Socialist Republic of Viet Nam

FY2023 Ex-Post Evaluation Report of

Japanese ODA Loan "Phan Ri - Phan Thiet Irrigation Project (E/S)" and "Phan Ri - Phan Thiet Irrigation Project" and Technical Cooperation Project "Project for Agriculture Development in Phan Ri - Phan Thiet Phase 2"

External Evaluator: Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

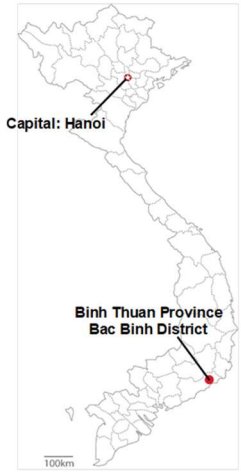
Phan Ri - Phan Thiet Irrigation Project (E/S[1]) and Phan Ri - Phan Thiet Irrigation Project (hereinafter referred to as "ODA loan (E/S and main works)" conducted agricultural development such as developing irrigation and drainage facilities, developing rural infrastructure, and strengthening agriculture extension services with the aim of expanding agricultural production in Bac Binh District of Binh Thuan Province, thereby contributing to poverty reduction through increasing farmers' income. Project for Agriculture Development in Phan Ri - Phan Thiet Phase 2 (hereinafter referred to as "Technical Cooperation Project Phase 2") was implemented with the aim of establishing the approach to develop irrigated agriculture in the District. In this ex-post evaluation, the ODA loan (E/S and main works) and the Technical Cooperation Project Phase 2 were evaluated together. The three projects of the ODA loan (E/S and main works) and the Technical Cooperation Project Phase 2 are collectively referred to as "the Project."

The Project is consistent with the development plan and development needs of Viet Nam, and the Project plan and approach were appropriate. In addition, the Project is consistent with Japan's development cooperation policy. Internal coherence with other JICA projects is also confirmed. Furthermore, external coherence is also confirmed, as the Project has collaborated and coordinated with the Vietnamese government's own-funded projects and projects of other organizations, and synergistic effects were confirmed. Therefore, its relevance and coherence are high. In terms of project implementation, the Project cost was within the plan, but the Project period significantly exceeded the plan. Therefore, efficiency of the Project is moderately low. Regarding project effects, overall, the indicators of quantitative effects, including additional indicators have achieved the targets. Qualitative effects (increased agricultural productivity) and impacts (increased farmers' income, improved living standards of local residents, and poverty reduction) were also confirmed, along with specific evidence for each. It was also confirmed that the Technical Cooperation Project Phase 2 has contributed to strengthening the results of the ODA loan (main works). Thus, the Project has generated the planned effects, and its effectiveness and impacts are high. Slight issues have been observed in the institutional/organizational and the current status of operation and maintenance, however, there are good prospects for improvement/resolution. Therefore, sustainability of the Project effects is high.

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

[1] E/S is an abbreviation for Engineering Service.

1. Project Description



Project Location
(Source: External evaluator)

Song Luy Headworks
(Source: External evaluator)

1.1 Background

Since the introduction of the "doi moi (renovation) policy," Viet Nam has achieved remarkable economic growth through the introduction of a market economy and other measures. However, although the urban poverty rate declined significantly, the economic disparity between urban and rural areas was expanding, and reducing the disparity was a major challenge for the country's sustainable development. Therefore, in order to address poverty and improve living standards in rural areas, it was essential to improve agricultural productivity through development and dissemination of agricultural technology and development of agricultural infrastructure and to increase the incomes of farmers through business diversification.

Binh Thuan Province, located in the south-central coastal region and the target area of the Project, is the area with the lowest rainfall in Viet Nam, with a significant difference in rainfall between the dry and rainy seasons, limiting the period during which cultivation was possible. In addition, the Province lacked sufficient irrigation facilities, limiting the areas that could be cultivated with agriculture relying on rainwater, and agricultural productivity was low. Therefore, expanding agricultural production and increasing farmers' incomes were an urgent task. To achieve this, in addition to developing irrigation and drainage facilities and rural infrastructure, it was necessary to disseminate an efficient water management system based on appropriate cropping plans.

1.2 Project Outline

The objective of this Project is to expand agricultural production in Bac Binh District of Binh Thuan Province, by conducting agricultural development such as developing irrigation and drainage facilities, developing rural infrastructure, and strengthening agriculture extension services, thereby contributing to poverty reduction through increasing farmers' income.

[ODA Loan (E/S and Main Works)]

<table>
<tr><th colspan="2"></th><th>E/S</th><th>Main Works</th></tr>
<tr><td colspan="2">Loan Approved Amount / Disbursed Amount</td><td>437 million yen / 345 million yen</td><td>4,874 million yen / 4,304 million yen</td></tr>
<tr><td colspan="2">Exchange of Notes Date / Loan Agreement Signing Date</td><td>March 2001 / March 2001</td><td>March 2006 / March 2006</td></tr>
<tr><td rowspan="3">Terms and Conditions</td><td>Interest Rate</td><td>0.75%</td><td>1.3%</td></tr>
<tr><td>Repayment Period (Grace Period)</td><td>40 years (10 years)</td><td>30 years (10 years)</td></tr>
<tr><td>Conditions for Procurement</td><td>Bilateral Tide</td><td>General Untied</td></tr>
<tr><td colspan="2">Borrower / Executing Agency</td><td colspan="2">Socialist Republic of Viet Nam / Ministry of Agriculture and Rural Development (hereinafter referred to as “MARD”)</td></tr>
<tr><td colspan="2">Project Completion</td><td>July 2005</td><td>November 2015</td></tr>
<tr><td colspan="2">Target Area</td><td colspan="2">Bac Binh District, Binh Thuan Province</td></tr>
<tr><td colspan="2">Main Contractor (Over 1 billion yen)</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">Main Consultants (Over 100 million yen)</td><td>Nippon Koei Co., Ltd. (Japan) / Hydraulic Engineering Consultants Corporation No.1 (Viet Nam)</td><td>Egis International (France)</td></tr>
<tr><td colspan="2">Related Studies (Feasibility Studies, etc.)</td><td colspan="2">・ Pre-F/S (MARD, March 1996)
・ The Master Plan Study on Dong Nai River and Surrounding Basins Water Resources Development (M/P) (JICA, August 1996)
・ SAPROF (JBIC, October 2000)
・ F/S (MARD, December 2001)</td></tr>
<tr><td colspan="2">Related Projects</td><td colspan="2">[Technical Cooperation]
・ Project for Agriculture Development in Phan Ri - Phan Thiet Phase 1 (2011-2014)
[ODA Loan]
・ Dai Ninh Hydropower Project (2) (March 2001)
・ Dai Ninh Hydropower Project (3) (March 2004)</td></tr>
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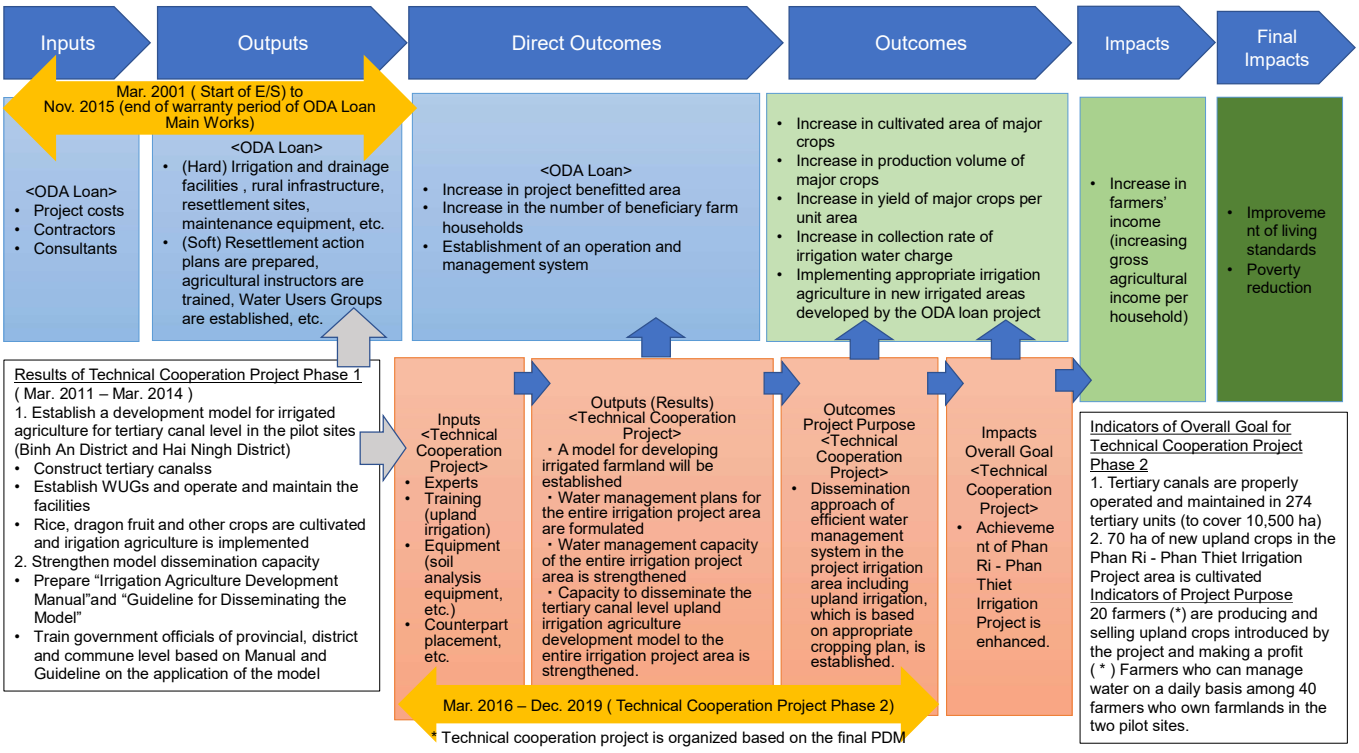
[Technical Cooperation Project Phase 2]

Overall Goal		Achievement of Phan Ri - Phan Thiet Irrigation Project (ODA loan project) is enhanced.
Project Purpose		Dissemination approach of efficient water management system in Phan Ri - Phan Thiet irrigation area including upland irrigation, which is based on appropriate cropping plan, is established.
Outputs	Output 1	Models of upland irrigated agriculture at tertiary canal (on-farm canal) level are developed.
	Output 2	The overall water management plan for whole Phan Ri - Phan Thiet irrigation area is prepared.
	Output 3	Capacity of overall water management in whole Phan Ri - Phan Thiet irrigation area is strengthened.
	Output 4	Capacity in disseminating the models of upland irrigated agriculture at tertiary canal (on-farm canal) level toward whole Phan Ri - Phan Thiet irrigation area is strengthened.
Total cost (Japanese Side)		320 million yen
Period of Cooperation		March 2016-December 2019 (Of which, extended period: April 2019-December 2019)
Target Area		Bac Binh District, Binh Thuan Province
Implementing Agency		Binh Thuan Province People's Committee Department of Agriculture and Rural Development (hereinafter referred to as "DARD")
Other Relevant Agencies / Organizations		Agriculture Extension Center, Agriculture Technical Service Center, Irrigation Management Company (hereinafter referred to as "IMC"), Irrigation Management Enterprises (hereinafter referred to as "IME")
Organization in Japan		-
Related Projects		[Technical Cooperation] ・ Project for Agriculture Development in Phan Ri - Phan Thiet Phase 1 (2011-2014) [ODA Loan] ・ Dai Ninh Hydropower Project (2) (March 2001) ・ Dai Ninh Hydropower Project (3) (March 2004)

[Integrated evaluation]

This ex-post evaluation is an integrated evaluation of the three projects consisting of the ODA loan (E/S and main works) and the Technical Cooperation Project Phase 2. All three projects have the same goal of expanding agricultural production by implementing appropriate irrigation projects in Bac Binh District, Binh Thuan Province. Figure 1 is a conceptual diagram of the logic model that integrates the three projects plus Project for Agriculture Development in Phan Ri - Phan Thiet Phase 1 (hereinafter referred to as "Technical Cooperation Project Phase 1"), which is closely related to the Project. The ODA loan (E/S and main works) shown in the upper half of the figure provided support in the form of hard support (developing irrigation and drainage facilities and rural infrastructure) and soft support (strengthening agricultural extension services, operation and maintenance guidance, etc.), while the Technical Cooperation Project Phase 2 shown in the lower half was implemented to enhance the results of the ODA loan. The outputs (results) of the Technical Cooperation Project Phase 2 are linked to the direct outcomes of the ODA loan, as indicated by the arrow, and the outcomes (project purpose) and impacts (overall goal) of the Technical Cooperation Project Phase 2 are linked to the generation of the outcomes and impacts of the ODA loan. The results of the Technical Cooperation Project Phase 1, which is closely related to the Project, are shown in the white box at the bottom left of the figure, but the Phase 1 is not included in the integrated evaluation because it is less than 200 million yen. Therefore, it was analyzed as a related project in this ex-post evaluation.



