Egypt

Ex-Post Evaluation of Japanese Grant Aid Project

The Project for Water Supply Development in Northwestern Part of Sharqiya Governorate

External Evaluator: Masami Tomita, Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

This project aimed at achieving increased and stable water supply and improving water quality in Hihya Markaz of Sharqiya Governorate by constructing a new water treatment plant and water distribution facilities.

Relevance of this project is high, as the project is consistent with priority areas of Egypt's development plans and Japan's ODA policy, and moreover development needs for the project are high. Efficiency of the project is high, as both project cost and period were within the plan. Effectiveness of the project is also high, as the project more or less achieved targets in major operation and effect indicators and beneficiaries showed high level of satisfaction with this project. Sustainability of the project is fair, as some problems have been observed in terms of financial status of the operation and maintenance (O&M) agency and the lack of procurement procedure of spare parts, while no major problems have been observed in the O&M system and technical capacity.

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

1. Project Description

Project Location

Drainage and Sludge Tanks

1.1 Background

In Sharqiya Governorate, where the project was implemented, National Organization for Potable Water and Sanitary Drainage (NOPWASD), which is responsible for provision of water supply and sewerage systems in Egypt, had constructed five water treatment plants in accordance to the master plan formulated by the survey conducted with Japan's technical cooperation from 1983 to 1984. These plants were operated and maintained by Sharqiya Economical General Authority for Water and Sanitary Drainage (SHEGAWASD). However, water treatment plants had not been constructed in Hihya, Ibrahimiya and Diarb Nigm Markaz yet due to the lack of funds. Potable water had been

supplied from compact units and wells in these areas, however, compact units were severely deteriorated and the salt level of groundwater reached the undrinkable level. Consequently, NOPWASD formulated the Three Markaz Water Supply Master Plan in 2002, stating the provision plan of water treatment plants and water distribution lines in these areas (the first target year is 2020 and the second target year is 2040), and requested financial assistance from Japan for the part unable to be financed by Egyptian governmental budget. This project was implemented as part of the Three Markaz Water Supply Master Plan.

An initial component requested from the Egyptian government was the construction of water treatment plants in all of Hihya, Ibrahimiya and Diarb Nigm Markaz. On the other hand, water distribution lines were to be constructed with Egyptian budget, which usually takes a long time (over 10 years), and hence the component funded by the Japanese government needed to be reduced so that it would become in line with the component that could be funded by the Egyptian government within a relatively short period of time. Accordingly, it was judged reasonable to provide potable water supply facilities in these markaz in a step-by-step manner. As there was not a large difference in the amount of water supply and water quality before the project was implemented, the priority was given to Hihya markaz, which was located closest to the water treatment plant, as the target area of this project. Moreover, the target year for the capacity of the water treatment plant was determined as 2010, since it was considered that the capacity for 2010 would be sufficient to determine the capacity for expansion of the plant afterwards taking into account the quality of water source and the level of population growth in future.

1.2 Project Outline

The objective of this project is to achieve increased and stable water supply and improve water quality in Hihya Markaz of Sharqiya Governorate by constructing a new water treatment plant and water distribution facilities.

Grant Limit / Actual Grant Amount	2,843 million yen / 2,781 million yen
Exchange of Notes Date	June, 2004
Implementing Agency	National Organization for Potable Water and Sanitary Drainage (NOPWASD)
Project Completion Date	January, 2007
Main Contractor	Dai Nippon Construction
Main Consultant	Yachiyo Engineering Co, Ltd
Basic Design	“Basic Design Study Report on The Project for Water Supply Development in Northwest Part of Sharqiya Governorate in the Arab

	Republic of Egypt" Japan International Cooperation Agency (JICA), Yachiyo Engineering Co, Ltd September, 2003
Detailed Design	June, 2004
Related Projects (if any)	"The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO" (2006-2009)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masami Tomita, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: December, 2010 – December, 2011

Duration of the Field Study: June 18, 2011 – July 1, 2011, September 11, 2011–September 20, 2011

2.3 Constraints during the Evaluation Study (if any)

None

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

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Egypt

The Fifth Five-Year Plan of Egypt (2002-2007) targeted at increasing the daily water production capacity in the country from 17,000 thousand m^3 to 26,000 thousand m^3, and extending the total length of water distribution lines from 25,000 km to 31,000 km, and construction of water treatment plants and water distribution lines was prioritized in the water supply sector. Sharqiya Governorate was the fifth largest governorate in the country, with the population of approximately five million (2002)[3]. The NOPWASD Fifth Five-Year Plan (2002/7-2007/6) stated that its budget allocated for Sharqiya Governorate was approximately 7.5% of the entire budget, placing the governorate the third out of 22 governorates that NOPWASD was responsible for, and the governorate was positioned as an area with urgent necessity for provision of infrastructures.

