

Kingdom of Cambodia

FY2020 Ex-Post Evaluation Report of Technical Cooperation Project

“The Project on the Capacity Building for Water Supply System
in Cambodia (Phase 2)/(Phase 3)”

External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

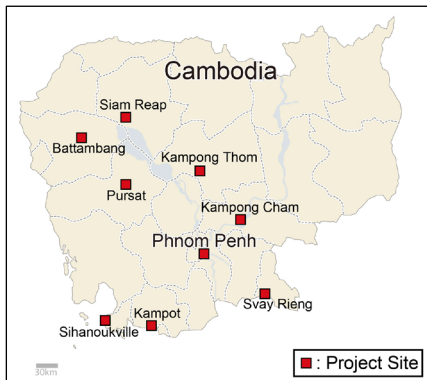
Through two phases of technical cooperation, this project aimed to improve the operation and maintenance (O&M) capacity of water supply facilities and the management capacity of water supply services of the public waterworks in eight cities¹ of Cambodia (Target Provincial Waterworks: TPWs). The aim was also to contribute to the dissemination of the project effect across the cities participating in the “National Conference on Public Water Utilities” and to the improvement of the water supply services in the project area.

In Cambodia, access to safe water in urban areas other than Phnom Penh was an issue, for which the country had a policy solution. The objective of the project was consistent with the above development policy and development needs and was also consistent with Japan’s policy at the time of planning. Therefore, the relevance of this project is high. Through the implementation of this project, the capacity development of all TPWs (O&M capacity of water facilities, management capacity of water supply services) was mostly achieved. An improvement of the water supply services, and a higher level of satisfaction of costumers were also found in seven TPWs (excluding Sihanoukville where the water business was leased to a private company for 20 years). Therefore, effectiveness and impact of this project is high, as the project effects were shown as planned. Taking an average of the two phases, efficiency of this project is fair as both the project cost and the project period exceeded the plan. The development policy aimed at the autonomous operation of public waterworks. In line with the policy, the water supply law was drafted and several Prakas (ministerial ordinances) were approved. The Ministry of Industry, Science, Technology, & Innovation (MISTI), which was the supervisory authority of public waterworks, established the monitoring scheme for seven TPWs, and the seven TPWs assigned sufficient personnel for the O&M of water supply facilities. The counterparts of this project were given training opportunities, and the seven TPWs were able to maintain their technical level through their daily operations. The water supply operations in the seven TPWs were financially stable. Therefore, sustainability of the project effects is high.

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

¹ Siem Reap, Battambang, Kampot, Kampong Cham, Kampong Thom, Pursat, Svay Rieng, Sihanoukville. In this report, all TPWs refer to the public waterworks of the above eight cities, while the seven TPWs means the public waterworks offices of the above cities other than Sihanoukville, where the water supply operation was transferred to a private company.

1. Project Description



Project Locations



Leakage Detector Provided by this Project

1.1 Background

After the end of the Cambodian Civil War, the construction of water supply facilities and the capacity improvement of the O&M for the facilities progressed in Phnom Penh with the support of Japan and other aid agencies. The Japan International Cooperation Agency (JICA) supported the O&M capacity of water supply facilities in the Phnom Penh Water Supply Authority (PPWSA) from 2003 to 2006, through the Project on the Capacity Building for the Water Supply System in Cambodia (Phase 1) and endeavored to establish a human resources development system for the water supply sector in Cambodia. In the early 2000s, however, water services were still inadequate in cities other than Phnom Penh. The Department of Potable Water Supply (DPWS of the Ministry of Industry, Mines, and Energy (MIME)), which was in charge of the water supply sector at that time, supervised 14 cities where the public waterworks had an urgent need for both a development of facilities and an improvement of operational capacity. With the Asian Development Bank (ADB), the World Bank (WB), and Japan's ODA loans and grant aids, the facilities of the public waterworks were developed. However, on the other hand, the operational capacity of the water supply operation had substantial room for improvement.

With this background, this project supported the capacity building of water supply operation at TPWs in eight cities from 2007 to 2018. This project consists of the Project on the Capacity Building for the Water Supply System in Cambodia (Phase 2) and (Phase 3) and it aimed to develop human resources in a wide variety of fields at all TPWs and the regulatory authority. Specifically, Phase 2 aimed to improve the technical capacity for the O&M of water supply facilities, and Phase 3 aimed to strengthen the management capacity of the water supply business. In addition, Phase 3 also strengthened the capacity of the supervisory authority in monitoring and consultation on the performance of public waterworks.

1.2 Project Outline

		Phase 2	Phase 3
Overall Goal		Capacity to operate and maintain water supply facilities is improved in the urban areas of 14 cities which participate in “National Conference on Public Water Utilities” in the Kingdom of Cambodia.	Water services provided by TPWs are enhanced.
Project Purpose		Capacity to operate and maintain water supply facilities is improved in the targeted provincial waterworks (TPWs) utilizing the experiences accumulated during the Phase 1 Project.	All TPWs are able to manage water supply more stable and sustainably.
Outputs	Output 1	Capacity to analyze the water quality is improved in the TPWs.	Capacity of managing the data necessary for Business Plan is enhanced at TPWs.
	Output 2	Capacity to treat water quality is improved in the TPWs.	Capacity of formulating Business Plans is improved at TPWs.
	Output 3	Capacity for operation and routine maintenance of electrical facilities is improved in the TPWs.	Capacity of monitoring Business Plans is enhanced at TPWs.
	Output 4	Capacity for operation and routine maintenance of mechanical facilities is improved in the TPWs.	Capacity of monitoring, evaluating Business Plan, formulation policies and supporting TPWs for funding is strengthened at MIH ² .
	Output 5	Capacity to maintain water distribution facilities is improved in the TPWs.	Capacity of analyzing human resources development and improvement measures at TPWs is enhanced.
	Output 0	The Project is managed appropriately by the Project Support Team (PST).	
Total cost (Japanese Side)		687 million yen	504 million yen
Period of Cooperation		May 2007 – March 2012 (Extended period: May 2011 – March 2013)	November 2012 – June 2018 (Extended period: December 2017 – June 2018)

² At the beginning of Phase 3, the implementing agency was MIME. During project implementation, it was reorganized into the Ministry of Industry and Handicraft (MIH). At the time of the ex-post evaluation, the name of the ministry was changed to MISTI.

Target Area	Phnom Penh, Siem Reap, Battambang, Kampot, Kampong Cham, Sihanoukville, Kampong Thom, Pursat, Svay Rieng	Same as left
Implementing Agency	DPWS/MIME, 8 TPWs	MIH ³ , 8 TPWs
Other Relevant Agencies/ Organizations	PPWSA	PPWSA
Organization in Japan	Ministry of Health, Labour and Welfare, Kitakyushu City Waterworks Bureau, Nagoya City Waterworks Bureau	Kitakyushu City Water and Sewer Bureau
Related Projects	<p>[Technical Cooperation]</p> <ul style="list-style-type: none"> • Project on the Capacity Building for Water Supply System in Cambodia (Phase 1) (2003 - 2006) • Project for Strengthening Administrative Capacity of Urban Water Supply in Cambodia (2018 - 2022) <p>[ODA Loan]</p> <ul style="list-style-type: none"> • Siem Reap Water Supply Expansion Project (2012) <p>[Grant Aid]</p> <ul style="list-style-type: none"> • Project for Improvement of Water Supply System in Siem Reap Town (2004) • Project for Replacement and Expansion of Water Distribution Systems in Provincial Capitals (2011) • Project for Expansion of Water Supply Systems in Kampong Cham and Battambang (2013) • Project for Expansion of Water Supply System in Kampot (2015) • Project for the Expansion of Water Supply System in Pursat (2019) <p>[Other aid agencies]</p> <ul style="list-style-type: none"> • WB “Urban Water Supply Project” (1996 - 2004) • WB “Provincial and Peri-Urban Water Supply and Sanitation Project” (2003 - 2008) • ADB “Provincial Towns Improvement Project” (2000 - 2006) • ADB “Urban Water Supply Project” (2015-) • ADB and Agence Française de Développement (AFD) “Provincial Water Supply and Sanitation Project” (2017-) 	

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

The following table shows the prospective achievement of the Project Purpose at the time of the terminal evaluation of the Project.