Source: Prepared by the external evaluator

Figure 1: Conceptual Diagram of the Project's Logic Model

1.3 Outline of the Terminal Evaluation

In the Completion Report of the Technical Cooperation Project Phase 2, it was judged that the project purpose was partially achieved. It was pointed out that whether Water Users Groups actually conduct maintenance of tertiary canals depended on the level of activation of the Groups by the stakeholders. The overall goal was expected to be achieved to some extent, but it was judged that further training was necessary for the Water Users Groups to conduct maintenance appropriately. In order to achieve the project purpose and the overall goal, it was recommended that the Vietnamese side implement the following.

- Extend the project period for nine months to strengthen capacity to disseminate upland crop cultivation by conducting training of trainers.
- Revise PDM to be more logical with clear goal.
- Agriculture Extension Center continues to promote upland crop cultivation method to other areas.
- Find several potential private companies to join the expansion of peppermint cultivation.
- Organize events to foster the community mindset of farmers.

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: November 2023-January 2025

Duration of the Field Study: March 23-April 14, 2024, July 25-August 8, 2024

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

3.1 Relevance/Coherence (Rating: ③[3])

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Viet Nam

At the time of the appraisal of the ODA loan (E/S), the Vietnamese government set the development of agriculture and rural economy as one of the priority areas in *the Five-Year Socio-Economic Development Plan (1996-2000)* and stated that the scale of agricultural management would be expanded along with technological innovation, considering the importance of revitalizing farmers in carrying out reform in the agricultural sector. In addition,

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

[3] ④: Very High, ③: High, ②: Moderately Low, ①: Low

the Master Plan on Socio-Economic Development of Binh Thuan Province (1995-2010) identified agricultural diversification, including the development of commodity crops and the livestock sector in addition to rice production, as a priority issue, and set the modernization of agriculture and the development of agricultural product processing-related industries as development goals by 2010. At the time of the appraisal of the ODA loan (main works), the Vietnamese government set agricultural development and poverty reduction in rural areas as one of the most prominent issues in *the Ten-Year Socio-Economic Development Str*ategy *(2001-2010)* to correct economic disparities among regions. Furthermore, in *the Five-Year Socio-Economic Development Plan (2006-2010),* the government set the goals of improving the quality, productivity, and competitiveness of agricultural production; diversification; improving efficiency and technology through application of science and technology; modernizing rural infrastructure; and improving the living standards of farmers, etc., and indicated "increased investment in irrigation to solve the drought as soon as possible, and development of production infrastructure, including strengthening irrigation and drainage systems to meet demand" as one of the priority measures. At the time of planning of the Technical Cooperation Project Phase 2, the Vietnamese government's *Ten-Year Socio-Economic Development Strategy (2011-2020)* called for "promoting large-scale production of highly productive, high-quality, effective and comprehensive products that take advantages of tropical agriculture."

At the time of the ex-post evaluation, the Vietnamese government stated that it would promote agricultural restructuring in its *Ten-Year for Socio-Economic Development Strategy (2021-2030)*, which aims to promote modern, large-scale intensive agriculture of commercial crops by taking advantages of tropical agriculture, and to advance development toward the cultivation of high-quality commercial crops. The government is also committed to restructuring crops according to market needs and promoting the formation of intensive and stable agricultural production areas. *The Five-Year Socio-Economic Development Plan (2021-2025)* also aims to promote agricultural restructuring. *MARD's Five-Year Agriculture and Rural Development Plan (2021-2025)* aims to continue agricultural restructuring and transformation to achieve sustainable agricultural development, strengthen quality, value-added, and agricultural competitiveness, and increase the income of people in rural areas. *The Strategy for Sustainable Agriculture and Rural Development for the 2021-2030 period with a Vision to 2050* aims to build a commodity-based agriculture, improve the income, quality of life, role and status of people engaged in agricultural production, and sustainably reduce poverty among rural people.

Therefore, the objectives of the Project are consistent with Viet Nam's development policies at the time of the appraisal, the planning and the ex-post evaluation.

3.1.1.2 Consistency with the Development Needs of Viet Nam

At the time of the appraisal of the ODA loan (E/S and main works) and the planning of the Technical Cooperation Project Phase 2, the economic disparity between urban and rural areas was widening, and correcting this disparity was a major challenge for Viet Nam's sustainable development. Therefore, it was important to increase agricultural productivity through development and dissemination of agricultural technologies and the improvement of agricultural infrastructure, as well as to increase farmers' income and living standards by diversifying the businesses.

At the time of the ex-post evaluation, remote areas, mountainous areas, and ethnic minority communities still face poverty reduction challenges, and the agricultural sector plays a significant role in promoting poverty reduction in these areas and ethnic groups. Table 1 shows the total number of households in Bac Binh District, Binh Thuan Province, the Project target area, and the number of ethnic minority households in the District and Table 2 shows the proportion of ethnic minority households in the total number of poor households[4] in Bac Binh District. The proportion of ethnic minority households in the total number of poor households in the District has remained extremely high, over 60% from 2019 to 2021 and over 80% from 2022 to 2023, and ethnic minorities[5] in the District continue to face poverty reduction challenges. Therefore, there is a strong need to improve productivity and quality of agricultural products to promote higher living standards and poverty reduction among the local population.

[4] The Vietnamese government has set a poverty line based on the Multidimensional Poverty Index, which defines poverty not only in terms of income but also in terms of lack of access to education, health care, housing, clean water, information, and others.

[5] There are 20 ethnic minorities living in the seven Communes of Bac Binh District: Cham, Hoa, Tay, Nung, Rac lay, K ho, Gia rai, Thai, Muong, Kho me, Ngai, San Diu, Dao, Cao Lan, San Chi, E De, Chu ru, Chau ro, Cho ro, and Tho. The main characteristics of the ethnic minorities are as follows: (Source: Bac Binh District People's Committee)

- Language: Each ethnic group speaks a different language. People of the same ethnic group communicate with each other in their own language, and with other ethnic groups they communicate in Kinh (the native language of the Kinh people, which accounts for about 86% of Viet Nam's total population and is the official language of Viet Nam.).
- Clothing: In everyday life, women often wear ethnic costumes, while men wear the same clothes as the majority of Vietnamese.
- Lifestyle and livelihood: People live according to the lifestyles and customs of their respective ethnic groups. The majority are farmers.
- Residence: People live in concentrated area in the District.

Table 1: Total Number of Households in Bac Binh District, Binh Thuan Province and Number of Ethnic Minority Households in the District

	2019	2020	2021	2022	2023
Total number of households in Bac Binh District	129,527	130,876	132,230	133,010	133,797
Total number of ethnic minority households in Bac Binh District	10,518	10,900	11,070	11,505	11,523
Proportion of ethnic minority households in the total number of households in Bac Binh District (%)	8.1	8.3	8.4	8.6	8.6

Source: Binh Thuan Province DARD and Bac Binh District People's Committee

Table 2: Proportion of Ethnic Minority Households among All Poor Households in Bac Binh District, Binh Thuan Province

	2019	2020	2021	2022	2023
Total number of poor households in Bac Binh District	660	382	213	971	804
Of which, number of ethnic minority households	438	252	132	783	655
Proportion of ethnic minority households in the county that are poor (%)	66.4	66.0	62.0	80.6	81.5

Source: Binh Thuan Province DARD and Bac Binh District People's Committee

Therefore, the Project is in line with the development needs of Bac Binh District, Binh Thuan Province at the time of the appraisal, the planning and the ex-post evaluation.

3.1.1.3 Appropriateness of the Project Plan and Approach

The Project plan and design were based on the lessons learned from the similar projects in the past, and the use of the lessons learned was appropriate. Specifically, based on the lessons learned from similar projects, the Project formulation and supervision were conducted while paying attention to the establishment of maintenance management system, and operation and maintenance support and farming support were provided through the consulting services of the ODA loan (main works). (See "3.2.1 Project Outputs.") In addition, the Project planned to provide support for ethnic minorities (subsidies for settlement and support for obtaining agricultural materials, etc.) through the ODA loan (main works) from the perspective of "leave no one behind," and the results of interviews with relevant organizations and qualitative survey confirmed that the support was actually implemented. (See "3.3.2.2 Other Positive and

Negative Impacts.")

In terms of equity, it was confirmed through interviews with relevant organizations and qualitative survey conducted with 50 beneficiary farmers that the Project adopted a participatory process, and that consideration has been given to equitable distribution of water among farmers. (See "3.3.2.2 Other Positive and Negative Impacts.")

From the above, it can be said that the Project plan and approach were appropriate.

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan's ODA Policy

At the time of the appraisal of the ODA loan (E/S), JICA's *Implementation Policy for Overseas Economic Cooperation Operations (December 1999)* placed agricultural development, which would contribute to addressing regional disparities and poverty, as one of the priority areas for assistance to Viet Nam. In addition, JICA's *Country Operation Implementation Policy* identified agricultural infrastructure development as priority area of assistance from the perspective of poverty alleviation and the correction of regional disparities. At the time of the appraisal of the ODA loan (main works), Japan's *Country Assistance Plan to Viet Nam (April 2004)* included a focus on assistance related to the development and management of living and production infrastructure, such as agricultural water utilization. In addition, JICA's *Country Assistance Strategy for Viet Nam (April 2005)* emphasized support for infrastructure development in rural areas, such as irrigation, and for increasing employment and income opportunities for the poor. Furthermore, JICA's *Country Operation Implementation Policy (FY2005)* set out a policy of placing emphasis on supporting agricultural and rural development through improved agricultural productivity and diversification of agricultural products, and on supporting basic infrastructure that contributes to improving social and living environment of the poor, based on the poverty situation in the area and the needs of the poor. At the time of the planning of the Technical Cooperation Project Phase 2, Japan's *Country Assistance Program for Viet Nam (December 2012)* stated that one of the development agenda targets was to improve social and livelihoods, reduce poverty, and correct disparities, and that support would be provided for agricultural and rural development programs.

Therefore, the Project was consistent with the development cooperation policies of the Japanese government and JICA at the time of planning.

3.1.2.2 Internal Coherence

From the planning stage, the Project was expected to have coordination with the Technical Cooperation Project Phase 1 and the ODA loan "Dai Ninh Hydropower Project (2) (3)." Internal coherence is confirmed because collaboration and coordination with these projects was actually conducted, and synergistic effects have been realized.

The Technical Cooperation Project Phase 1 was implemented with the aim of establishing an approach to develop irrigated agriculture in Bac Binh District. In fact, the Phase 1 project has played a role in showing a clear direction for crop cultivation in the District and an overall picture for promoting irrigated agriculture (a guidepost for rural development) and was smoothly handed over to the ODA loan (main works) and the Technical Cooperation Project Phase 2. As a result of the collaboration, synergistic effects were generated, ensuring the sustainability of the Project's effects.

