculture ponds in the northwest region of Madagascar increase in comparison with those in 2003

Table 4: The number of small-scale shrimp farms and the areas of aquaculture ponds

	2003	2012
Small-scale shrimp farm (household)	5	0
Areas of aquaculture ponds (ha)	41.4	0

Sourced: CDCC

In 2003, five small-scale farms engaged in Penaeus Monodon aquaculture at 41.4 ha of aquaculture ponds in total. However, because of the slump that occurred in international shrimp prices[12], two small-scale farms withdrew from the market in 2004. Additional two farms withdrew from the market in 2007 and the remaining one farm withdrew from the market in 2009. No newcomers entered the market because the project struggled to continue its extension and promotion activities of shrimp aquaculture between 2003 and 2012. As a result, no small-scale shrimp farm and aquaculture ponds were in operation in 2012. Therefore, the overall goal in terms of the indicator 1 has not been achieved.

2) Indicator 2: Economic impacts for small-scale shrimp farms and the region

No small-scale shrimp farm were in operation at the time of the ex-post evaluation in 2013. Therefore, there was no impact for farms. CDCC sold approximately 46 million postlarva Penaeus Monodon in 2011 and 74 million postlarva Penaeus Monodon in 2012 to a large-scale company that exports shrimps. However, because the company was considering the construction of hatcheries for seed production, it is uncertain that the company will continue to place orders for postlarva Penaeus Monodon with CDCC in the future.

As the terminal evaluation of the project in 2003 noted, implementation of an activity to develop a system to provide continuous training for the purpose of promoting small-scale shrimp aquacultures was required to achieve the overall goal. However, this activity was not included in the original Project Design Matrix (PDM). Nor was it included in the PDM created after the mid-term evaluation of the project.

[12] $17.4/kg in 2000 →$11.6/kg in 2003 →$10.4/kg in 2006 →$8.6/kg in 2012

Hence, an extension of the project was required. However, this activity was not included in the PDM in the end and implemented even during the extended period. Therefore, it is difficult to say that outputs were appropriate to achieve the overall goal.

In conclusion, it is true at the time of the ex-post evaluation of the project in 2013 that CDCC sells postlarva Penaeus Monodon to the large-scale company, but it is uncertain as well that it can continue to do so in the future. In addition, the overall goal was not achieved because of the inappropriate setting of outputs. Therefore, it is judged that the overall goal has not been achieved.

3.2.2.2 Other Impacts

①Impacts on the natural environment

None.

②Relocation and land acquisition

None.

③Other indirect impacts

Mahajanga University opened a shrimp aquaculture course of 25 students in 1999 and reopened a general aquaculture course in 2006. Since that time, the university has been using CDCC facilities as its practical teaching facilities.

In conclusion, this project has not achieved its objectives, and therefore its effectiveness is low.

3.3 Efficiency (Rating:①)

3.3.1 Inputs

Table 5: Planned and actual performance of inputs

	Plan	Actual performance
Japanese side		
Project cost	680 million yen	917.1 million yen (Original period: 813.15 million yen, Extended period: 103.95million yen)
Project period	April, 1998 – March, 2003 (60 months)	April 1998 – May 2006 (98 months) (Original period: April 1998 – March 2003, Extended period: December 2003 – May 2006)
Experts	Long-term: 4 experts Short-term: N/A	Long-term: 7 experts (Original period: 6, Extended period: 1) Short-term: 18 experts (Original period: 14, Extended period: 4)
Trainees received	5 – 10 trainees	11 trainees (Original period: 11, Extended period: 0)
Third Country Training	None	None

Program		
Equipment	N/A	128.38 million yen (Original period: 117.13 million yen, Extended period: 11.25 million yen)
Local cost	N/A	103 million yen (Original period: 89 million yen, Extended period: 14 million yen)
Madagascar side		
Counterparts	N/A	17 counterparts (Original period: 8, Extended period: 9)
Land, Facilities, and Equipment	Office, tables, chairs, etc	Office, tables, chairs, etc
Local cost	N/A	75 million yen (Original period: 53 million yen, Extended period; 22 million yen)

Source: CDCC

3.3.1.1 Elements of Inputs

＜Japanese side＞

The achievement level for output 4 during the original project period was not high enough to realize the overall goal. Therefore, it was necessary to extend the project period to carry out output 6 through 8 to strengthen the achievement level for output 4. As a result, the actual project cost exceeded the planned project cost. The actual project period also exceeded the planned project period due to the same reason. The number of long-term experts dispatched from Japan exceeded the planned number because two long-term experts in charge of project coordination and aquaculture had to be replaced. The number of trainees sent to Japan also exceeded the planned number because new staff required training for reasons such as counterparts' retirement. It was not possible to compare actual figures with planned figures of others because of the limited information available at the time of the project's planning.