³ At the completion of Phase 3

Table 1: Prospective Achievement of the Project Purpose (at the Terminal Evaluation)

Phase 2	In consideration of the achievement of the four indicators for the Project Purpose, it is assessed that the Project Purpose is expected to be mostly achieved. However, the extent of capacity improvement differs among TPWs, especially between the leading TPWs (Siem Reap, Battambang, Kampot, and Sihanoukville) and other TPWs.
Phase 3	The Project Purpose has been partially achieved at the time of the terminal evaluation, but there are differences among TPWs. An extension of the project period increases the likelihood that all TPWs will achieve the Project Purpose.

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

The following table shows the prospective achievement of the Overall Goal at the time of the terminal evaluation on this Project.

Table 2: Prospective Achievement of the Overall Goal (at the Terminal Evaluation)

Phase 2	At the time of the terminal evaluation, it is difficult to foresee the possibility and scale of impact expected from this Project. The achievement of the Overall Goal depends mainly on how effectively and efficiently the human resource development system functions internally.
Phase 3	It is very likely that the Overall Goal will be achieved. Based on the customer satisfaction survey conducted by the project, it can be seen that customer satisfaction has increased in almost all TPWs. In Kampot, the improvement of customer satisfaction is slightly lower, but customer satisfaction is expected to be improved with the operation of the new facility.

1.3.3 Recommendations from the Terminal Evaluation

The following table shows the recommendations at the terminal evaluation of the Project.

Table 3: Recommendations (at the Terminal Evaluation)

Phase 2	<ol style="list-style-type: none"> (1) Promotion of appropriate water treatment based on accurate understanding and judgment of water quality analysis in all TPWs (2) Continuation of leak detection in the water distribution in all TPWs (3) Joint training by local experts from PPWSA and local trainers of the leading TPWs (4) Formulation of a plan for PPWSA's involvement in capacity building (5) Supporting the establishment of an association for waterworks by Japanese experts (6) Preparation of a roster for all technical staff of PPWSA, DPWS/MIME, and TPWs (7) Integration and sharing of the information on suppliers and procurement methods for materials and supplies (8) Activities to establish an association for waterworks based on DPWS/MIME's Action Plan (9) Preparation of short- and medium-term action plans for each office of DPWS/MIME (10) Preparation of annual human resource development plans for all TPWs (11) Development of an organizational mechanism to secure funds for further capacity building of all TPWs (12) Continuation of on-the-job training to effectively apply Standard Operation Procedures (SOP) to operation and routine maintenance of electrical and mechanical equipment (13) Preparation of an SOP for routine inspections of chlorine injection facilities and continuation of OJT
Phase 3	<ol style="list-style-type: none"> (1) Review of the implementation schedule until the project completion (2) Completing the installation and effective use of the synergic utility management system (3) Utilization of local human resources in the leading group (4) MIH's independent and continuous monitoring (5) Review of indicators and activities (6) Support for the formulation of the water supply law (7) Appropriate accounting for the depreciation of facilities (8) Setting of water tariff

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corporation

2.2 Duration of Evaluation Study

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

Duration of the Study: October 2020 – January 2022

Duration of the Field Study: Not conducted

2.3 Constraints during the Evaluation Study

In this ex-post evaluation, the external evaluator was unable to conduct a field survey due to the coronavirus pandemic. Neither were the field survey assistants able to visit TPWs as the disease was spread across Cambodia. Therefore, the collection method of information and data was limited to questionnaires and interviews using the web conferencing system. As a result, of the 14 cities participating in the “National Conference on Public Water Utilities”, it was impossible to obtain sufficient information for six cities unassisted by this project. For this reason, the dissemination of the project effect on these cities was not taken into consideration in the judgement. At the ex-post evaluation, water supply operation in Sihanoukville was leased to a private company for 20 years and the public waterworks assisted by this project ceased to exist. Since sufficient information was not available for six cities outside the project area and Sihanoukville, the analysis on Impact and Sustainability was based on the current status of the seven cities assisted by this project.

3. Results of the Evaluation (Overall Rating: A⁴)

3.1 Relevance (Rating: ③⁵)

3.1.1 Consistency with the Development Plan of Cambodia⁶

At the planning of Phase 2, Cambodia’s national development strategy, *the Rectangular Strategy* (2004), had four strategies. Strategy 2 “Further Rehabilitation and Construction of Physical Infrastructure” had the policy goals: (1) providing clean and safe water to all citizens and (2) protecting all citizens from water-related diseases. In addition, *the National Strategic Development Plan 2006 – 2010* selected the percentage of the population with access to safe water sources in urban areas as a monitoring indicator, aiming to improve this indicator. Moreover, the sector plan *Implementation Strategy for Urban Water Supply* (2006) was also

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ③: High, ②: Fair, ①: Low

⁶ There is continuity in the project objectives and activities of Phase 2 and Phase 3, and the two phases mostly share the subjects to be assessed in development policy and development needs. Therefore, the analysis focused on three points: at the planning of Phase 2, at the completion of Phase/the planning of Phase 3, and the completion of Phase 3.

formulated, with the policy to strengthen small- and medium-sized water supply services in urban areas. The short-term goals included enhancement of staff capacity, improvement in the efficiency of public water supply services, maintenance of infrastructure and the development of maintenance skills.

At the completion of Phase 2 and the planning of Phase 3, in the country's national development strategy *the Second Rectangular Strategy* (2008), Strategy 2 "Further Rehabilitation and Construction of Physical Infrastructure" had the policy of focusing more on access to clean water, in line with *the Cambodia Millennium Development Goals*. *The National Strategic Development Plan Update 2009 – 2013* stated that the access to safe water in urban areas had been improved. However, the plan also pointed out that (1) access was still low at about 50% of the urban population, (2) access to safe water was limited among poor people, and (3) funds for further improvement were insufficient. Based on this understanding, the plan included the policy to enhance the capacity of public waterworks in the water supply sector of urban areas.

At the completion of Phase 3, the country's national development strategy *Fourth Rectangular Strategy* (2018) had four strategies. Strategy 4 "Inclusive and Sustainable Development" promoted a good and clean living environment. As a part of this strategy, the policy was to support urban development, including the water supply sector, and to prioritize the formulation of master plans in urban areas. In addition, *the National Strategic Development Plan 2014 – 2018* mentioned that the coverage of water supply services was approximately 50% in urban areas, excluding Phnom Penh. The plan also pointed out issues such as (1) weak autonomy except in the water supply authorities in Phnom Penh and Siem Reap, (2) lackluster operational performance and inadequate human resources, and (3) tariff setting that did not allow full cost recovery. Measures such as decentralization of the water supply in urban areas, autonomous management of public waterworks modeled on PPWSA, the formulation of business plans for public waterworks, and human resource development in the water supply sector in urban areas were proposed as solutions for the above problems. At the completion of Phase 3, the sector plan *Implementation Strategy for Urban Water Supply* (2006) was an active plan in use.