The Dai Ninh Hydropower Plant is located upstream of the Project area and was constructed by the ODA loan "Dai Ninh Hydropower Project (2) (3)." The facility began operation in 2008. The discharged water from the hydropower plant flows into Song Luy River and is used for irrigation for this Project. Based on the memorandum of understanding between DARD and the Dai Ninh Hydropower Plant, monthly meetings are held to discuss water rights, including discharge plans for hydropower generation and water intake plans for downstream irrigation. Close cooperation between the projects has been maintained from the time of Project implementation to the present. As a result of the cooperation, a stable water supply has been realized in the Project area. (For specific synergistic effects with the related projects mentioned above, see "3.3.2.2 Other Positive and Negative Impacts.")

3.1.2.3 External Coherence

External coherence is confirmed for the Project because collaboration with the Vietnamese government's own-funded projects and the project of World Vision, an international cooperation NGO, has been conducted and synergistic effects have generated.

During the implementation and after the completion of the ODA loan (main works), collaboration with the Vietnamese government's own-funded projects (construction of Song Luy Dam (reservoir)[6], tertiary canals, rural roads, etc.) has taken place and the projects are still ongoing. The collaboration has made it possible to supply sufficient water to the Project site, generating Project effects.

World Vision selected Bac Binh District as the target area for support, expecting synergistic effects with the ODA loan (E/S and main works), and provided support for poor farmers in planning agricultural activities (technical support for integrated pest control and integrated crop management). The collaboration has strengthened the capacity of farmers, etc., and reinforced the effectiveness of the Project.

Furthermore, the Project has collaborated with the Dry Irrigation Transport Program[7], a mutual assistance framework among farmers in Bac Binh District, and the existing community

[6] Construction period for Song Luy Dam (reservoir) was from February 2019 to September 2020, and it started operation in December 2020.

[7] The Dry Irrigation Transport Program is a framework to promote the maintenance and management of tertiary and on-farm canals, with Water Users Groups and Communes serving as focal points.

program for malaria prevention in the District, resulting in synergistic effects. (See "3.3.2.2 Other Positive and Negative Impacts" for concrete synergistic effects with the above related projects and programs.)

The Project is consistent with Viet Nam's development policy and development needs, and the Project plan and approach were appropriate. The Project is also consistent with Japan's development cooperation policy. Internal coherence with other JICA projects is also confirmed. Furthermore, external coherence is also confirmed, as collaboration and coordination have taken place with the Vietnamese government's own-funded projects and projects of other organizations, and synergistic effects are confirmed. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

ODA Loan (E/S)

Comparison of major planned and actual outputs of the ODA loan (E/S) is shown in Table 3. All were implemented as planned.

Table 3: Comparison of Major Planned and Actual Outputs of the E/S

Plan	Actual	Comparison
Review of final F/S	As planned	-
Assistance in preparation of Resettlement Action Plan	As planned	-
Detail design of irrigation facilities and preparation of bidding documents	As planned	-
Preparation of manuals for training agricultural extension service workers	As planned	-
Establishment of credit system (Note 1) (preparation of manuals, selection of implementing organizations (NGOs, etc.))	As planned	-
Preparation of guidelines for establishment of demonstration plots and agricultural cooperatives and preparation of staff training programs for executing agencies	As planned	-
Preparation of manuals for maintenance of irrigation facilities and water management	As planned	-
Preparation of environmental monitoring plans	As planned	-

Source: Information provided by JICA, results from questionnaire survey and interviews with the executing agency

Note 1: Introduction of microfinance system to support start-up of new farmland

ODA Loan (Main Works)

Comparison of major planned and actual outputs of the ODA loan (main works) (civil works and equipment procurement) is shown in Table 4. Major changes from the original plan were (1) changes in the number and distance of primary, secondary, and tertiary canals, (2) reduction in the area of farmland development, (3) reduction in the number of resettlement areas to be developed for settlers, and (4) additional scope using the unused balance of ODA loan. Regarding (1), adjustments were made based on the actual needs and the situation on the ground, and the change in scope was appropriate. Regarding (2), due to delays in construction of primary, secondary, and tertiary canals and the resulting delay in farmers starting to develop on-farm canals, the area of farmland development at the time of the project completion was 3,500 ha (reduction of outputs). The area of farmland developed at the time of the ex-post evaluation is 11,456 ha, as farmers continued to develop on-farm canals even after the completion of the Project. Regarding (3), the area was reduced in consideration of the resettlement intentions of the settlers themselves and changes in their needs. Compatibility with the housing and land use plans of the Communes in the Project area, the socio-economic master plan of Bac Binh District, and the new rural standards were also taken into consideration. The reduction in the outputs was appropriate, considering that the unused balance of ODA loan from the output reduction was utilized for additional scope as indicated in (4) (e.g., for the development of higher priority canals, etc.), and that the reduction in the number of resettlement areas avoided further increase in unoccupied vacant land (see Table 16 for the status of resettlement in the resettlement areas developed for settlers). Regarding (4), it was appropriate to add scope by utilizing the unused balance of ODA loan because rehabilitation of the main canals was a high priority issue from the perspective of generation of Project effectiveness.

Table 4: Comparison of Major Planned and Actual Outputs of the ODA loan (Main Works)
(Civil Works and Equipment Procurement)

Plan	Actual	Comparison
Song Luy headworks and main canals (9.7 km)	Song Luy headworks and main canals (9.72 km)	Almost as planned
10 primary canals, 62.8 km in total	8 primary canals, 40.8 km in total	Adjustments made according to actual needs and situation on the ground
27 secondary canals, 61.2 km in total	29 secondary canals, 83.3 km in total	Adjustments made according to actual needs and situation on the ground
7 tertiary canals, 13.8 km in total	14 tertiary canals, 22.979 km in total	Adjustments made according to actual needs and situation on the ground
Administration and connecting roads	As planned	-
Irrigation management office	As planned	-
Rehabilitation of Dong Moi main canal (gate rehabilitation)	As planned	-
Farmland development (mowing, leveling, stone removal, construction of on-farm canals and drainage channels on 10,500 ha of new irrigated land)	Farmland development (mowing, leveling, stone removal, construction of on-farm canals and drainage channels on 3,500 ha of new irrigated land)	Due to delays in the construction of canals and the resulting delay in farmers starting to develop on-farm canals, the area of farmland development decreased. At the time of the ex-post evaluation, developed area is 11,456 ha.
Development of 19 resettlement areas (public facilities and basic infrastructure)	Development of 4 resettlement areas (public facilities and basic infrastructure)	Reduction from 19 planned areas to 4 locations
-	Upgrading and lining Nha Mung-Cha Vau and Uy Thay-Da Gia main canals	Additional scope utilizing the unused ODA loan balance
Procurement of maintenance and management equipment	As planned	-

Source: Information provided by JICA, results from questionnaire survey and interviews with the executing agency

Comparison of major planned and actual outputs for the ODA loan (main works) (consulting services) is shown in Table 5. Survey and design of tertiary canals were added by utilizing the unused balance of ODA loan. Survey and design of tertiary canals were highly necessary but were not included in the original scope due to the budget constraints on the Vietnamese side. Thus, it was appropriate to add them by utilizing the unused balance of ODA loan.

Table 5: Comparison of Major Planned and Actual Outputs of the ODA loan (Main Works) (Consulting Services)

Plan	Actual	Comparison
Tender assistance	As planned	-
Construction supervision	As planned	-
Strengthening of agricultural extension services (training of agricultural leaders, etc.)	As planned	-
Guidance on operation and maintenance (including support for establishment of Water Users Groups)	As planned	-
Monitoring related to environment, resettlement and land acquisition, and infectious diseases	As planned	-
Implementation and monitoring of infectious disease control measures and HIV-AIDS control measures	As planned	-
-	Survey and design of tertiary canals	Unused ODA loan balance was utilized for survey and design of tertiary canals.

Source: Information provided by JICA, results from questionnaire survey and interviews with the executing agency

Primary Canal
(Source: External evaluator)

Secondary Canal
(Source: External evaluator)

Tertiary Canal
(Source: External evaluator)

Irrigation Management Office
(Source: External evaluator)

Technical Cooperation Project Phase 2

See [Direct Outcomes] in "3.3.1.2 Qualitative Effects (Other Effects)."

3.2.2 Project Inputs

Since the Project is an integrated evaluation of the ODA loan (E/S and main works) and the Technical Cooperation Project Phase 2, the analysis was conducted based on the average figures of the ratios (%) of the actual project cost and actual project period of each project against the planned amounts.

3.2.2.1 Project Cost

The planned and actual project costs are shown in Table 6. Project cost of the ODA loan (E/S and main works) was within the plan (79% and 92% of the planned cost, respectively). Project cost of the Technical Cooperation Project Phase 2 exceeded the plan (128% of the planned cost).

This was because the project period was extended by nine months, which resulted in an increase in personnel costs, vehicle costs, and other expenses.

The average of the Project costs for each project was 100% of the planned cost, remaining within the plan.

Table 6: Comparison of Planned and Actual Project Costs

	Plan	Actual	Comparison
ODA Loan (E/S)	437 million yen (including 437 million yen in ODA loan)	345 million yen (including 345 million yen in ODA loan)	79%
ODA Loan (Main Works)	6,197 million yen (including 4,874 million yen in ODA loan)	5,703 million yen (including 4,304 million yen in ODA loan)	92%
Technical Cooperation Project Phase 2	250 million yen	320 million yen	128%
Average compared to plan			100%

Source: Information provided by JICA, results from questionnaire survey with the executing agency

3.2.2.2 Project Period

The planned and actual project periods are shown in Table 7.

Table 7: Comparison of Planned and Actual Project Periods

	Plan	Actual	Comparison
ODA Loan (E/S)	24 months: March 2001 (signing of loan agreement) to February 2003 (end of consulting services)	53 months: March 2001 (signing of loan agreement) to July 2005 (end of consulting services)	221%
ODA Loan (Main Works)	93 months (see Table 8 for calculation method of period)	117 months (see Table 8 for calculation method of period)	126%
Technical Cooperation Project Phase 2	37 months: March 2016-March 2019	46 months: March 2016-December 2019	124%
Average compared to plan			157%

Source: Information provided by JICA, results from questionnaire survey with the executing agency

The project period for the ODA loan (E/S) was 221% of the plan, which significantly exceeded the plan. The reason for the delay was due to the delay in effectuation of the loan agreement. The condition for the loan agreement effectuation was the approval by the Prime Minister of the F/S prepared by MARD, but it took time for the contents of the F/S to be agreed upon by then JBIC and the Vietnamese side at the time, for the loan agreement to come into effect after approval by the Prime Minister. Thus, consultant's work did not begin until January 2004, two years and nine months after the loan agreement was signed.

The project period for the ODA loan (main works) was 82 months from March 2006 to December 2012, but the actual period including the period for the additional scope was 117 months from March 2006 to November 2015. As mentioned earlier in "3.2.1 Outputs," since the additional scope utilizing the unused ODA loan balance was relevant, and the period required for the additional scope (11 months) was commensurate with the additional outputs, the planned period was set at 93 months, which is the period required for the additional scope added to the originally planned period (82 months) (Table 8). The actual period was set at 117 months, including the actual period of the original scope (106 months) and the actual period of the additional scope. As a result, the project period exceeded the plan (126% of the planned period). The main reasons for the delay were delays in bidding and construction work, and delays in land acquisition. According to Binh Thuan Province DARD, it took time to reach an agreement with the target residents on the compensation amount during the land acquisition process, which also affected the construction work.

Table 8: Comparison of Planned and Actual Project Period for the ODA Loan Main Woks

Plan	Actual	Comparison
93 months: 82 months + 11 months	117 months: 106 months + 11 months March 2006 (signing of the loan agreement)-November 2015 (end of the warranty period)	126% of plan
Initial Plan	Actual for the Initial Plan	Additional Scope Duration Utilizing Unused ODA Loan Balance
82 months: March 2006 (signing of the loan agreement)-December 2012 (end of the warranty period)	106 months: March 2006 (signing of the loan agreement)-December 2014 (end of the warranty period)	11 months: January 2015-November 2015

Source: Prepared by the external evaluator

The planned project period for the Technical Cooperation Project Phase 2 was 37 months, from March 2016 to March 2019, as opposed to 46 months in actuality, from March 2016 to December 2019 which exceeded the plan, reaching 124% of the planned period. Main reason for the delay was due to the 9-month extension as a result of the terminal evaluation, as mentioned earlier in "1.3 Outline of the Terminal Evaluation."