＜Madagascar side＞

The provision of land, facilities, and equipment was achieved as planned. It was not possible to compare actual figures with planned figures of others because of the limited information available at the time of the project's planning.

3.3.1.2 Project Cost

While the planned project cost was 680 million yen, the actual project cost was 917.1 million yen (135% increase of the plan) and therefore higher than planned. It was because of an increase in the number of long-term experts and the extension of the project period.

3.3.1.3 Period of Cooperation

While the planned project period was 60 months, the actual project period was 98 months (163% increase of the plan) and therefore significantly higher than planned. It was because the achievement level of output 4 during the original project period was not high enough to realize the overall goal, and it was necessary to extend the project period in order to carry out output 6 through 8 to strengthen the achievement level of output 4.

Project cost exceeded the plan and project period significantly exceeded the plan, and therefore efficiency of the project is low.

3.4 Sustainability (Rating:①)

3.4.1 Related Policy towards the Project

The Madagascar Action Plan (2006) and the Master Pan on Aquaculture (2003) remain unchanged. However, MALF supervising CDCC is not actively considering the promotion of small-scale shrimp aquaculture because of the slump that occurred in the international shrimp prices at the time of the ex-post evaluation study of the project in 2013. Thus, the importance of the project on small-scale shrimp aquaculture appears to have decreased. Therefore, it is judged that sustainability in terms of policies after the project is low.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

Based on a decision made by the government of Madagascar in October, 2012, the legal status of CDCC changed from an Establishment of Public Administration (EPA) to an Establishment of Public Industry and Commerce (EPIC) that involves independent accounting systems. It was not realistic to expect that CDCC would earn sufficient sales revenues from shrimp aquaculture in the middle of a major decline in international shrimp prices. Consequently, CDCC was restructured from the entity to produce only shrimp into the entity to produce other kinds of fish as well as shrimp, the Center of Development of Aquaculture (CDA).

CDA currently employs 29 staff members. This include one CDA director, three accountants, one human resource officer, one secretary, one officer in charge of seed production, one officer in charge of pond management, four technicians, five assistant technicians, and twelve other staff including drivers and security staff[13]. The total

[13] While the CDA director is a national government officer, the remaining staff are employed by CDA.

number of staff employed is smaller than planned, but the number of core staff of fifteen in charge of operations and maintenance related to the project (i.e., one CDA director, three accountants, two officers in charge of seed production and pond management, four technicians and five assistant technicians), is slightly larger than the planned number of fourteen. However, because no biologist who can handle epidemic disease prevention measures has been employed, it is difficult to say that there is no problem with institutional and operational aspects of CDA.

3.4.3 Technical Aspects of the Implementing Agency

The CDA director was the counterpart in charge of pond management and can manage ponds together with the current officer in charge of pond management. Therefore, there is no problem with pond management. The current officer in charge of seed production was the counterpart in charge of seed production and can continue to produce seed for the large-scale company even after the project. Therefore, there is no problem with seed production. However, a manual on epidemic disease prevention is not in use and vacant positions for biologists have not been filled. Therefore, epidemic disease prevention measures, including pathological examinations and control of water quality, are not fully functional. Diseased fish have not been found at CDA. However, fish infected with white spot disease[14] have been found at a large-scale company near CDA. Hence, there is a concern about infections. Currently, therefore, it is difficult to maintain the project objective that CDCC's technical capabilities to develop aquaculture adjusted to the local environments and conditions are improved. This objective was once achieved at the time of the project's completion in 2006. It is also still difficult to achieve the overall goal that sustainable shrimp aquaculture by small-scale farmers is promoted in the northwest region of Madagascar because a system to provide continuous training has not been developed yet.

[14] If fish become infected, they develop functional problems with their gills and suffocate.