At the planning of Phase 2, and at the completion of Phase 2/the planning of Phase 3, and at the completion of Phase 3, the development policy aimed to improve the access to safe water in urban areas. Since the achievement of the project objectives for this project contributes to the policy goals of the development policy (access to safe water in urban areas), this project is consistent with the development policy.

3.1.2 Consistency with the Development Needs of Cambodia

At the planning of Phase 2, households using water piped to dwellings accounted for only about 30% of the population in urban areas other than Phnom Penh⁷. Aid agencies provided support in major cities, but the O&M capacity of public waterworks, which was under the supervision of MIME, was insufficient. As a result, it was difficult to provide a stable supply of safe water. One of the causes of this issue was an insufficient system for human resources development for the water supply sector of MIME.

At the completion of Phase 2 and the planning of Phase 3, the MIME survey found that the population with access to safe water accounted for only about 60% of the urban population in 2010. It was pointed out that the management of public waterworks was inefficient and that this had become an issue in the improvement of access to safe water. In order to make public waterworks operate efficiently as a public corporation, it was necessary to solve several problems: (1) tariff revenues and operating costs were not well recognized, (2) financial statements in accordance with standard accounting standards were not prepared, and (3) development and replacement plans for facilities and equipment in the medium- and long-term were not formulated.

At the completion of Phase 3, access to “improved water⁸” had reached about 80% in the urban areas other than Phnom Penh, but the access to tap water accounted for less than 60%. The above-mentioned “improved water” included water from wells and rainwater and these water sources did not necessarily ensure appropriate water quality. The terminal evaluation of Phase 3 pointed out that the weak capacity of operation and limited human resources was a challenge in the water supply sector in urban areas.

Table 4: Access to the Improved Water (2017)

	Cambodia	Phnom Penh	Other urban areas	Rural areas
Access to the improved water	64.8%	97.6%	78.5%	58.3%
Piped to dwellings or on premises	29.2%	96.1%	56.6%	16.0%
Unimproved water	35.2%	2.4%	21.5%	41.7%

Source: Cambodia Socio-Economic Survey 2017

In a comparison of the three points (at the planning of Phase 2, at the completion of Phase 2/the planning of Phase 3, and at the completion of Phase 3), the population who could use safe water in urban areas increased, but even at the completion of Phase 3, there was still room for improvement in the cities other than Phnom Penh. During this period, the further use of water

⁷ Based on National Institute of Statistics of Cambodia “Housing Condition 2007”. Water piped to dwellings means water supply directly from waterworks to each house and does not include public taps.

⁸ Improved water includes water piped to dwellings, public taps, tubes/piped wells, protected dug wells, rainwater collection systems.

supply required the improvement of the O&M of public waterworks and of business management. Since both phases focused on the improvement of the capacity of local public waterworks, this project is consistent with development needs.

3.1.3 Consistency with Japan's ODA Policy

At the planning of Phase 2, Japan's *Country Assistance Program for Cambodia* (2002) included "support for vulnerable people" in its priority areas and there was the policy to continue cooperation for basic human needs, including the water supply sector. The program regarded basic human needs as an important assistance area for ODA to the country due to (1) direct benefits to the Cambodian people and (2) coping with the disparities caused by economic growth.

At the planning of Phase 3, *Japan's Country Assistance Policy for Cambodia* (2012) included the "promotion of social development" in its priority areas and, as a part of the strategy, had the policy to promote the development of the water supply and sewage infrastructure. It was emphasized that the knowledge of PPWSA, where technical capabilities had been obtained with the support of Japan, would be utilized to promote the development of waterworks in large regional cities.

Both Phase 2 and Phase 3 had the Project Purpose to strengthen the O&M of water supply facilities and the business management of the waterworks of large regional cities and this is consistent with Japan's ODA policy that emphasized assistance in the water supply sector.

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

3.2 Effectiveness and Impacts⁹ (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Output

(1) Phase 2

The table below shows the achievement level of the Outputs at the completion of Phase 2. Of the six Outputs, five were achieved or mostly achieved. The Output 2 (improvement of capacity for water treatment) was difficult to achieve in some TPWs due to malfunction of the water treatment facilities.

⁹ Sub-rating for Effectiveness is to be put with consideration of Impacts.

Table 5: Achievement Level of the Outputs (Phase 2)

Output	Achievement*
Output 1: Capacity to analyze the water quality is improved in the TPWs.	<p>Achieved:</p> <ul style="list-style-type: none"> a. All TPWs could regularly analyze water quality in accordance with the SOP. b. All TPWs started the preparation of annual reports on the analysis of water quality from 2010. c. All laboratory staff in TPWs could analyze water quality.
Output 2: Capacity to treat water quality is improved in the TPWs.	<p>Partially achieved:</p> <ul style="list-style-type: none"> a. All TPWs prepared a daily report on water treatment facilities. b. Turbidity of the unfiltered settled water mostly satisfied the target value. c. 3 TPWs could not achieve the target for monthly average residual chlorine due to equipment problems. d. 2 TPWs could not control the cleaning process of filter sand due to equipment problems. e. The SOP for water treatment was prepared. f. At least one person for each of all TPWs could conduct activities related to water treatment.
Output 3: Capacity for operation and routine maintenance of electrical facilities is improved in the TPWs.	<p>Mostly achieved:</p> <ul style="list-style-type: none"> a. The SOP for electrical facilities was prepared. b. All TPWs started the operation of electrical facilities based on the SOP. c. All TPWs started routine and periodic inspections in accordance with the SOP and designated formats. d. All TPWs could assess the condition of the equipment from the inspection results and identify causes of malfunction to some extent. e. At each of all TPWs, there was at least one employee who acquired the ability for the operation and daily maintenance based on the SOP, but it is difficult to assess the achievement level of the target.
Output 4: Capacity for operation and routine maintenance of mechanical facilities is improved in the TPWs.	<p>Mostly achieved:</p> <ul style="list-style-type: none"> a. The SOP for mechanical facilities was prepared. b. All TPWs started the operation of mechanical facilities based on the SOP. c. All TPWs started routine and periodic inspections in accordance with the SOP and designated formats. d. All TPWs could assess the condition of the equipment from the inspection results and identify causes of malfunction to some extent. e. At each of all TPWs, there was at least one employee who acquired the ability for the operation and daily maintenance based on the SOP, but it is difficult to assess the achievement level of the target.
Output 5: Capacity to maintain water distribution facilities is improved in the TPWs.	<p>Mostly achieved:</p> <ul style="list-style-type: none"> a. All TPWs prepared plans to replace old pipes. b. All TPWs completed the construction of approximately 1 km of pipelines. c. All TPWs constructed pipelines in accordance with the design, achieving the target for water-resistant pressure (7.5 kgf/cm²). d. All TPWs inspected water leaks until project completion. e. No water theft inspection was conducted, but related training was conducted. f. At each of all TPWs, there was at least one employee who acquired the ability for the maintenance of distribution facilities, but it is difficult to assess the achievement level of the target.
Output 0: The Project is managed appropriately by the Project Support Team (PST).	<p>Achieved:</p> <ul style="list-style-type: none"> a. PST was established at the beginning of the project and members were appointed. b. A baseline survey report on the capabilities of all TPWs technical staff was prepared. c. Various planning documents for the project were approved in 2007. d. Monitoring was conducted by using a checking format for project activities. e. Project progress was regularly monitored at meetings such as Joint Coordination Meetings. f. A manual on the planning, administration, and evaluation of training programs was prepared in 2009.