As a result of the above, the average figure of the ratio of actual project period to the planned period for each project is 157%, which significantly exceeded the plan.

3.2.2.3 Inputs

The planned and actual elements of inputs for the Technical Cooperation Project Phase 2 are as shown in Table 9.

Table 9: Planned and Actual Elements of Inputs for the Technical Cooperation Project Phase 2

Elements of Inputs	Plan	Actual
Dispatch of Experts	Long-term experts: Chief advisor/on-farm water management/environmental and social considerations, upland irrigation, project coordinator/extension/public relations (number not specified) Short-term experts: Agricultural extension (upland crops) and other experts in necessary fields as needed (number of experts not stated)	4 long-term experts: Chief advisor/on-farm water management/environmental and social considerations, coordinator/extension/public relations, 1 short-term expert, 4 consulting experts: Chief advisor/on-farm water management, agricultural extension (upland crops), coordinator/extension/public relations
Training	Upland irrigation: About 8 people per year	Accepted 55 trainees (2 trainings in Viet Nam (1 each in 2016 and 2018) 2 trainings in Japan (1 each in 2016 and 2017))
Provision of Equipment	Soil analysis equipment, etc.	3.8 million yen: Materials for concrete canals, sluice gates for tertiary canals, PC, etc.
Overseas Project Enhancement Expenses	Not specified	3.8 million yen (as of the end of September 2018)

Source: Information provided by JICA

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

The economic internal rate of return (EIRR) of ODA loan projects at the time of the appraisal was 12.1%, with the project cost (excluding taxes), and operation and maintenance costs as "costs," the increased crop production as "benefits," and the project life as 30 years. When recalculated under the same conditions for this ex-post evaluation, the figure came to 18.9 %, which exceeded the values at the time of the appraisal.

Therefore, efficiency of the project is moderately low.

3.3 Effectiveness and Impacts[8] (Rating: ③)

It should be noted that, as mentioned earlier in "3.1.2.2 Internal Coherence" and "3.1.2.3 External Coherence," the effectiveness and impacts of the Project are not the results of this Project alone but are the results of synergistic effects with the Technical Cooperation Project Phase 1 and the Vietnamese government's own-funded projects.

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

At the time of the appraisal of the ODA loan projects, (1) "area benefited by the project," (2) "main cultivated area by crops," (3) "collection rate of irrigation water charge," (4) "production volume of major crops," and (5) "yield of major crops per unit area" were set as quantitative effect indicators of the project. For (2), (4), and (5), the commodities (cotton, winter-spring rice, summer-autumn rice, and bean) were specified. The baseline, target, and 2018-2023 actual values for each indicator are shown in Table 10. Since the project was completed in November 2015, the target year for comparison is 2018, three years after completion.

[8] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 10: Operation and Effectiveness Indicators

Indicators	Baseline Value 2005	Target Value 2015 3 Years After Completion	Actual Value					
			2018	2019	2020	2021	2022	2023
Area benefited by the project (ha)	1,200	11,700	10,671	11,010	11,473	11,766	11,855	12,178
Main cultivated area by crops (ha)								
・ Cotton	0	7,850	0	0	0	0	0	0
・ Winter-Spring Rice	604	1,930	5,225	5,790	2,960	6,510	6,754	6,885
・ Summer-Autumn Rice	1,051	4,750	5,490	6,680	6,680	6,820	7,123	7,480
・ Bean	490	3,020	1,012	1,024	1,045	1,312	1,323	1,496
(Additional indicator based on actual conditions)								
・ Autumn-Winter Rice			5,624	6,910	6,785	7,060	7,436	7,612
・ Fruits (Note 1) and vegetables			8,707	9,509	9,969	9,805	9,565	9,664
Collection rate of irrigation water charge (%)	N.A.	90	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Production volume of major crops (ton/year)								
・ Cotton	0	19,625	0	0	0	0	0	0
・ Winter-Spring Rice	2,718	9,650	34,015	37,056	18,737	42,315	41,402	44,753
・ Summer-Autumn Rice	4,414	22,325	32,281	40,080	43,086	42,966	42,738	45,628
・ Bean	245	3,020	1,417	1,229	1,672	1,443	1,323	1,197
(Additional indicator based on actual conditions)								
・ Autumn-Winter Rice			28,120	37,314	38,675	39,536	33,462	37,299
Yield of major crops per unit area (ton/ha)								
・ Cotton	N.A.	2.5	0	0	0	0	0	0
・ Winter-Spring Rice	4.5	5.0	6.5	6.4	6.3	6.5	6.1	6.5
・ Summer-Autumn Rice	4.2	4.7	5.9	6.0	6.5	6.3	6.0	6.1
・ Bean	0.5	1.0	1.4	1.2	1.6	1.1	1.0	0.8
(Additional indicator based on actual conditions)								
Autumn-Winter Rice			5.0	5.4	5.7	5.6	4.5	4.9

Source: Information provided by JICA (baseline values and target values), results from questionnaire survey of the executing agency (actual values)

Note 1: Dragon fruit, grapefruit, tangerine, melon, mango, and jackfruit.

Note 2: The large decrease in winter-spring rice area and its production in 2020 is due to the extremely low rainfall during the winter-spring rice growing season of that year, which greatly reduced the water storage capacity of the Song Luy Dam.

Note 3: The dry season in the Project area is from October to March, and the rainy season is from April to September.

The actual area benefited by the project in 2018 was 10,671 ha, with an achievement rate of 91%. After the completion of the ODA loan project, the Vietnamese government has continued to develop tertiary canals and other facilities through its own-funded projects, and the beneficiary area has been increasing steadily since then.

Cotton is not cultivated due to low market prices. As a result, cultivated area with cotton, its production volume, and yield per unit area are all zero. This is because cotton prices have fallen since 2010, and since the project was implemented, there is sufficient irrigation water and water reaches all the way to the end of the field, so farmers have decided to cultivate rice, fruit trees, and vegetables, which are more profitable. In other words, the assumed cropping patterns of farmers have changed due to the changes in the preconditions at the time of the appraisal.

For rice, the actual values for cultivated area, production volume, and yield per unit area for both winter-spring rice and summer-autumn rice far exceeded the targets (achievement rates are as follows. Cultivated area: Winter-spring rice 271%, summer-autumn rice 116%, production volume: Winter-spring rice 352%, summer-autumn rice 145%, yield per unit area: Winter-spring rice 130%, summer-autumn rice 125%). One particularly noteworthy and extremely significant achievement is that the cultivation of autumn-winter rice became possible, making three crops in a year possible. In addition, the sufficient amount of irrigation water has made it possible for farmers to grow fruit trees and vegetables.

For beans, the actual yield per unit area exceeded the target, but the actual values for cultivated area and production volume fell short of the target. This is because farmers switched to growing higher value-added crops (rice, fruit trees, and vegetables) and beans were only grown in the uplands during the rainy season.

As for the collection rate of irrigation water charge, water users fees are no longer collected from farmers who use irrigation facilities because they are covered by the government subsidies, and it is no longer necessary to collect water users fees from the farmers. In this Project, Water Users Groups were initially established on the assumption that farmers would pay water users fees, but the environment surrounding the Project has changed, and there is no longer any need to collect them in the first place (there is no longer any point in checking this indicator), which is why the indicator is marked as “N.A.”

As shown, cotton is not grown and bean production fell short of the target, but this is because

farmers voluntarily changed their cropping patterns to gain more profits. In addition, no water users fees are collected from farmers. This is also because the assumption that farmers would establish Water Users Groups and pay water users fees, which was assumed at the time of the appraisal, has changed. Therefore, based on the actual situation, data on autumn-winter rice cultivation area, its production, and yield per unit area and fruit trees and vegetable planted area for 2018-2023 were added to Table 10 as additional indicators. It is possible to confirm the realization of profitable autumn-winter rice (realization of three crops in a year) and planted area of fruit trees and vegetables, indicating that the Project has generated significant effects. In other words, it is confirmed, with concrete evidence, that the effects that have been realized more than compensated for the lack of achievement in cotton and beans.

From the above, it can be judged that the quantitative indicators, including additional indicators, have achieved their targets overall.

3.3.1.2 Qualitative Effects (Other Effects)

ODA Loan (E/S and Main Works)

Regarding the qualitative effects of the ODA loan project, (1) "improvement of agricultural productivity" and (2) "improvement of living standards of local residents in the Project areas," (1) is categorized as qualitative effects and (2) is categorized as impacts. Thus, (2) is described below in "3.3.2.1 Intended Impacts."

Table 11 summarizes the results of qualitative survey of 50 beneficiary farmers[9] on "improvement of agricultural productivity." Analysis was conducted after obtaining specific figures for each of the questions, "Compared to 10 years ago and 5 years ago, how have your (a) cultivated area, (b) production volume, (c) yield per unit area, and (d) agricultural income changed?" The results confirmed that most of the beneficiary farmers felt that agricultural productivity has increased.

[9] Breakdown of the 50 farmers is as follows. The gender and age bias is due to the fact that agricultural workforce is biased toward men and older age group as well as due to local customs.

- 40 men (12 in their 40s, 15 in their 50s, 13 in their 60s or older)
- 10 women (2 in their 20s, 1 in her 30s, 3 in their 40s, 2 in their 50s, and 2 in their 60s or older)

The ethnic breakdown of the 50 people is as follows. 32 Kinh, 14 Cham, 1 Ngai, 1 Tay, and 2 unknown.
The breakdown of Communes which 50 people live is as follows. 13 in Song Binh, 13 in Binh An, 12 in Phan Thanh, and 12 in Luong Son.

Table 11: Results of Qualitative Survey of 50 Beneficiary Farmers

Comparison with 10 years ago	Comparison with 5 years ago
(a) Change in cultivated area: The average cultivated area per beneficiary farm household has changed from 0.99 ha (10 years ago) to 1.32 ha (5 years ago) to 1.32 ha (at the time of the ex-post evaluation)	
・ 24 out of 50 (48%): Increased ・ 24 out of 50 (48%): No change ・ 2 out of 50 (4%): Decreased	・ 7 out of 50 (14%): Increased ・ 41 out of 50 (82%): No change ・ 2 out of 50 (4%): Decreased
(b) Change in production volume: Average production volume per beneficiary farm household increased from 6.6 tons (10 years ago) to 14.1 tons (5 years ago) to 19.8 tons (at the time of the ex-post evaluation)	
・ 49 out of 50 (98%): Increased ・ 0 out of 50 (0%): No change ・ 1 out of 50 (2%): Decreased	・ 43 out of 50 (86%): Increased ・ 6 out of 50 (12%): No change ・ 1 out of 50 (8%): Decreased
(c) Change in yield per unit area	
・ 43 out of 50 (86%): Increased ・ 7 out of 50 (14%): No response	・ 42 out of 50 (84%): Increased ・ 8 out of 50 (16%): No response
(d) Change in agricultural income: The average amount of agricultural income (annual income) per beneficiary farm household increased from VND 17.5 million (10 years ago) to VND 47.2 million (5 years ago) to VND 105.1 million (at the time of the ex-post evaluation)	
・ 46 out of 50 (92%): Increased ・ 1 out of 50 (2%): Decreased ・ 3 out of 50 (6%): No response	・ 46 out of 50 (92%): Increased ・ 4 out of 50 (8%): No response

Source: Prepared by the external evaluator

Regarding (d) agricultural income (annual income) per beneficiary farm household, compared with the existing data from the General Statistics Office of Viet Nam in Table 12, the income (annual income) per household in the entire Viet Nam, urban areas, and rural areas is 1.3 times, 1.1 times, and 1.4 times, respectively compared to five years ago (2018), while the income of beneficiary farm households surveyed in the qualitative survey has increased significantly by 2.2 times compared to five years ago. (For an analysis based on consumer price trends, see "(1) improvement in farm household income (increase in gross agricultural income per household)" in "3.3.2.1 Intended Impacts" below.)