3.4.4 Financial Aspects of the Implementing Agency

Table 6: P/L of CDCC (CDA)

(Unit: MGA Million)

		2010	2011	2012
Revenue	Govt. budget (AMPA)	115	120	120
	Sales (shrimp)	20	182	294
	Total	135	302	414
Expense	Human resources	76	97	102
	Operation	98	102	134
	Maintenance	13	9	15
	Others	17	9	10
	Total	204	217	261
Net		-68	84	153

Source: CDCC

The MALF relies on funds provided by the Madagascar Agency of Fisheries and Aquaculture (AMPA[15]). It allocates budget to CDCC (CDA). Over the past three years, the government budget remained stable. However, because the government budget was not enough to cover annual expenses of CDCC (CDA), sales revenues must increase. Sales revenues in 2010 were so low that the net was minus MGA 68 million. However, sales revenues in 2011 and 2012 increased significantly because of orders from the large-scale company. This resulted in a positive net of MGA 84 million and MGA 153 million, respectively. However, because the large-scale company is considering the construction of hatcheries for seed production, it is uncertain that the company will continue to place orders with CDCC (CDA) in the future. Therefore, one cannot deny the possibility that the net may become negative again. Besides, CDCC (CDA) has not developed a mid- to long-term management plan to stabilize its shaky financial situations. Therefore, it is difficult to say that there is no problem with financial aspects of CDCC (CDA).

In conclusion, major problems have been observed in the policy background and concerns have been also found in the structural, technical, and financial aspects of CDCC (CDA), and therefore sustainability of the project effects is low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project intended to develop shrimp aquaculture technologies at CDCC for the purpose of promoting the growth of small-scale Penaeus Monodon aquacultures. The

15 Development Fund for Marine Resources and Agriculture (FDHA) of MALF was restructured into Madagascar Agency of Fisheries and Aquaculture (AMPA) in 2006.

objective of the project was in line with the development policies of Madagascar and Japan, as well as with the development needs of Madagascar at the time of the project's planning. However, it was not partially in line with the development needs at the time of the project's completion. Therefore, relevance is fair. The project improved CDCC's technical capabilities and successfully developed shrimp aquaculture technologies for small-scale farmers. However, because of a slump that occurred in international shrimp prices, all small-scale farmers withdrew from the shrimp market. In addition, both the project and the government of Madagascar struggled to continue the extension and promotion of shrimp aquaculture activities, no small-scale farmers entering the market. Consequently, no small-scale farmers are engaged in aquaculture activity. Therefore, none of the project's intended impacts was realized. Project cost exceeded the planed costs. The project period significantly exceeded the planned project period. Therefore, efficiency is low. The government of Madagascar still faces difficulties in extending or promoting small-scale shrimp aquaculture activities due to the slump of the international shrimp prices. In addition, these activities are not well-supported by other policies. Therefore, sustainability of the project effects is low.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

CDA needs to reconsider its objectives and roles in small-scale shrimp aquaculture.

CDA, Establishment of Public Industry and Commerce (EPIC), needs to maintain independent accounting systems, but whether or not CDA can maintain it heavily depends on orders from the large-company. Therefore, CDA needs to make a mid- to long-term management plan that enables CDA to maintain independent accounting systems, including diversifications of sales revenues, based on its objectives and roles in small-scale shrimp aquaculture.

4.2.2 Recommendations to JICA

Although MALF has directed CDA to make a mid- to long-term management plan and Japan International Cooperation Agency (JICA) has been in consultation with CDA in this matter, CDA has not made it yet. JICA should keep its consultation with CDA and monitor CDA's progresses in making it.

4.3 Lessons Learned

International shrimp prices increased at the time of the project's planning, and therefore the project intended to promote Penaeus Monodon aquaculture for the international

market. However, there is no record of international market analyses at the time of the project's planning. In addition, despite the fact that the international shrimp prices were declining at the time of considering whether or not the project should be continued, the project continued without analyzing international market. When the project performed a domestic market analysis during the extended project period, the analysis concluded that additional study was required. However, the project continued based on the possibility noted by the analysis that CDCC (CDA) might be able to sell Penaeus Monodon at domestic markets if it successfully developed large and inexpensive aquaculture. However, because of the continuous decline in international shrimp prices, small-scale shrimp farms lost their incentive to engage in Penaeus Monodon aquaculture. As a result, existing small-scale farms started withdrawing from the market during the project period and there was no small-scale shrimp farm in the end.

Therefore, when a technical assistance project supports the production of an agricultural product that is susceptible to international market prices and aims to increase its promotion, it is important to carry out in-depth market analyses and fully consider both the feasibilities and risks involved in the production and promotion of the agricultural product. Should the analyses reveal that it is difficult to foresee market trends, it is important to consider changes to the project design (e.g., choosing an agricultural product that is less susceptible to international market prices) or even consider cancelling the project per se. Should the analyses were able to foresee market trends but international market prices unexpectedly declined contrary to the analyses, it is important to carry out additional in-depth market analyses and consider changes to the project design (e.g., changing some outputs, project objectives, or impacts) or even consider cancelling the project per se.