Source: Documents provided by JICA, answers of questionnaires for experts

Note: * Achievement level of indicators set for each output

(2) Phase 3

The table below shows the achievement level of the Outputs at the completion of Phase 3. Of the five Outputs, four were achieved. Output 5 (improvement of the capacity for management of human resources development) is judged to have been partially achieved because human resources development plans with longer perspective were not formulated.

Table 6: Achievement Level of the Outputs (Phase 3)

Output	Achievement*
Output 1: Capacity of managing the data necessary for Business Plan is enhanced at TPWs.	<p>Achieved:</p> <p>1-1. All TPWs introduced the Synergistic Utility Management System (SUMS) and used the system for the management of customer information.</p> <p>1-2. The control of asset ledgers based on SUMS was introduced in all TPWs.</p> <p>1-3. Financial statements were prepared every year.</p>
Output 2: Capacity of formulating Business Plans is improved at TPWs.	<p>Achieved:</p> <p>2-1. All TPWs formulated five-year business plans. The contents of the plans were comprehensive and covered the expansion/replacement of facilities, O&M, production, finance, and action plans.</p> <p>2-2. The seminars on the five-year business plans had been conducted by the terminal evaluation.</p>
Output 3: Capacity of monitoring Business Plans is enhanced at TPWs.	<p>Achieved:</p> <p>3-1. All TPWs submitted annual reports on management performance and business plans to MIH. Monitoring of the business plan had commenced by the project completion.</p>
Output 4: Capacity of monitoring, evaluating Business Plan, formulation policies and supporting TPWs for funding is strengthened at MIH.	<p>Achieved:</p> <p>4-1. All TPWs started reporting of Performance Indicators (PI) to MIH as a part of their annual reports.</p> <p>4-2. MIH reviewed PI during the project period and started monitoring based on PI.</p> <p>4-3. MIH compared the annual plans and actual results of TPWs and discussed with TPWs future plans and targets for the next year.</p> <p>4-4. MIH conducted performance evaluations and regularly proposed business improvements for public waterworks.</p>
Output 5: Capacity of analyzing human resources development and improvement measures at TPWs is enhanced.	<p>Partially achieved:</p> <p>5-1. A personnel evaluation scheme was established in all TPWs, and the performance evaluations of their staff were carried out. However, a medium- to long-term human resources development plan had not yet been formulated.</p>

Source: Documents provided by JICA, answers to questionnaires for experts

Note: *Achievement level of indicators set for each output

3.2.1.2 Achievement of Project Purpose

(1) Achievement level of the Project Purpose for Phase 2

Phase 2 aimed at the development of capacities in several fields related to water supply and the Project Purpose was that TPWs improve the “capacity to operate and maintain water supply facilities”. Four indicators were set for the above objective of which two indicators had been achieved and two indicators were mostly achieved by the completion of Phase 2 (see the following table). Therefore, it is judged that the Project Purpose of Phase 2 was mostly achieved.

Table 7: Achievement Level of the Project Purpose (Phase 2)

Project Purpose	Indicator	Achievement
Capacity to operate and maintain water supply facilities is improved in the targeted provincial waterworks (TPWs) utilizing the experiences accumulated during the Phase 1 Project.	(a) Technical staff of 8 TPWs (88 persons in total at the beginning of the Project) are able to operate and maintain their respective water supply facilities based on the SOPs prepared and/or improved by the Project by the end of the Project.	Achieved: The SOPs for five fields (water quality testing, water treatment, electrical facilities, mechanical facilities, distribution facilities) were prepared and adequately covered the water supply operation. All TPWs could operate and conduct maintenance based on the SOPs.
	(b) The essential analytical items, namely pH, conductivity, turbidity, color and alkalinity, of the treated water distributed by 8 TPWs always satisfy the Cambodian National Drinking Water Quality Standard (CNDWQS); and iron of the treated water distributed by 3 TPWs (i.e. Siem Reap, Sihanoukville, Svay Rieng) always satisfies the Standard by the end of the Project.	Mostly achieved: All TPWs mostly satisfied the essential parameters. Due to equipment problems, Kampong Thom often did not meet the standards for pH, turbidity, color, and Svay Rieng for color. Siem Reap and Sihanoukville satisfied the iron concentration of the water quality standards, but Svay Rieng could not meet the standard due to inadequate facilities. Since the water quality standard did not include alkalinity, the parameter was not assessed in this evaluation.
	(c) Treated water is produced in accordance with the production plan at each TPW daily by the end of the Project.	Achieved: At the time of the terminal evaluation, all TPWs produced treated water based on demand forecasts every day.
	(d) Optimum distributed pressure is kept at each TPW by the end of Project while the water treatment plants are operated.	Mostly achieved: In Siem Reap, water pressure was temporarily low in the morning and evening due to lack of water supply. In other TPWs, water was supplied in line with demand at the time when water could be supplied, and water pressure was maintained properly. Based on the Project Completion Report, in Kampot and Battambang, however, water was not supplied for 24 hours a day.

Source: Documents provided by JICA, questionnaire answers from experts

TPWs acquired a wide variety of capabilities for the O&M of water supply facilities, but there were a few TPWs (Kampong Thom, Svay Rieng, Siem Reap) which could not satisfy some parameters on water quality and water pressure at the completion of Phase 2 due to equipment problems. After the completion of Phase 2, the above three TPWs replaced and expanded water supply facilities with the support of JICA and ADB. In addition, at the completion of Phase 2, no organization for waterworks, which would play an important role in the dissemination of the project effect to other areas, had been established. At the time of the ex-post evaluation, the Cambodian Water Supply Association (CWA) was established.

(2) Achievement level of the Project Purpose for Phase 3

Phase 3 aimed at working out business performance, formulating business plans, and improving monitoring, and the Project Purpose was that all TPWs improve their ability to sustainably manage the water supply business. Three indicators were set for the above objective, and all three indicators were achieved at the completion of Phase 3 (see the table below). Therefore, it is judged that the Project Purpose of Phase 3 was achieved.

All TPWs enabled themselves to operate businesses by using SUMS, and MIH established a monitoring scheme. At the completion of Phase 3, the water supply cost was lower than the water tariff in all TPWs. This project introduced accounting procedures in accordance with international accounting standards. As a result, water supply costs were recognized accurately and cost management could be carried out properly. In Kampong Cham and Battambang, the amount of water treatment increased with the expansion of water treatment facilities and this resulted in cost reduction due to economies of scale. Phase 3 also supported the revision of water tariffs in Kampong Cham. Specifically, this project estimated the profit and loss of the public waterworks in Kampong Cham in the future and explained to residents the appropriate level of water tariff.

Table 8: Achievement Level of the Project Purpose (Phase 3)

Project Purpose	Indicator	Achievement
All TPWs are able to manage water supply more stable and sustainably.	(1) All TPWs are able to utilize the knowledge given by the Project activities.	Achieved: All TPWs formulated business plans and continuously prepared financial statements and PI by using SUMS. The ability for business planning and monitoring, which was essential for the management of water supply operation, was acquired.
	(2) The performance indicators (PIs) are clarified and monitored.	Achieved: A monitoring system for public waterworks was established. All TPWs regularly prepare PIs and report them to MIH. MIH monitored the performance (including PI) of the public waterworks, and provided management advice.
	(3) Performance at all TPWs is improved as compared to 2013, using the PIs as a tool.	Achieved: In all TPWs, the water supply cost fell in 2014 and 2015, dropping below the water tariff. TPWs became profitable. For all TPWs, the non-revenue water at the completion of Phase 3 (2017) was lower than that at the beginning of the phase (2012) (see the following table).