Table 12: Income Per Household (Monthly Income) in the Entire Viet Nam, Urban Areas, and Rural Areas (Unit: In millions of VND)

	2018	2019	2020	2021	2022	2023
Entire Vie Nam	3.874	4.295	4.250	4.205	4.673	4.962
Urban Areas	5.624	6.022	5.590	5.388	5.945	6.260
Rural Areas	2.986	3.399	3.482	3.486	3.864	4.169

Source: General Statistics Office of Viet Nam (GSO)

Technical Cooperation Project Phase 2

For the Technical Cooperation Project Phase 2, outputs were classified as "direct outcomes" and project purpose and overall goal were classified as "outcomes," and the analysis was made under effectiveness (see "Figure 1: Conceptual Diagram of the Project's Logic Model" for the concept).

[Direct Outcomes]

<Outputs>

The status of achievement of the outputs at the time of the completion of Phase 2 is shown in Table 13. Output 1 was judged to be mostly achieved, Output 2 was achieved, Output 3 was mostly achieved, and Output 4 was achieved.

Table 13: Achievement Status of the Outputs of the Technical Cooperation Project Phase 2

Outputs	Indicator	Achievement Status
Output 1: Models of upland irrigated agriculture at tertiary canal (on-farm canal) level are developed.	(1) Upland irrigated farming practices have been conducted in the pilot sites (*). (2) The constructed tertiary canals are operated and maintained properly by Water Users Groups. (*) Two pilot sites are Binh An Commune and Song Binh Commune.	Almost Achieved (1) achieved and (2) partially achieved: In the pilot sites, upland irrigation agriculture for peppermint and new crops was implemented (Indicator 1). However, construction of tertiary canals in the irrigation project area was not all completed, and 8,361 ha of the planned 10,620 ha tertiary canals were constructed and partially used (Indicator 2).
Output 2: The overall water management plan for whole Phan Ri - Phan Thiet irrigation area is prepared.	Overall plan for operation and maintenance of irrigation facilities in Phan Ri - Phan Thiet irrigation area has been formulated.	Achieved Irrigation plan for the whole Phan Ri - Phan Thiet irrigation project area was formulated.

Output 3: Capacity of overall water management in whole Phan Ri - Phan Thiet irrigation area is strengthened.	More than 70% of the staff who is related to Phan Ri - Phan Thiet Irrigation Project at IMC, IME and DARD understand the training content.	Almost Achieved A survey on level of understanding of the training conducted after the water management training confirmed that 77% of staff understood the training contents.
Output 4: Capacity in disseminating the models of upland irrigated agriculture at tertiary canal (on-farm canal) level toward whole Phan Ri - Phan Thiet irrigation area is strengthened.	(1) Two staff members from the extension office in Bac Binh District instruct farmers in the training on upland crops introduced in the project. (2) Several farmers can instruct other farmers on upland crops introduced by the project.	Achieved Both (1) and (2) were achieved: Two agricultural extension workers from the Technical Service Center served as instructors a total of five times in cultivation training sessions for new crops, disseminating cultivation techniques to farmers (Indicator 1). Of the 25 farmers who tried out new crops, 15 farmers instructed neighboring farmers on cultivation methods of new upland crops (Indicator 2).

Source: Information provided by JICA, results from questionnaire survey of the executing agency

[Outcomes]

<Project Purpose>

The project purpose "Dissemination approach of efficient water management system in Phan Ri - Phan Thiet irrigation area including upland irrigation, which is based on appropriate cropping plan, is established" was not achieved, as shown in Table 14. At the time of project completion, only eight farms were producing and selling the upland crops introduced by the project and making a profit, falling short of the target of 20 farms.

Table 14: Achievement Status of the Project Purpose of the Technical Cooperation Project Phase 2

Project Purpose	Indicator	Achievement Status
Dissemination approach of efficient water management system in Phan Ri - Phan Thiet irrigation area including upland irrigation, which is based on appropriate cropping plan, is established.	20 farmers (*) are producing and selling upland crops introduced by the project and making a profit (not achieved) (*) Farmers who can manage water on a daily basis among 40 farmers who own farmlands in the two pilot sites.	Not Achieved Eight farmers are producing, selling, and making a profit from the upland crops introduced by the project, falling short of the target of 20 farmers (achievement rate: 40%).

Source: Information provided by JICA, results from questionnaire survey of the executing agency

At the time of the ex-post evaluation, there were 73 farmers who owned farmlands in the two pilot sites, and 71 of them were producing and selling upland crops and earning income, which is about nine times the number at the time of the project completion (March 2019). However, the majority of farmers in the project areas still depend on small-scale collectors, and there are issues such as unstable prices of agricultural inputs and agricultural products, and farmers' agricultural production income is easily affected by market conditions. Farmers rely on small-scale collectors because they provide farmers with agricultural machinery, fertilizer, and other materials and equipment without requiring up-front payment (payment is settled at the time of sale of agricultural products). To address these issues, Bac Binh District People's Committee is encouraging the establishment of agricultural cooperatives and contracts with private companies (such as distribution and processing companies) as business partners, with the aim of stabilizing agricultural product prices and creating stable agricultural production areas and realizing stable livelihoods. However, there are only five agricultural cooperatives active in the seven Communes of Bac Binh District. This is recognized as an issue not only for this District but for the whole of Viet Nam, but the fact that many small and micro-farms are scattered around has become a physical barrier. It is also important to change farmers' mindset (to not rely too heavily on small-scale collectors, and to conduct agricultural activities with a more medium- to long-term perspective). In order for farmers to be incorporated into the value chain, they need to meet the standards required by private companies (e.g., producing agricultural products of a set quantity and quality within a set period of time in accordance with set safety standards). The Vietnamese government is promoting the establishment of agricultural cooperatives, and the improvement of crop production and management capacity.

On the other hand, a good practice example that deserves special mention is the cultivation of peppermint by the local private peppermint processing company, which processes oil for wholesale and exports to Japan. The company was established in Bac Binh District in 2013 and

has been promoting sustainable agricultural development that ensures profit by establishing a value chain and enhancing value-added. The company has established business and cooperative relationships with a Japanese peppermint company and is expected to actively develop its business in the future.

Peppermint Field at a Local Private Mint Processing Company
(Source: External evaluator)

Orchard in Phan Lam Commune (Grapefruit Harvesting)
(Source: External evaluator)

<Overall goal>

The overall goal was "Achievement of Phan Ri - Phan Thiet Irrigation Project (ODA loan (main works)) is enhanced." As shown in Table 15, it is judged that this is achieved. Although the achievement of the project purpose was limited, the effects continued and further enhanced after project completion, and the overall goal was achieved through synergistic effects with the ODA loan project, the Vietnamese government's own-funded projects (which is ongoing), and the Dry Irrigation Transport Program, which is a framework for mutual assistance among farmers in Bac Binh District.

Table 15: Achievement Status of the Overall Goal of the Technical Cooperation Project Phase 2

Overall Goal	Indicator	Achievement Status
Achievement of Phan Ri - Phan Thiet Irrigation Project is enhanced.	(1) Tertiary canals are properly operated and maintained in 274 tertiary units (to cover 10,500 ha) (2) 70 ha of new upland crops in the Phan Ri - Phan Thiet Irrigation Project area is cultivated	Achieved Both (1) and (2) are achieved: Tertiary canals cover 11,456 ha and are operated and maintained with almost no problems (Indicator 1). The area planted with new upland crops (fruit trees and vegetables) is 2,844 ha (Indicator 2).

Source: Information provided by JICA, results from questionnaire survey of the executing agency

The achievement level of each indicator was judged based on the qualitative survey of 50 beneficiary farmers, interviews with Bac Binh District People's Committee, and site inspections during the field survey. Regarding indicator (1) "Tertiary canals are properly operated and maintained in 274 tertiary units (to cover 10,500 ha)," at the time of the ex-post evaluation, tertiary canals cover 11,456 ha and are operated and maintained almost without problems under the Dry Irrigation Transport Program in Bac Binh District. The qualitative survey results showed that 37 out of 50 beneficiary farmers (74%) answered that the tertiary canals are operated and maintained well, 11 (22%) answered that it is all right, and 2 (4%) answered that there are some problems (removal of sediment accumulated in the canals and repairs of deteriorated canals are not being carried out in a timely manner, and necessary funds are insufficient). Regarding indicator (2) "70 ha of new upland crops in the Phan Ri - Phan Thiet Irrigation Project area is cultivated," the area planted with fruit trees and vegetables is 2,844 ha at the time of the ex-post evaluation. As mentioned earlier in "3.3.1.1 Quantitative Effects (Operation and Effect Indicators)," since there is sufficient irrigation water after the Project, farmers changed their cropping patterns to cultivate crops with higher value added (rice, fruit trees and vegetables). Bac Binh District People's Committee has been providing farmers with guidelines on cropping plans and cultivation methods. In addition, an increasing number of farmers are receiving training at the District's Technical Service Center, enabling farmers to grow crops with an understanding of the pesticides and fertilizers needed to cultivate their crops.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The state of generation of "impacts" of the project, i.e., (1) "increase in farmers' income (increase in gross farm income per household)" and the "final impacts," i.e., (2) "improvement in the living standards of local residents" and (3) "poverty reduction," were confirmed from the results of questionnaire survey of the executing agency and related organizations, as well as the qualitative survey conducted with 50 beneficiary farmers.

[Impacts]

(1) Increase in farmers' income (increase in gross farm income per household)

As shown in Table 11, the results of the qualitative survey show that the average agricultural income (annual income)[10] per beneficiary farm household surveyed has increased from 17.5 million VND (10 years ago) to 47.2 million VND (5 years ago) to 105.1 million VND (at the time of the ex-post evaluation), which is six times higher than 10 years ago. Since the consumer price (estimate) in 2024 is about 1.3 times[11] that of 10 years ago, it

[10] The figures are self-reported by the beneficiary farmers in the qualitative survey and may not be accurate.
[11] Source: IMF World Economic Outlook Database

can be said that farm income has increased significantly in real terms. In addition, 46 out of 50 farmers (92%) responded that their agricultural income has increased compared to 10 years ago, and 46 farmers (92%) responded that their agricultural income has increased compared to 5 years ago, both of which are extremely high percentages. Furthermore, according to Bac Binh District People's Committee, after the completion of the tertiary canal, farmers have been actively improving their land, switching to crops with higher value-added, and conducting agricultural activities while improving cultivation techniques and soil fertility, which has led to an increase in income. As discussed earlier in "3.3.1.2 Qualitative Effects (Other Effects)," it can be inferred that the income of the beneficiary farmers of the Project has increased significantly compared to the data from the General Statistics Office of Viet Nam in Table 12.

From the above, it can be said that the Project has contributed to improving farmers' incomes.

[Final Impacts]

(2) Improvement in the living standards of local residents

The results of the qualitative survey indicated that 47 out of 50 people (94%) responded that their standard of living has improved as a result of the Project (remaining 3 respondents did not answer). Of the respondents, 15 (32%) answered that they were very satisfied with their current standard of living, and 32 (68%) responded that they were satisfied. (For qualitative responses, see BOX 1, "Detailed Analysis of People's Well-Being.")

In light of the above, it can be said that the Project has contributed to improving the living standards of local residents.

(3) Poverty reduction

The results of the qualitative survey showed that 48 out of 50 people (96%) answered that the Project contributed to reducing the number of poor farmers (remaining 2 did not answer). The main responses from the farmers were as follows.

- After the project, the number of poor households was significantly reduced. Before the project, rain-fed agriculture was practiced with one crop in a year, but the Project enabled farmers to use irrigation water to grow three crops in a year, which significantly increased their income.
- The amount of irrigation water provided by the Project is sufficient, and the number of poor households was reduced. The increased variety of crops that could be grown allowed farmers to switch to more profitable crops, which significantly increased their incomes.
- Before the project, all the farmers were poor even though they owned farmland, but

after the project, farmers were lifted out of poverty.