Source: Documents provided by JICA, questionnaire answers from experts

Table 9: Non-revenue Water in TPWs (2012 and 2017)

Year	Siem Reap	Battambang	Kampot	Kampong Cham	Sihanouk ville	Kampong Thom	Pursat	Svay Rieng
2012	9.7%	20.5%	18.7%	11.8%	15.6%	17.0%	17.0%	14.8%
2017	6.1%	10.6%	9.3%	7.2%	14.7%	10.0%	9.6%	9.6%

Source: Documents provided by JICA

Phase 2 mostly achieved its purpose and Phase 3 achieved its purpose. From the above, it can be seen that the project mostly achieved its purpose.

3.2.2 Impacts

The impact of Phase 2 was the improvement of the “capacity to operate and maintain water supply facilities” in 14 cities, and included the dissemination of the project effect to six cities outside the project area. At the ex-post evaluation, however, information on the current situation was only available in the seven cities supported by this project. For this reason, the judgment is based on the realization of project effect in those cities. Moreover, the achievement level was based on the current situation at the time of the ex-post evaluation as there was no target timing set for the achievement of the Overall Goal in either Phase 2 or Phase 3.

3.2.2.1 Achievement of Overall Goal

(1) Achievement Level of the Overall Goal for Phase 2

The goal of Phase 2 was that all TPWs continued to improve water supply services after project completion. Two indicators were set for the above objective. At the time of the ex-post evaluation, one indicator (Indicator a) had been achieved and another indicator (Indicator b) was mostly achieved (see the following table). Therefore, it is judged that the Overall Goal of Phase 2 was mostly achieved.

After the completion of Phase 2, seven TPWs developed water treatment plants, and the treated water generally satisfied the water quality standards of Cambodia. At the time of the ex-post evaluation, seven TPWs were supplying water 24 hours a day. In the beneficiary survey¹⁰ at the time of the ex-post evaluation, most of the beneficiaries had the opinion that water pressure was sufficient. However, the beneficiaries of Kampot and Battambang stated that water pressure dropped after 2018 (at the completion of Phase 3). According to the public waterworks in Kampot and Battambang, the demand increase in recent years has been affecting water pressure.

¹⁰ For the beneficiary survey, a questionnaire survey was carried out and 47 beneficiaries (23 men and 24 women) in the project area excluding Sihanoukville replied. The responses to the questionnaire were collected via TPWs (6-8 people per TPW). TPWs divided their water supply areas into three zones (near / medium / far) along the distance from the water treatment plants and selected an almost equal number of respondents from each zone.

Table 10: Achievement Level of the Overall Goal (Phase 2)

Overall Goal	Indicator	Achievement
Capacity to operate and maintain water supply facilities is improved in the urban areas of 14 cities which participate in “National Conference on Public Water Utilities” in the Kingdom of Cambodia.	(a) Important analytical items, namely Fe, Mn, Al, Cu, Zn, hardness, Cl, SO ₄ ²⁻ , NH ₃ , H ₂ S, of the treated water distributed by 8 provincial waterworks always satisfy the Cambodian National Drinking Water Quality Standard.	Achieved: Based on questionnaire answers from seven TPWs, all met most of the water quality standards in 2020. TPWs in Svay Rieng, and Prusat reported that they could not satisfy some parameters which were not included in the indicator on the left.
	(b) Optimum distributed pressure is always kept at each water treatment plant.	Mostly achieved: Based on questionnaire answers from seven TPWs, all achieved 24-hour water supply in 2020. In the beneficiary survey at the time of the ex-post evaluation, 90% of the respondents answered that water pressure was “sufficient” and “mostly sufficient” (see Table 11). However, there was an opinion that water pressure decreased from 2018 (the completion of Phase 3), mainly from the residents of Kampot and Battambang (see Table 12).

Source: Documents provided by JICA, questionnaire answers from seven TPWs, beneficiary survey at the time of ex-post evaluation

Table 11: Water Pressure at the Time of the Ex-post Evaluation (2021)

	Sufficient	Mostly Sufficient	Mostly Insufficient	Insufficient	Total
Respondents	34	9	2	2	47
%	72%	19%	4%	4%	100%

Table 12: Water Pressure at the Ex-post Evaluation (2021)

in Comparison of the Completion of Phase 3 (2018)

	Much Higher	Higher	No Change	Lower	Much Lower	Total
Respondents	6	15	15	10	1	47
%	13%	32%	32%	21%	2%	100%

(2) Achievement Level of Overall Goal for Phase 3

The goal of Phase 3 was the improvement of water supply services even after project completion. One index was set for the above objective. At the time of the ex-post evaluation, the indicator had been achieved (see the following table). Therefore, it is judged that the Overall Goal of Phase 3 was achieved.

In the beneficiary survey at the time of the ex-post evaluation, all the respondents were satisfied with the water supply services, and approximately 80% of them answered that their satisfaction had increased from 2018 (at the completion of Phase 3). It is concluded that customer satisfaction is improving because seven TPWs are proceeding with the development of water supply facilities such as the new construction and renewal of water supply pipes since the completion of Phase 3, and as the customer information management by SUMS is ongoing.

Table 13: Achievement Level of the Overall Goal (Phase 3)

Overall Goal	Indicator	Achievement
Water services provided by TPWs are enhanced.	Level of Customer Satisfaction in TPWs is improved.	Achieved: Based on the customer survey conducted by the project, almost 70% (average of 8 TPWs) of the respondents answered that the service improved from 2013 to 2017. In the beneficiary survey at the time of ex-post evaluation, all respondents answered that they were “very satisfied” or “satisfied” (Table 14). Approximately 80% of the respondents replied that their satisfaction level was improved, compared with 2018 (the completion of Phase 3) (see Table 15).

Source: Documents provided by JICA, beneficiary survey at the time of ex-post evaluation

Table 14: Customer Satisfaction at the Time of Ex-post Evaluation (2021)

	Very Satisfied	Satisfied	Neither of Satisfied nor Unsatisfied	Unsatisfied	Very Unsatisfied	Total
Respondents	22	25	0	0	0	47
%	47%	53%	0%	0%	0%	100%

Table 15: Customer Satisfaction at and the Ex-post Evaluation (2021) in Comparison of the Completion of Phase 3 (2018)

	Much Higher	Higher	No Change	Lower	Much Lower	Total
Respondents	14	23	8	2	0	47
%	30%	49%	17%	4%	0%	100%

(3) Current Status of the Project Purposes

- Number of households served by water supply services in 7 TPWs

As seven TPWs enhanced their abilities for the O&M of water supply facilities, the number of households served by the water supply in the project areas was on the rise (see the table below). The renewal and expansion of water supply facilities by other projects also affects the quality of water supply services. Nevertheless, water quality and water pressure are maintained appropriately in the project areas while the beneficiary population is increasing.

Table 16: Number of Households Served by Water Supply Services at Project Commencement and after Project Completion

	At Project Commencement (2007)	At Project Completion (2018)	One Year after Project Completion (2019)	Two Years after Project Completion (2020)
Siem Reap	3,578	8,797	11,033	13,087
Battambang	7,897	23,920	27,398	30,616
Kampot	NA	13,135	13,304	13,764
Kampong Cham	3,338	10,464	12,001	13,345
Kampong Thom	1,683	5,555	6,087	6,672
Pursat	2,503	7,657	8,002	8,615
Svay Rieng	NA	4,432	4,812	5,069

Source: Questionnaire answers from MISTI

- Submission of annual reports by TPWs

In Phase 3, all TPWs established a performance monitoring system based on PI. Based on the responses of the questionnaires to seven TPWs, it can be confirmed that they periodically submitted annual reports (including PI and financial statements) to MISTI in 2020. MISTI kept track of the performance of seven TPWs through its annual report and provided management advice to them.