In light of the above, it is considered that the Project has contributed to reducing the number of poor farmers in Bac Binh District.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

The ODA loan (main works) was classified as Category A as it falls under the agricultural sector listed in *the JBIC Guidelines for Confirmation of Environmental and Social Considerations (April 2002)* having characteristics that are likely to have an adverse effects, while the ODA loan (E/S) was classified as Category B in *the JBIC Guidelines for Environmental Consideration in ODA Loans (October 1999)* because it was the E/S for projects that fall under Category A. The Technical Cooperation Project Phase 2 was classified as Category B as it does not fall under the environmentally sensitive sector, characteristics, or sensitive area listed in *the JICA Guidelines for Environmental and Social Considerations (April 2010)* and the adverse impacts on the environment were considered to be not significant.

According to the executing agency, during the implementation of the ODA loan (main works), monitoring was conducted by the environmental consultants on air quality, soil, water quality, and vegetation. No particular negative impacts were reported as a result of the monitoring. According to the executing agency, no particular negative impacts were reported during the implementation of the Technical Cooperation Project Phase 2 as well. Also, no protected or endangered flora or fauna were found in the reservoir or river. No negative impacts on the ecosystem were observed. As a pollution countermeasure, excessive use of pesticides and chemical fertilizers was avoided by promoting integrated pest management in accordance with the local pesticide management guidelines. No particular complaints were raised in the interviews with the farmers. It was also confirmed with the executing agency that no particular negative impacts were reported when irrigation facilities are in service.

Based on the above and the on-site inspection, it is considered that there was no particular negative impact on the natural environment.

2) Resettlement and Land Acquisition

Resettlement action plan (RAP) was prepared under the ODA loan (E/S), and land acquisition of 858.99 ha occurred under the ODA loan (main works), and agricultural land for 1,524 households was subject to land acquisition. Land acquisition procedures were conducted in accordance with the Vietnamese domestic laws and JBIC/JICA guidelines for confirming environmental and social considerations. The farmers had no objections to the Project and were cooperative with the land acquisition. According to Binh Thuan Province

DARD, a detailed social survey was conducted prior to the construction work, and through this survey, farmers were informed in advance of the contents and benefits of the Project. Some farmers were expecting more compensation, so it took some time to come to agreements on the price of land and trees, but there was no particular confusion. According to the qualitative survey, 20 out of 50 households (40%) were affected by the land acquisition, but all of them were satisfied with the compensation amount and had no particular complaints, including about the procedures.

In the Technical Cooperation Project Phase 2, due to lack of funds on the Vietnamese side, construction of terminal canals did not progress, which led to farmers becoming less willing to provide land, and the land acquisition process took time. There was no compensation for land acquisition, as there was with the ODA loan, and farmers voluntarily provided their land, but according to the executing agency, some farmers felt it was unfair that there was no compensation.

Resettlement sites (four sites) developed for settlers by the ODA loan (main works) are equipped with basic infrastructure such as electricity and water supply, as well as facilities such as schools and clinics, and are ready for resettlement at any time. The status of resettlement in the resettlement sites developed for settlers is shown in Table 16. 571 plots were offered to the target households, but only 71 (12.4%) of them actually built houses and settled, while the remaining households continue to live in their original locations. According to Bac Binh District People's Committee, the reason for the lack of progress in resettlement is that the target households are assessing the trends of other resettled households, and also because they are waiting to see what the Commune's housing and land use plans will be like in the future.

Table 16: Status of Resettlement in the Resettlement Sites (Four Sites) Developed for Settlers

Resettlement Sites (Communes)	Number of Plots Offered to Resettled Households	Number of Households Already Built Houses
S11 (Bac Son - Luong Son)	188	40
C1 (Binh An)	152	7
C2 (Phan Lam)	3	2
C5 (Song Binh)	228	22
Total	571	71 (12.4%)

Source: Bac Binh District People's Committee

From the above, although the resettlement and land acquisition process took time, there were no major problems. Resettlement to the resettlement sites developed for settlers has not

progressed, but this may be due to the fact that target households are determining the appropriate time for resettlement.

3) Gender Equality, Marginalized People

Regarding communication, coordination, and decision-making among beneficiary farmers, it was confirmed that all farmers, regardless of the size or location of their farmland, gender, ethnicity, etc., are able to participate in the decision-making process, that they are guaranteed an opportunity to speak, and that the needs of women and poor farmers are also reflected. (In the qualitative survey, 49 out of 50 people (98%) responded that fairness is always or almost always ensured in the decision-making process among farmers.)

Water is distributed to the end of the farmland and irrigation water is supplied in the right amount at the right time, and there are no particular conflicts among farmers. (49 out of 50 people (98%) responded that water is distributed fairly and adequately.) Water Users Groups have established rules (Water Users Group rules) for water allocation and usage among farmers, and a system is in place for fair water distribution based on the agreement among farmers.

Regarding changes in the environment surrounding women (whether changes in behavior and awareness, such as mutual support by men in the village, have occurred), 43 out of 50 people (86%) responded "somewhat," "much," or "a great deal," indicating that changes have occurred.

The Project provided support to ethnic minorities when they settle in new rural areas, such as subsidies and assistance with obtaining agricultural materials. As shown in footnote 9, 16 out of the 50 respondents in the qualitative survey were ethnic minorities (14 Cham, 1 Ngai and 1 Tay), and of these, 14 answered that they received support and were satisfied with it. (The remaining two said they did not receive any support.) In Bac Binh District, different ethnic groups, including ethnic minorities, live together peacefully in the same area, and the survey also confirmed that no particular problems between ethnic groups have occurred.

From the above, gender and equity considerations have been considered in the Project.

4) Social Systems and Norms, People's Well-being and Human Rights

In the qualitative survey, questions were asked about "confidence in irrigated agriculture," "willingness to increase agricultural production," "willingness to collaborate with distributors and processors," and "sense of cooperation among farmers." For each question, all 50 farmers responded that their confidence, willingness, and awareness have increased.

Based on these results, in this ex-post evaluation, 20 people[12] were selected out of the 50

[12] The breakdown of the 20 farmers is as follows. Those who were able to answer in-depth questions with specific

people subject to the qualitative survey and analyzed in detail in order to dig deeper starting from the subjective life satisfaction of the beneficiary farmers and to obtain a deeper understanding of the impacts on wellbeing, including the impacts that were not intended at the time of the planning. As a result, all 20 respondents answered that they are satisfied with their lives and their level of well-being increased after the Project, and it became clear the Project brought about positive changes in the subjective well-being of the farmers, especially in the individual domains related to "housing," "social connections," and "employment." No one pointed out any negative impacts of the Project. "Increased trust in government" was an impact that was not anticipated prior to conducting this in-depth analysis survey. Regarding "respect for cultural norms of ethnic minorities," it was confirmed that there is no discrimination or prejudice against ethnic minorities, that different ethnic groups coexist peacefully, and that there are no particular problems with preserving their culture. The individual domains and items of people's well-being in this survey, as well as major specific examples and episodes obtained from the farmers, are summarized in Box 1, "Detailed Analysis of People's Well-Being."

BOX 1: Detailed Analysis of People's Well-Being

Survey Objective: To deepen understanding of the impacts of the Project by taking a deeper look at whether positive or negative impacts other than those anticipated as Project effects are being produced, starting from the farmers' subjective life satisfaction.

Research Target: Of the 50 qualitative survey targets, 20 people were selected who could answer in-depth questions with specific examples and episodes, while also taking into consideration in terms of place of residence, age, gender, and ethnicity.

Research Methodology: Group interviews were conducted in each Commune.

Findings: Individual domains, items, specific examples and episodes that influenced changes in farmers' subjective well-being and happiness are summarized below.

Individual Domains	Items	Specific examples or episodes obtained from farmers (major examples)
Housing	Satisfaction with living environment	・ Before the Project, the area was very dry, and the living environment was not good. At that time, farmers conducted rain-fed agriculture and slept in temporary huts on the farmland during the farming period, which was very

examples and episodes, and those who made suggestions regarding secondary effects in the qualitative survey were selected as the main respondents.

- 17 men (7 in their 40s, 5 in their 50s, 5 in their 60s or older)
- 3 women (1 in her 40s, 2 in their 60s or older)

The ethnic breakdown of the 20 people is as follows. 12 Kinh, 7 Cham, and 1 Ngai.
The breakdown of Communes which 20 people live is as follows. 5 in Song Binh, 5 in Binh An, 6 in Phan Thanh, and 4 in Luong Son.

		inconvenient because there was not enough water. (Note: Many farmers live on their farmland during the farming period because their farmland is located some distance away from the village.) After the Project, the farmers no longer have to worry about water. Three crops in a year has realized, and agricultural income has increased, allowing farmers to build more permanent structures (houses) on the farmland while still having the main living base in the village, thus improving the quality of life on the farmland. (Farmer in Phan Thanh Commune, a man in his 50s) ・ After the Project, water shortage was resolved and I built a bathroom inside my house, which enables the whole family to take showers in the house. (Previously, we used to take soap and go on foot or by bicycle to a river 2 to 3 km away to wash our bodies. We had to fetch water from the river for our children and return home, which was an inconvenient lifestyle.) (Farmer in Binh Anh commune, a man in his 40s) ・ Before the Project, water was very precious. We lived by digging deep into the ground and drawing groundwater. Since there was a constant water shortage at that time, the same water was used for various purposes. First, I washed the rice, then washed the vegetables with the water from the rice, and then washed my hands and feet with the water from the vegetables. Now we do not have to worry about water at all, I do not have to reuse it, and I can use it freely whenever I want. (Farmer in Song Binh Commune, a woman in her 60s) ・ Before the Project, farmland often burned on sunny days during the off-season (dry season). Since rain-fed agriculture was used at that time, farmland in the dry season was vacant and was burned when it was ignited by cigarette fires. After the Project, farmland is irrigated with water and crops are cultivated even in the dry season, so fires no longer occur. (Farmer in Phan Thanh Commune, a man in his 50s)
Health	Physical health	・ After irrigation facilities were developed, trees were planted around the farmers' farmland. Before the Project, I had to work continuously under the hot sun, which was quite hard on my old body, but after trees were planted, I can take a rest under the shade of the trees between farm work, making it easier for me to manage my health. (Farmer in Binh An Commune, a woman in her 70s)
	Mental health	・ Before the Project, we were relying on rain-fed agriculture, so if it did not rain, there would be no harvest and or income, and all the work would go to waste. So, I always felt anxious about whether I could make a living. After the Project, I no longer worry about water, and I no longer feel anxious. If there is enough water, everyone can be happy. (Farmer in Song Binh Commune, a man in his 60s)

Social Connection	Connection with the community	・ Before the Project, farmers just exchanged greetings when we met other farmers because we had only one crop in a year. But after the Project, we can grow three crops in a year, and we see each other all year round on the farmland for farm work. We not only say hello, but also enjoy spending time together during breaks and chatting. We have become more sociable, and I feel that unity among farmers has been strengthened. I have also become more relaxed in my life and have started to voluntarily participate in club activities (I joined clubs for the elderly people and women and have made friends to practice tai chi and sing with chorus members). I also joined a farmers' club that was established as part of World Vision's support which is still active. Our network has expanded, and farmers are sharing information with each other. (Farmers in Song Binh Commune, a man his 60s, and a woman in her 60s) ・ After the Project, unity and ties among farmers have strengthened. We work together to decide on the crops we grow. We also cooperate to buy fertilizer and seeds together. (Farmers in Phan Thanh Commune, a man in his 40s) ・ Farmers cooperate with each other in our daily life, and we voluntarily participate in the cleaning of the tertiary canals. If someone cannot participate in the cleaning for some reason, others who is able to do so will do it for them, creating a mutually beneficial relationship. (Farmers in Phan Thanh Commune, a man in his 40s, and a woman in her 40s)
Safety	Crime	・ Before the Project, when we had only one crop in a year, young people had a lot of free time and some of them would spend time together with bad people, which made me feel scared. But after the Project, we can cultivate three crops in a year, and there is farm work all year round, so I feel that there are no more young people who hang out with those kinds of people. (Farmer in Luong Son Commune, a man in his 60s)
	Conflict and violence	・ A neighboring farmer told me that before the Project, when we were growing only one crop in a year, life was poor and there was domestic violence after her husband came home after drinking. After the Project, the farmers' income increased and their lives became more prosperous, and they began to interact more with the neighbors, for example, singing karaoke together. Everyone in the community is able to enjoy life more, and stories of domestic violence are no longer heard. (Farmer in Luong Son Commune, a man in his 50s)
Governance	Trust in government	・ The resettlement sites were developed by the Project. Basic infrastructure such as electricity, water, and roads are also in place. Compensation has also been paid to the target residents. At present, the number of households that have resettled is not large, but seeing the support being provided has increased my trust in the government. (Farmer in Luong Son Commune, a man in his 60s)