Phase 2 mostly achieved its overall goal and Phase 3 achieved its overall goal. From the above, it can be confirmed that the project mostly achieved its purpose.

3.2.2.2 Other Positive and Negative Impacts

(1) Impacts on the natural environment, resettlement and land acquisition

This project provided materials and equipment for water supply operation, constructed water supply pipes, and renewed old equipment at the water treatment plants. Based on the answers of the questionnaires to seven TPWs and the expert questionnaires, it can be seen that the project did not have a significant negative impact on the natural environment, and neither land acquisition nor resettlement of residents occurred.

(2) Dissemination of the project effect to water supply operators other than TPWs

In Phase 3, CWA, public waterworks other than TPWs, and private water suppliers also participated in training on non-revenue water and Cambodia International Financial Reporting Standards (CIFRS). According to experts, some private water suppliers took action on non-revenue water after the training. Moreover, the waterworks in Kampong Cham provided guidance on water leakage countermeasures in Stung Treng, outside their supply area. Since the solution of non-revenue water and water leakage problems leads to an increase in income and the efficient management of the water supply business, it is considered that this project contributed to the improvement of water supply services in the areas unassisted by the project.

(3) Support for capital investment of TPWs

Out of the five-year business plans assisted by Phase 3, the expansion plans were utilized for the preparation of Japanese grant aid projects in Pursat and Svay Rieng. The grant aid project “Project for the Expansion of Water Supply System in Pursat” commenced in 2019.

(4) Overseas expansion of local governments

Kitakyushu City commenced the dispatch of experts in 1999, and dispatched many long-term experts and short-term experts through this project. In tandem with the dispatch of experts, Kitakyushu City has organized the Cambodia-Japan Water Supply and Sewage Seminar

annually since 2008, and established the Kitakyushu City Overseas Water Business Promotion Council in 2010. The city has the role of a bridge between the water supply sector in Cambodia and Japanese companies, including indigenous ones. As a result, Prime Minister Hun Sen visited Kitakyushu City in 2015, and Phnom Penh and Kitakyushu City signed a friendship town agreement in 2016. This project helped Kitakyushu City build a cooperative relationship with the Cambodian government, and led to the overseas operations of local governments.

Through the implementation of this project, the Project Purpose, the capacity improvement of all TPWs (O&M capacity of water supply facilities and the capacity to sustainably manage water supply services), was mostly achieved. Regarding the Overall Goal, it is confirmed that seven TPWs improved water supply services and that customer satisfaction has increased. Since the project effects are as planned, effectiveness and impacts of the project are high.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

The Inputs of each phase of this project are shown in the following table.

Table 17: Inputs of Phase 2 (Plan and Actual)

Inputs	Plan	Actual (at the Time of Project Completion)
(1) Experts	Long-term: 3 fields (chief advisor/ distribution facility/electrical facility, water treatment, coordination/training) Short-term: 5 fields (water quality testing, water treatment, electrical facility, mechanical facility, distribution facility) Total 200.5 PM*	Long-term: 4 persons (chief advisor, water treatment process, chief advisor/distribution network, human resource development/coordination) Short-term: 20 persons (water quality testing, water treatment, electrical facility, mechanical facility, distribution facility, human resource development) Total 208.9 PM*
(2) Trainees received	Training in Japan, group training	Training in Japan 22 persons, group training 452 persons
(3) Equipment	Equipment for water quality testing, pipeline equipment, water distribution management equipment, leakage detectors, equipment for electrical and mechanical facilities	Vehicles, equipment for water quality testing, water treatment equipment, equipment for electrical and mechanical facilities, equipment for a distribution facility (including pipeline equipment and leakage detector) Total: JPY 185 million
(4) Overseas Activities Cost	The target is not shown.	69 million yen
Japanese Side Total Project Cost	487 million yen	687 million yen
Cambodia Side Total Project Cost	Local cost	11 million yen**

Source: the ex-ante evaluation sheet of Phase 2, the terminal evaluation report for Phase 2, documents provided by JICA

Note 1: * PM stands for person month.

Note 2: ** At the terminal evaluation

Table 18: Inputs of Phase 3 (Plan and Actual)

Inputs	Plan	Actual (at the Time of Project Completion)
(1) Experts	Long-term: 2 fields (chief advisor/ customer information management, coordination/ monitoring) Short-term: 8 fields (accounting standards, asset data management, replacement/O&M planning, expansion planning, financial planning, technical examination of plan, financial examination of plan, human resource development management)	Long-term: 3 persons (chief advisor, coordination/monitoring) Short-term: 24 persons (accounting standards, asset data management, replacement/O&M planning, expansion planning, financial planning, human resource development management)
(2) Trainees received	Training in Japan, training in a third country	Training in Japan 26 persons, training in a third country 22 persons
(3) Equipment	Equipment for replacement and others (JPY 8 million)	Same as the left (JPY 35 million)
(4) Overseas Activities Cost	58 million yen	108 million yen
Japanese Side Total Project Cost	432 million yen	504 million yen
Cambodia Side Total Project Cost	Costs required for project activities	-

Source: the ex-ante evaluation sheet of Phase 3, documents provided by JICA



Source: Battambang Waterworks

Equipment for Waterworks (drill)



Source: Siem Reap Water Supply Authority

SUMS
(Synergistic Utility Management System)

3.3.1.1 Elements of Inputs

In both Phase 2 and Phase 3, the scope of technical advice was as planned. Based on answers to the questionnaires to the implementing agencies, it can be seen that the equipment provided, the abilities of experts, and the contents of training were appropriate or appropriate to some extent. For Phase 2, it was assumed that equipment would be provided for training purposes at the planning. As the facilities in the water treatment plants of TPWs had many problems which hindered training during project implementation, measures to expand the provision of equipment were taken.

In both Phase 2 and Phase 3, the Cambodian side assigned counterparts, provided facilities and information/data necessary for the project, and bore local costs. This project utilized the human resources of PPWSA, with which Phase 1 assisted, and disseminated the technical capabilities and knowledge of the water supply authority over a wide area in Cambodia. Based on the answers of the questionnaires to the experts, it is clear that the facilities in the water treatment plants had problems as mentioned above. On the other hand, the experts also replied that (1) the appropriate facilities were finally provided for offices, and (2) the Cambodian side provided the required amount of the local cost.

3.3.1.2 Project Cost

For Phase 2, the actual project cost (amount of cooperation) on the Japanese side was JPY 687 million, compared with the planned amount of JPY 487 million. The actual project cost was higher than the plan (141% of the plan). As mentioned above, an increase in the provision of equipment was required during project implementation and this was the main reason for the increase of the project cost.

For Phase 3, the actual project cost (amount of cooperation) on the Japanese side was 504 million yen, compared with the planned amount of JPY 432 million. The actual project cost was higher than the plan (117% of the plan).

On average for the two phases, the actual project cost (amount of cooperation) on the Japanese side was 129% of the plan and exceeded the plan.

3.3.1.3 Project Period

For Phase 2, the actual project period was 4 years and 11 months (from May 2007 to March 2012), compared with the planned project period of 4 years (from April 2007 to March 2011). The actual project period exceeded the plan (123% of the plan). Malfunctions in the water treatment plants of TPWs led to a delay in training and, eventually, a delay in the project implementation.

For Phase 3, the actual project period was 5 years and 8 months (November 2012 - June 2018), compared with the planned project period of 5 years (November 2012 - October 2017). The actual project period exceeded the plan (113% of the plan). It was pointed out that the delay in project implementation was caused by the extension of the procurement period of SUMS.