		・ Our lives have changed dramatically since the irrigation facilities were developed by the Project. The government has provided the basic infrastructure that is extremely important to our lives as farmers. I feel encouraged by the government's leadership and my trust in the government has increased. (Farmer in Song Binh Commune, a man in his 50s)
Employment	Confidence and satisfaction in irrigated agriculture	・ Before the Project, all farmers were poor because we only had one crop in a year and conducted rainfed farming, so our income was low. Since we could not live on our agricultural income alone, we had to travel about an hour to the mountains to cut down trees and sell them to lumber collectors and carpenters to cover our living expenses. We felt we had no choice and that it was the only way to make a living. (Currently, the forest is protected by the government, and cutting down trees is illegal.) After the Project, we are able to farm even in the dry season because there is enough irrigation water. Three crops in a year became possible, and our income from farming increased significantly, allowing us to concentrate on farming. We are satisfied with irrigated agriculture. (Farmer in Luong Son Commune, a man in his 50s) ・ Before the Project, farmers only earned a small income from one crop in a year and had to go to work elsewhere (such as factories 20-30 km away from our homes) to make a living. These jobs were temporary and unstable. At the time, my children were small, so it was difficult for me to go back and forth between the factory and my home many times to raise them. After the Project, I was able to concentrate on farming, and I am satisfied with my work. (Farmer in Song Binh Commune, a man in his 40s)
Culture	Respect for cultural norms of ethnic minorities	・ Although different ethnic groups live in the same village, there are no particular problems among ethnic groups. We, the Cham, live in harmony with other ethnic groups and maintain our Cham culture (language, culture, religion, etc.). People of other ethnic groups in the village also respect the Cham culture. (Farmer in Binh Anh Commune, a man in his 60s) ・ The Kinh people treat us, an ethnic minority group, with respect, and we have a relationship of mutual trust. We, the Cham, maintain our own culture (language, customs, ceremonies, festivals, clothing, etc.). Every year in the tenth month of the lunar calendar, there is a big Cham festival, and all the Kinh people participate and enjoy singing and dancing together with us. (Farmer in Luong Son Commune a man in his 40s)

Source: Prepared by the external evaluator

5) Unintended Positive/Negative Impacts

<Synergistic effects from collaboration with the Technical Cooperation Project Phase 1>

As discussed earlier in "3.1.2.2 Internal Coherence," the Technical Cooperation Project Phase 1 was implemented to establish an approach to develop irrigated agriculture in Bac

Binh District. It created a model for operating the irrigation system and cultivating new crops and facilitated the construction of comprehensive tertiary and on-farm canals in Bac Binh District. The irrigation infrastructure was developed by the ODA loan project, and sufficient irrigation water volume was secured, which has facilitated the implementation of the Technical Cooperation Project Phase 1 and 2. The implementation of the Technical Cooperation Projects also promoted the realization of the effects of the ODA loan project, and a virtuous cycle was created in which sustainability was ensured. According to Binh Thuan Province DARD, it would have taken more time to acquire technical knowledge of irrigation systems and cultivate new crops if the Technical Cooperation Project Phase 1 has not been implemented. In addition, all inputs and activities would have been fragmented without a clear direction for crop cultivation in Bac Binh District. The implementation of the Technical Cooperation Project Phase 1 enabled them to grasp the overall picture of rural development and provided a guidepost for subsequent initiatives.

<Synergistic effects from collaboration with Dai Ninh Hydropower Project (2), (3)>

The collaboration has enabled a stable water supply to the Project target area downstream of Song Luy River, where water is released from the hydroelectric power plant. According to MARD and Binh Thuan Province DARD, the peak electricity demand in Viet Nam is from May to August, and it is necessary to secure water storage capacity for hydropower plants in advance to meet peak demand. However, from the viewpoint of supporting farmers' livelihood, Dai Ninh Hydropower Plant has been discharging water on a priority basis even during the dry season in Binh Thuan Province (October to March). Until Song Luy Dam (reservoir) was constructed with the Vietnamese government's own funds, the water discharged from the power plant has played a significant role in the water supply, especially during the dry season as the key source of water for the Project.

<Synergistic effects from collaboration with the Vietnamese government's own-financed projects>

After completion of the ODA loan (main works), Song Luy Dam (reservoir) was constructed as the Vietnamese government's own-funded projects, and Bac Binh District became the "water center" of Binh Thuan Province, resolving water shortages. The Project area has sufficient irrigation water, and water reaches to the end of the canal. Furthermore, water supply has been realized to the surrounding areas of Bac Binh District[13], where water is also used for agricultural, residential, commercial, and industrial purposes. For example, a large titanium mineral processing industrial zone and a milk factory have been built in the District. The stable water supply has improved the investment environment, and it can be

[13] Phan Thiet City, Ham Thuan Bac District and Tuy Phong District.

said that the District has been successful in attracting factories. This area used to be one of the driest areas in Viet Nam, where it was unthinkable to build factories, but it has now been transformed into one of the most water-rich areas, and economic activities have become more active, not only in agriculture but also in attracting investment.

<Synergistic effects from collaboration with World Vision (international cooperation NGO)>

It was confirmed through interviews with Bac Binh District People's Committee that the results of World Vision's project (farmers' acquisition of crop cultivation techniques, promotion of sales at higher prices and in larger markets, improved livelihoods for children, etc.) were generated through synergistic effects with the Project, and World Vision's project also contributed to the creation of outcomes and impacts of the Project (increased farmers' income).

<Synergistic effects from collaboration with Bac Binh District's Dry Irrigation Transport Program>

Under the Dry Irrigation Transport Program, a framework for mutual support among farmers, farmers cooperate and share the work by providing free labor, and maintenance activities for tertiary and on-farm irrigation canals are promoted by Water Users Groups and Communes as focal points.

<Collaboration with the community program for malaria prevention in Bac Binh District District>

Bac Binh District has an existing community program and guidelines for malaria prevention, which were successfully coordinated with the ODA loan project (implementation and monitoring of infectious disease control measures). Through this collaboration, residents' awareness was raised, and infectious disease control measures were promoted, leading to the prevention of malaria infection, contributing to the creation of a safe and secure living environment.

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

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

As discussed earlier in "3.1.1 Relevance," there is no change in Binh Thuan Province's policy of building commodity-based agriculture and increasing productivity to achieve modern and sustainable agriculture at the time of the ex-post evaluation. Therefore, sustainability in terms

of policy and system is assured.

3.4.2 Institutional/Organizational Aspect

Regarding operation and maintenance of the Project, IMC is responsible for the headworks and main canals, Bac Binh District IME for the primary and secondary canals, and beneficiary farmers are responsible for the maintenance of tertiary and on-farm canals.

IMC consists of Administrative Department, Planning and Engineering Department, Irrigation Management Department, and Financial Management and Accounting Department under the supervision of Director and Deputy Director. Under IMC, IME has been established in each of the seven Districts that have irrigation facilities, and the total number of IMC staff members, including IME is 583 as of the ex-post evaluation. The operation and maintenance of the Project is under the jurisdiction of Bac Binh District IME, which consists of 71 staff members. The number of staff members responsible for operation and maintenance of the Project is sufficient, and there have been no problems with staff turnover.

As for the beneficiary farmers, farmers share and cooperate with each other to maintain and manage all tertiary and on-farm canals under the Dry Irrigation Transport Program of Bac Binh District. Not all irrigation areas have established Water Users Groups, and the operation and maintenance of tertiary and on-farm canals in areas without Water Users Groups are led by the Commune in charge. The number of Water Users Groups established in the seven Communes in the project target area is shown in Table 17.

Table 17: Number of Water Users Groups Established in the Seven Communes in the Project Area

Project Target Communes	Number of Water Users Groups
Binh An	1
Hai Ningh	1
Song Binh	6
Phan Thanh	5
Phan Lam	0
Luong Son	2
Hong Thai	1
Total	16

Source: Bac Binh District People's Committee

Communication, coordination, and decision-making among IMC, Bac Binh District IME, and beneficiary farmers have been conducted without any particular problems. Bac Binh District IME reports to IMC on operation and maintenance status monthly, and in case of emergency it reports to the IMC each time, and a system of communication and coordination is in place. Bac

Binh District IME also concludes Memorandums of Understanding regarding water supply with Water Users Groups for each cropping season and formulates water management plans based on the crop cultivation plans, cultivation areas, required water volumes, weather conditions, etc., and makes adjustments to ensure that water is distributed to the entire irrigated area.

On the other hand, according to the interview with Bac Binh District People's Committee, there is a shortage of extension workers in the District, and with the support of Binh Thuan Province Agricultural Extension Center, efforts are being made to establish community agricultural extension groups.

From the above, there is a shortage of agricultural extension workers in Bac Binh District and some problems remain, but measures are being taken.

3.4.3 Technical Aspect

Most (80-90%) of IMC and Bac Binh District IME engineers in charge of operation and maintenance of irrigation facilities (headworks, main canals, primary and secondary canals) developed by the ODA loan (main works) have graduated from irrigation universities in Hanoi and in Ho Chi Minh City and have sufficient technical skills for daily operation and maintenance. In addition, training was conducted to staff of IMC, IME, and Binh Thuan Province DARD as part of the consulting services of the ODA loan project, with the aim of strengthening their operation and maintenance capacity. Participants of the training have shared the training contents with other staff, and the knowledge and skills they acquired through the training are being used in their daily maintenance work. In addition, experienced senior staff members of IMC and IME provide daily on-the-job training (OJT) to younger staff. For the maintenance of tertiary and on-farm canals, capacity of managers has been strengthened through training by the ODA loan project, and in Technical Cooperation Project Phase 1, the irrigation maintenance manual has promoted farmers to understand participatory irrigation maintenance management. As a result, farmers provide labor free of charge, removing sediment and rubbish that have accumulated in the canals and pulling weeds, and thus no specific skills are required for this work.

As for agricultural extension workers, they have been trained using the manuals created through the Technical Cooperation Projects.

From the above, it is considered that the on-site operation and maintenance staff and farmers have sufficient technical capacity to conduct ordinary operation and maintenance work, and there are no particular problems.

3.4.4 Financial Aspect

Planned budget, actual allocation, and actual expenditures for operation and maintenance of

irrigation facilities in Bac Binh District are shown in Table 18. According to IMC, the budget necessary for daily operation and maintenance activities has been secured and there are no particular problems. In addition, it is possible to mobilize contingency funds necessary for large-scale repairs in an emergency, if necessary.

Table 18: Operation and Maintenance Costs for Irrigation Facilities in Bac Binh District

(unit: Million VND)

	2020	2021	2022	2023
Planned Budget	2,270	1,317	2,229	1,721
Actual Allocation	2,263	1,314	2,053	1,620
Actual Expenditures	2,263	1,314	2,053	1,620

Source: IMC

As mentioned above in "3.4.3 Technical Aspect," farmers provide labor for free for the maintenance of tertiary and on-farm canals. Irrigation water is subsidized by the government, and water users fees are not collected by Water Users Groups or other entities. When excavators or other equipment are needed for maintenance, farmers contribute funds each time.

From the above, there are no particular problems with the financial aspects of operation and maintenance.

3.4.5 Environmental and Social Aspect

As a result of confirmation with the executing agency, there were no unexpected environmental and social considerations.

3.4.6 Preventative Measures to Risks

As mentioned earlier in "3.3.2.2 Other Positive and Negative Impacts," after completion of the ODA loan (main works), the Vietnamese government constructed Song Luy Dam (reservoir) in the upstream of Song Luy Headworks with its own funds, which has eliminated water shortages during the dry season. Bac Binh District, once the driest area in Viet Nam, is now the "water center" of Binh Thuan Province, providing the province with sufficient supply of water and farmers no longer have to rely on water discharged from Dai Ninh Hydropower Plant.

From the above, appropriate measures are being taken to address risks.

3.4.7 Status of Operation and Maintenance

The irrigation facilities constructed by the Project (Song Luy Headworks, main canal, primary, secondary, tertiary and on-farm canals) are operating without any problems and are fully

utilized. Operation and maintenance status (routine maintenance, preventive maintenance, small-scale repairs, emergency repairs, etc.) is also good and there are no particular problems. Maintenance activities for the tertiary and on-farm canals by farmers are removal of sediment and rubbish that have accumulated in the canals and weeding, and there have been no reports of major problems due to lack of maintenance.

Farmers Cleaning the Tertiary Canal
(Source: Bac Binh District People's Committee)

On the other hand, in order for farmers to break away from their excessive reliance on small-scale collectors and to secure stable and sustainable agricultural income, they are required to step into the marketing and distribution of agricultural products to participate in the value chain. The case of the local private peppermint processing company mentioned in "3.3.1.2 Qualitative Effects (Other Effects)" is just one good example, but the majority of farmers procure agricultural equipment from small-scale collectors and sell their produce to the collectors at market prices after harvest. Binh Thuan Province DARD and Bac Binh District People's Committee are encouraging farmers to participate in the value chain, recognizing the importance of changing farmers' awareness and farming practices.

From the above, regarding operation and maintenance, the irrigation facilities are well maintained, and no particular problems are observed. On the other hand, farmers need to participate in the value chain and address the challenges they face in order to break away from excessive dependence on small-scale collectors and secure stable and sustainable agricultural income.

In conclusion, slight issues have been observed in the institutional/organizational aspect and the current status of operation and maintenance, however, there are good prospects for improvement/resolution. Therefore, sustainability of the Project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

ODA loan (E/S and main works) conducted agricultural development such as developing irrigation and drainage facilities, developing rural infrastructure, and strengthening agriculture extension services with the aim of expanding agricultural production in Bac Binh District of Binh Thuan Province, thereby contributing to poverty reduction through increasing farmers' income. Technical Cooperation Project Phase 2 was implemented with the aim of establishing the

approach to develop irrigated agriculture in the District. In this ex-post evaluation, the ODA loan (E/S and main works) and the Technical Cooperation Project Phase 2 were evaluated together.

The Project is consistent with the development plan and development needs of Viet Nam, and the Project plan and approach were appropriate. In addition, the Project is consistent with Japan's development cooperation policy. Internal coherence with other JICA projects is also confirmed. Furthermore, external coherence is also confirmed, as the Project has collaborated and coordinated with the Vietnamese government's own-funded projects and projects of other organizations, and synergistic effects were confirmed. Therefore, its relevance and coherence are high. In terms of project implementation, the Project cost was within the plan, but the Project period significantly exceeded the plan. Therefore, efficiency of the Project is moderately low. Regarding project effects, overall, the indicators of quantitative effects, including additional indicators have achieved the targets. Qualitative effects (increased agricultural productivity) and impacts (increased farmers' income, improved living standards of local residents, and poverty reduction) were also confirmed, along with specific evidence for each. It was also confirmed that the Technical Cooperation Project Phase 2 has contributed to strengthening the results of the ODA loan (main works). Thus, the Project has generated the planned effects, and its effectiveness and impacts are high. Slight issues have been observed in the institutional/organizational and the current status of operation and maintenance, however, there are good prospects for improvement/resolution. Therefore, sustainability of the Project effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

There are many challenges for farmers in order for them to be integrated into the value chain and to realize sustainable agricultural development that ensures profitability (e.g., changing farmers' awareness, changing excessive dependence on collectors, promoting the establishment of agricultural cooperatives, and strengthening farming operations by obtaining cultivation techniques that meet the standards required by private companies). Addressing these issues will take time, but it is important that Binh Thuan Province DARD and Bac Binh District People's Committee continue to encourage farmers to evolve in a direction along the value chain (based on the national program "Value Chain Linkage Program" and others, promotion of OCOP (One Commune One Product), establishment of agricultural cooperatives, and training for farmers (training on market needs, quality improvement, health foods such as organic foods, etc.) are implemented on the ground). Another idea is to provide support to encourage farmers to change their mindsets, such as introducing good practice cases (peppermint cultivation, wholesale oil processing, and exporting to Japan by a local private peppermint processing company), to other farmers depending on the situation.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

A good example of a project that has achieved significant effects through flexible responses during project implementation and synergistic effects with various initiatives

What is noteworthy about the Project is that project scope was changed in a timely manner in response to changes in the Vietnamese government's policy and the circumstances on the ground since the planning stage, and smooth collaboration with other projects both within and outside JICA created synergistic effects, generating significant Project effects as a whole. In the civil works of the ODA loan (main works), the number and distance of primary, secondary, and tertiary canals were changed, the number of resettlement sites to be developed for settlers was changed, and the scope was added using the unused balance of ODA loan, and the outputs were increased or decreased in a timely manner. In addition, as described in "5.1.1 Objective Perspective" below, significant synergistic effects were generated through collaboration with other JICA projects (Dai Ninh Hydropower Project (2) (3) and Technical Cooperation Project Phase 1), the Vietnamese government's own-funded projects, project of international cooperation NGO, and programs in Bac Binh District. The success of these various efforts has resulted in a stable water supply and sustainable operation and maintenance, which has increased the number of crop options available for farmers to grow. In this way, farmers are now able to flexibly respond to changes in crop market conditions, which can be a risk factor, and are able to cultivate more profitable crops. The realization of three crops in a year is a particularly noteworthy achievement. This not only realized a significant increase in farmers' agricultural income, but also dramatically improved the lives of farmers in many aspects, contributing to a greater sense of satisfaction and happiness. Therefore, it is important to create synergies by making timely changes in the scope according to the situation and needs on the ground and by smoothly coordinating with other projects both within and outside JICA.

For quantitative effects, the appropriateness of setting indicators focused on specific commodities should be carefully considered, taking into account possibility of their future market changes

When setting indicators and targets during the project planning, it is important to have a good understanding of the market and distribution situation of the supply chain. It is also important to consider support contents and indicators, including confirming the international competitiveness of the candidate crops and securing the supply chain (buyers, infrastructure). If these issues have been addressed and the support is for a relatively short period of time, it may be possible to set indicators focused on specific commodities. However, for projects such as this one, which have a

long project period and are expected to take many years from the planning to the ex-post evaluation, there is a high possibility that macroeconomic and market conditions will change. In this project, cultivated area, production volume, and yield per unit area of cotton and beans were set as operation and effect indicators, but because they were not in line with the current situation at the time of the ex-post evaluation, it was difficult to evaluate them based on the initially set indicators. What should have been kept in mind during the project planning was the possibility of changes in macroeconomic and market conditions during and after the project, and instead of limiting the candidate commodities to a few, the project should have considered setting indicators related to farmers' production (total sales amount) and income. In addition, reanalyzing the supply chain during the project in light of changes in market conditions may have helped to improve efficiency of agricultural production activities and to stabilize farmers' income.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

This Project is characterized by the involvement of various stakeholders and the synergies generated by collaboration and coordination with other projects both within and outside JICA. The Project target area, Bac Binh District, was once the driest area in Viet Nam, but has since been transformed into one of the most water-rich areas in the country, and economic activities have become more active, not only in agriculture but also in attracting investment. One of the reasons for the successful collaboration is that the implementation of the Technical Cooperation Project Phase 1 provided a clear direction for crop cultivation in Bac Binh District and a guidepost for subsequent efforts. This is thought to have laid the groundwork for all parties involved to work together in the same direction from the early stage. In addition, the Vietnamese side has strong ownership in promoting its own-funded projects, and it is believed that they aimed to create synergy by making good use of external support such as JICA and World Vision to supplement the lack of resources, technology, and knowledge. Furthermore, JICA and World Vision adequately understood the needs of the Vietnamese side, respecting their ownership, and implemented the project in a way that aligned with the policies and strategies, making the most of their respective strengths. This is thought to have been a factor in the success of the Project.

5.2 Additionality

None.

(End)

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	1) E/S ・ Review of final F/S ・ Assistance in preparation of Resettlement Action Plan ・ Detail design of irrigation facilities and preparation of bidding documents ・ Preparation of manuals for training agricultural extension service workers ・ Establishment of credit system ・ Preparation of guidelines for establishment of demonstration plots and agricultural cooperatives and preparation of staff training programs for executing agencies ・ Preparation of manuals for maintenance of irrigation facilities and water management ・ Preparation of environmental monitoring plans 2) Main Works <Civil Works and Equipment Procurement> ・ Song Luy headworks and main canals (9.7 km) ・ 10 primary canals, 62.8 km in total ・ 27 secondary canals, 61.2 km in total ・ 7 tertiary canals, 13.8 km in total ・ Administration and connecting roads ・ Irrigation management office ・ Rehabilitation of Dong Moi main canal (gate rehabilitation) ・ Farmland development (mowing, leveling, stone removal, construction of on-farm canals and drainage channels on 10,500 ha of new irrigated land) ・ Development of 19 resettlement areas <Consulting Services> ・ Tender assistance ・ Construction supervision ・ Strengthening of agricultural extension services ・ Guidance on operation and maintenance ・ Monitoring related to environment, resettlement and land acquisition, and infectious diseases	1) E/S ・ As planned ・ As planned ・ As planned ・ As planned ・ As planned ・ As planned ・ As planned ・ As planned 2) Main Works <Civil Works and Equipment Procurement> ・ Almost as planned ・ 8 primary canals, 40.8 km in total ・ 29 secondary canals, 83.3 km in total ・ 14 tertiary canals, 22.979 km in total ・ As planned ・ As planned ・ As planned ・ Farmland development (mowing, leveling, stone removal, construction of on-farm canals and drainage channels on 3,500 ha of new irrigated land) ・ Development of 4 resettlement areas ・ Upgrading and lining Nha Mung-Cha Vau and Uy Thay-Da Gia main canals (additional scope) <Consulting Services> ・ As planned ・ As planned ・ As planned ・ As planned ・ As planned ・ Survey and design of tertiary canals (additional scope)

2. Project Period	E/S March 2001-February 2003 (24 months) Main Works March 2006-December 2012 (*) (*) In comparing planned and actual period, the period required for additional scope (11 months) was added, making total as 93 months	E/S March 2001-July 2005 (53 months) Main Works March 2006-November 2015 (117 months)
3. Project Cost	E/S	E/S
Amount Paid in Foreign Currency	199 million yen	345 million yen
Amount Paid in Local Currency	238 million yen (31,070 million VND)	- (-)
Total	437 million yen	345 million yen
ODA Loan Portion	437 million yen	345 million yen
Exchange Rate	1VND=0.00766 yen (As of October 2000)	- (-)
	Main Works	Main Works
Amount Paid in Foreign Currency	835 million yen	4,304 million yen
Amount Paid in Local Currency	5,362 million yen (762,731 million VND)	1,399 million yen (258,595 million VND)
Total	6,197 million yen	5,703 million yen
ODA Loan Portion	4,874 million yen	4,304 million yen
Exchange Rate	1VND=0.00703 yen (As of October 2005)	1VND=0.00541 yen (average between 2006 and 2015)
4. Final Disbursement	June 2006 (E/S), August 2014 (Main Works)	

End