On average for two phases, the actual project period was 118% of the plan and exceeded the plan.

Both the project cost and project period exceeded the plan. Therefore, efficiency of the project is fair.

3.4 Sustainability (Rating: ③)

This project aimed to improve water supply services by strengthening the O&M capacity of water supply facilities and business management in TPWs. Therefore, the analysis focused mainly on the provision of stable water services by seven TPWs, but also assessed the maintenance of the capacity of the regulatory authority for monitoring public waterworks.

3.4.1 Policy and Political Commitment for the Sustainability of Project Effects

At the time of the ex-post evaluation, the national development strategy, the *National Strategic Development Plan 2019 - 2023*, had the goal of raising the percentage of the urban population with access to clean water from 86% in 2018 to 100% by 2025. Furthermore, the plan included measures to improve technical and financial management: (1) formulation of five-year business plans in all public enterprises by 2023, (2) expansion of the water supply capacity, and sufficient autonomy in public enterprises, and (3) ensuring full-cost recovery and efforts to provide services with quality at a payable price.

Based on the interviews with MISTI, it was understood that the water supply law was in the approval process of the national congress at the ex-post evaluation. The contents of the law included major issues of water supply operation (business licenses, tariff setting, water quality standards, supervision/audits, etc.). Prior to the water supply law, From 2014 to 2017, 15 Prakas (ministerial ordinances) on water supply operation were approved. For example, four Prakas had been approved in 2016, such as performance evaluation of water supply business, water tariff setting, and depreciation of facilities, which were directly related to the sustainability of this project. These ministerial ordinances provided the legal basis for the efficient and stable operation of waterworks.

The policy to expand the access to safe water in urban areas has continued, and development policy had aimed at the autonomous operation of public waterworks. The water supply law was drafted and four important ministerial ordinances were approved in 2016 in line with these policies. Thus, it is concluded that there are no particular problems affecting sustainability in terms of policy and political commitment.

3.4.2 Institutional/Organizational Aspect for the Sustainability of Project Effects

At the completion of Phase 3, the Department of Potable Water Supply in the implementing agency MIH was promoted to the General Department of Potable Water (GD/WAT). MIH renamed itself MISTI in 2020, but GD/WAT continued to supervise water supply services. At the time of the ex-post evaluation, GD/WAT was composed of the Department of Wrap-up & Information (administrative function), the Department of Planning and Data Management, the Department of Potable Water Policies, the Department of Technics & Project Management, and the Department of Potable Water Regulations. The Department of Planning and Data

Management directly supervised public waterworks. The number of personnel in GD/WAT increased from 50 at the terminal evaluation (2017) to 74 at the ex-post evaluation (2021).

Of eight TPWs assisted by this project, the public waterworks in Sihanoukville no longer existed. According to MISTI, the redevelopment of the urban area required capital investment. As the public waterworks did not have a sufficient budget for re-investment and at the same time the waterworks facing the lack of water source for the water production, so the water supply system of Sihanoukville waterworks was leased to a private company. The staff of the public waterworks in Sihanoukville were transferred to the private company which operates water supply services, or transferred to Preah Sihanouk DISTI, or other choice.

Seven TPWs which existed at the ex-post evaluation kept the same institutional position after the completion of Phase 3, and they are public waterworks, except the Siem Reap Water Supply Authority. According to answers to the questionnaires to seven TPWs, the number of technical staff increased after the completion of Phase 3 (2018) in five cities (Kampong Cham, Pursat, Battambang, Siem Reap, and Svay Rieng), with no increase in two cities (Kampong Thom, and Kampot). At the ex-post evaluation, the technical staff had generally achieved the desirable level estimated at the planning of Phase 2. According to the answers in the questionnaires to the experts, the staff of the water treatment plants (water treatment process, electrical facilities, machinery facilities) were engaged in operation regardless of their actual fields of responsibility. Therefore, it is concluded that even TPWs (Kampong Cham, Kampong Thom, Pursat) with very few staff in specific fields can smoothly manage their operations by the complementary staffing of the above three fields.

Table 19: Appropriate Number of Technical Staff in Seven TPWs at the Planning of Phase 2

Unit: persons

Field	Siem Reap	Battambang	Kampot	Kampong Cham	Kampong Thom	Pursat	Svay Rieng	Total
Water quality testing	2	3	2	2	2	2	2	15
Water treatment	2	5	4	3	2	3	2	21
Electrical Facilities	2	3	2	2	2	2	2	15
Mechanical Facilities	2	3	2	2	2	2	2	15
Distribution Facilities	6	6	4	7	3	3	2	31
Total	14	20	14	16	11	12	10	97

Source: The ex-ante evaluation survey report for the Project on the Capacity Building for Water Supply System in Cambodia (Phase 2)

Table 20: Number of Technical Staff in Seven TPWs
at the Time of the Ex-post Evaluation (2021)

Unit: persons

Field	Siem Reap	Battambang	Kampot	Kampong Cham	Kampong Thom	Pursat	Svay Rieng	Total
Water quality testing	3	4	2	2	1	2	2	16
Water treatment	14	8	7	11	4	2	6	52
Electrical Facilities	2	3	4	1	1	2	3	16
Mechanical Facilities	3	3	3	4	1	2	3	19
Distribution Facilities	20	8	10	7	5	7	2	59
Total	42	26	26	25	12	15	16	162

Source: Questionnaire answers from seven TPWs

MISTI established a system for monitoring the seven TPWs and the seven TPWs had the personnel sufficient for the O&M of water supply facilities. Thus, it is concluded that there are no particular problems affecting sustainability in terms of the institutional and organizational aspects.

3.4.3 Technical Aspect for the Sustainability of Project Effects

At the ex-post evaluation, GD/WAT, MISTI formulated an annual training plan and continued training for its staff and the staff of public waterworks. The training covered subjects on O&M and the management of water supply business (see the following table). Moreover, JICA's subsequent project "Project for Strengthening the Administrative Capacity for Urban Water Supply in Cambodia" continuously supported the monitoring capacity of GD/WAT, MISTI, which was enhanced by Phase 3.

Table 21: Training Activities Conducted by MISTI

Training Field	Frequency per Year	Participants per Year
Water treatment	5 times	Approximately 160 persons
Electrical and mechanical facilities	10 times	Approximately 250 persons
Distribution facilities	1 time	Approximately 60 persons
Water testing	No information	No information
Finance and accounting	6 times	Approximately 90 persons
Business planning	No information	No information

Source: Questionnaire answers from MISTI

Based on the answers of the questionnaires to seven TPWs, it was seen that they used the SOPs for the five fields (water quality testing, water treatment, electrical facilities, mechanical facilities, distribution facilities) provided by Phase 2 and continued to collect information for

updating customer ledgers, asset ledgers, and financial statements. Moreover, five of the seven TPWs prepared annual training programs and planned to offer internal training courses on four to seven subjects in 2021 (see the table below). Although the contents of training differ across TPWs, training on electrical and mechanical facilities, measures on non-revenue water, and business planning were mainly provided. In addition, staff could participate in MISTI training even in TPWs without training programs (Battambang and Kampot). From the use of the SOPs and SUMS, it is concluded that the staff in seven TPWs had the opportunity to maintain the technical level through their work, and many TPWs tried to improve the technical level through internal training.

Table 22: Training Activities Conducted by Seven TPWs

	Annual Plan	Frequency*	Training Field
Siem Reap	Yes	4	Water resource management, hygiene, countermeasures on non-revenue water, business management, internal audit, water meter reading
Battambang	No	None	No training
Kampot	No	None	No training
Kampong Cham	Yes	7	Mechanical and electrical facility, planning, countermeasures on non-revenue water
Kampong Thom	Yes	7	Countermeasures on non-revenue water, construction of distribution network, machinery, taxation
Pursat	Yes	4	No information
Svay Rieng	Yes	5	Mechanical and electrical facility, accounting, distribution network management system

Source: Questionnaire answers from seven TPWs

Note: * The number of training courses which TPWs will conduct in 2021

Training opportunities were provided to the staff of seven TPWs who were the counterparts of this project. The technical level could be maintained through daily work in the seven TPWs. Thus, it is concluded that there are no particular problems affecting sustainability in terms of technical aspect.

3.4.4 Financial Aspect for the Sustainability of Project Effects

The expense for training in the water supply sector in MISTI was 72 million riel in 2018 and 2019, but the amount decreased to 36 million riel in 2020. The reduction of the training expense was caused by the difficulty in conducting training due to the coronavirus pandemic. However, as mentioned above, JICA’s “Project for Strengthening the Administrative Capacity of Urban Water Supply in Cambodia” was continuing to assist the monitoring capacity of public waterworks in MISTI at the ex-post evaluation. Therefore, MISTI should be able to maintain the monitoring capacity of public waterworks.

Based on a comparison of the water tariff and the water supply cost among seven TPWs in 2020, it can be seen that the balances were positive or in equilibrium among TPWs other than

Siem Reap and Kampot. The deficits in Siem Reap and Kampot were due to the increases of depreciation caused by the large amount of capital investment in recent years. Therefore, the balance of Siem Reap would be in equilibrium and that of Kampot would be positive if the depreciation were adjusted. Moreover, the cash flow from the operation of seven TPWs was positive on the average of the past three years, and the water supply operations were considered to be financially healthy. Based on the answers in the questionnaires to seven TPWs, for TPWs other than Siem Reap, it can be confirmed that the general budget items (total of maintenance, salary, training) relevant to the project effect of this project increased for the past 3 years (2018 - 2020).

Table 23: Water Tariff and Supply Cost in Seven TPWs (2020)

	Siem Reap	Battambang	Kampot	Kampong Cham	Kampong Thom	Pursat	Svay Rieng
(A) Water tariff	1,960	1,498	1,438	1,389	1,214	1,599	1,200
(B) Supply cost	2,451	1,452	1,813	1,434	1,214	1,534	870
Difference	-491	46	-375	-45	0	65	330
(C) Depreciation	545	428	790	458	204	262	232
Difference excluding depreciation	54	474	415	413	204	327	562

Unit: Riel/m³

Source: Questionnaire answers from seven TPWs

Table 24: Cash Flow from Operation in Seven TPWs

	2018	2019	2020	Average
Siem Reap	-1,580,727	5,114,749	-2,067,772	488,750
Battambang	968,830	2,378,525	2,696,037	2,014,464
Kampot	341,261	941,637	1,947,319	1,076,739
Kampong Cham	3,362,425	2,735,516	4,200,103	3,432,681
Kampong Thom	1,127,210	923,080	1,168,598	1,072,962
Pursat	2,274,274	2,851,292	2,748,612	2,624,726
Svay Rieng	461,167	609,635	531,481	534,094

Unit: thousand Riel

Source: Questionnaire answers from seven TPWs

In parallel with this project, grant aid was provided for the development of water supply facilities in Siem Reap, Battambang, Kampong Cham, and Kampot, contributing to an increase in the population served by water supply and water supply revenue. Human resource development through this project brought about the effective O&M of water supply facilities constructed by grant aid projects and also improved managerial efficiency. Therefore, it is concluded that the synergistic effects of this project and grant aid projects also contributed to the improvement of financial stability.

The water supply operations were financially stable in Seven TPWs. Thus, it is concluded that there are no particular problems affecting sustainability in terms of financial aspect.

No major problems have been observed in the policy background and the institutional/organizational, technical, financial aspects. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Through two phases of technical cooperation, this project aimed to improve the operation and maintenance (O&M) capacity of water supply facilities and the management capacity of water supply services of the public waterworks in eight cities of Cambodia. The aim was also to contribute to the dissemination of the project effect across the cities participating in the “National Conference on Public Water Utilities” and to the improvement of the water supply services in the project area.

In Cambodia, access to safe water in urban areas other than Phnom Penh was an issue, for which the country had a policy solution. The objective of the project was consistent with the above development policy and development needs and was also consistent with Japan’s policy at the time of planning. Therefore, the relevance of this project is high. Through the implementation of this project, the capacity development of all TPWs (O&M capacity of water facilities, management capacity of water supply services) was mostly achieved. An improvement of the water supply services, and a higher level of satisfaction of costumers were also found in seven TPWs (excluding Sihanoukville where the water business was leased to a private company for 20 years). Therefore, effectiveness and impacts of this project is high, as the project effects were as planned. Taking an average of the two phases, efficiency of this project is fair as both the project cost and the project period exceeded the plan. The development policy aimed at the autonomous operation of public waterworks. In line with the policy, the water supply law was drafted and several Prakas (ministerial ordinances) were approved. MISTI, which was the supervisory authority of public waterworks, established the monitoring scheme for seven TPWs, and the seven TPWs assigned sufficient personnel for the O&M of water supply facilities. The counterparts of this project were given training opportunities, and the seven TPWs were able to maintain their technical level through their daily operations. The water supply operations in the seven TPWs were financially stable. 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 Implementing Agency

It was expected that the project effects of Phase 2 would be disseminated to cities outside the project area, but an organization for public waterworks had not been established by the completion of Phase 2. This became a constraint on the dissemination of project effects, and made it difficult to recognize the project effects after the completion of Phase 2. As CWA was established at the time of ex-post evaluation, it is possible to utilize the organization for the dissemination of project effects. It is desirable that MISTI promptly formulates a plan to utilize CWA for the dissemination of the project effects of this project.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Grouping of project target staff

Phase 3 used the approach of dividing all TPWs into two groups for smoother project implementation. Specifically, the preceding group implemented and used SUMS to some extent, allowing counterpart staff of the following group to participate in the process, and utilizing the experience for smoother implementation in the following group. In addition, the staff of the preceding group supported the following group for efficient project implementation. In this process, motivated and skilled staff were actively assigned to work with other TPWs for the development of key personnel in all TPWs. When it is appropriate to divide a cross-jurisdictional project into multiple target groups, it is desirable to use experience gained in support of a preceding group and to actively utilize the staff of a preceding group.

Utilization of human resources from the preceding phase

In this project, the staff of PPWSA, which was supported in Phase 1, were assigned to teach TPWs. As a result of the implementation of Phase 1, the water supply operation of PPWSA became a good practice in Cambodia, and it was meaningful that the technical capabilities and know-how of PPWSA were widely disseminated. If there are human resources that have been developed in the preceding phase, it is desirable to utilize them in a subsequent cross-jurisdictional project for disseminating the impacts of the preceding phase.

Enhancement of development effect by synergy of technical and financial cooperation

In the regional cities supported by this project, water supply facilities were constructed with financial cooperation. This project contributed to the proper O&M of the water supply facilities. The expansion of the facilities brought an increase in the population served by water supply and

in tariff revenue, and led to the sound management of TPWs in tandem with the strengthening of financial and management capacity through the project. As shown above, the synergistic effect of this project and several instances of financial cooperation resulted in development effects such as improvement of water supply services and sound management of water supply business. In a sector where both facility development (hardware) and capacity development (software) are important (such as water supply), it is desirable that, when facility development is needed, technical cooperation is planned with the effective collaboration of financial cooperation.