On the other hand, according to the Sixth Five-Year Plan of Egypt (2007-2012), which is the national development plan at the time of ex-post evaluation, the national daily water production

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

[2] ③ High, ② Fair, ① Low

[3] "Basic Design Study Report on The Project for Water Supply Development in Northwest Part of Sharqiya Governorate in the Arab Republic of Egypt" P.i

capacity was increased to 21,900 thousand m^3 and the total length of water distribution lines was extended to 29,200 km and achieved more than 80% of the target during the Fifth Five-Year Plan period. The Sixth Five-Year Plan targets at increasing the daily water production capacity in the country to 27,800 thousand m^3 and extending the total length of water distribution lines to 36,100 km, investing 12,300 million LE of the national budget (7.8 % of the national budget) in the water supply sector, and construction of water treatment plants and water distribution lines is still prioritized in the water supply sector. Moreover, according to NOPWASD, construction of water distribution lines in Hihya Markaz for the first target year of 2020 stated in the Three Markaz Water Supply Master Plan has been completed, while approximately 70% has been completed in Ibrahimiya and Diarb Nigm Markaz. On the other hand, as explained earlier, the target year for the water treatment plant constructed by the project is 2010, and the expansion of the plant to meet the water demand after 2011 was to be implemented with Egyptian budget. However, the expansion has not been started yet due to the lack of NOPWASD's budget. While the budget for the expansion is currently not allocated yet, partly influenced by the disruption of governmental agencies due to the democratization movement in February, 2011, efforts are being made to obtain the budget, utilizing the modified compact unit in order to meet the increasing demand for potable water.

Therefore, water supply projects including construction of water treatment plants and water distribution lines were/are prioritized in Egypt's development plans both at the time of basic design study and ex-post evaluation, as well as the Three Markaz Water Supply Master Plan is still valid, and thus relevance of this project remains high.

3.1.2 Relevance with the Development Needs of Egypt

At the time of basic design study (2003), in Hihya Markaz of Sharqiya Governorate potable water was supplied from compact units (three units at two locations, production capacity 6,000 m^3 per day) which took water from the Muweiz Canal and wells (13 units, production capacity 25,490 m^3 per day) whose source was groundwater[4]. The planned production capacity of existing water supply facilities was 31,490 m^3 per day, however, these facilities were deteriorated severely and actual amount of water supply was as little as 17,680 m^3 per day[5] (101 L per person per day, while the national average was 158 L per person per day in 2000[6]), and deterioration of water supply facilities often caused water stoppage (once to four times per week, three to five hours per stoppage)[7]. Moreover, the saline groundwater development became severer year by year, and residents of Hihya Markaz were forced to cope with insufficient amount of water whose quality had been deteriorated overtime.

On the other hand, while the situation regarding water supply per capita, water stoppage and water quality has been improved at the time of ex-post evaluation, as explained in "3.3 Effectiveness",

[4] "Basic Design Study Report on The Project for Water Supply Development in Northwest Part of Sharqiya Governorate in the Arab Republic of Egypt" P.10
[5] Same as above.
[6] Same as above. P.50
[7] Same as above. P.41

demand for potable water has been increasing due to population growth and improved living standards. The table below shows the demand and supply of daily life water in Hihya Markaz.

Table 1: Demand and Supply of Daily Life Water in Hihya Markaz

(Unit: m^3 per day)

	2004 (Before Project Completion)	2007 (Project Completion)	2008 (1 Year After Completion)	2009 (2 Years After Completion)	2010 (3 Years After Completion)
Demand	29,550	31,725	32,651	33,575	36,799
Supply	23,760	29,202	30,636	32,989	37,000
Balance	-5,790	-2,523	-2,015	-586	201

Source: answer to questionnaire

Note: The reason for the supply amount had been below the production capacity of the Hihya water treatment plant (35,000 m^3 per day) until 2009 is that construction of water distribution lines in all villages in Hihya Markaz was not completed until June, 2010. The supply amount in 2010 includes water supplied from both the Hihya plant (35,150 m^3 per day) and the modified compact unit (1,850 m^3 per day).

Apart from the Hihya water treatment plant, the modified compact unit has been used since 2010 in order to meet the increasing demand for potable water due to population growth and improved living standards, and development needs for the project is still high.

3.1.3 Relevance with Japan's ODA Policy

In Japan's Official Development Assistance (ODA) Charter revised in 2003, assistance for the area of water and sanitation targeted at poverty reduction was prioritized, and the Country Assistance Program for Egypt formulated in 2000 stated improvement of living conditions including stable supply of safe potable water as an important area for Japan's assistance to Egypt.

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

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

Table 2 below shows outputs of the project (both planned and actual) which were constructed and procured with Japan's grant aid, and Table 3 below shows outputs of the project (both planned and actual) which were constructed and procured with Egypt's budget.

Table 2: Outputs of the Project Constructed and Procured with Japan's Grant Aid (Planned/Actual)

Item		Planned	Actual
Facilities	Water Intake Facilities	3 Intake pipes, raw water pit	As planned.
	Raw Water Transmission Pumps	Intake volume 38,500 m^3 /day, 3 pumps (including 1 spare pump)	As planned.
	Water Purification Facilities	Production volume 35,000 m^3 /day, receiving well, mixing basin, flocculation basin, sedimentation basin, rapid sand filter, chlorine system, sludge treatment facilities, treated water reservoir etc	As planned.
	Water Transmission Pumps	Transmission volume 44,000 m^3 /day, 4pumps (including 1 spare pump)	As planned.
	Operation Management Facilities	Control panel, monitor panel, flow monitor etc	As planned.
	Electric Facilities	Power receiving system, transformer	As planned.
	Emergency Power Generating Facility	1 Diesel generator 700kVA	As planned.
	Buildings	Central monitoring and administration building, raw water and transmission pump house, chemical dosing house, rapid sand filter basin operation building	As planned.
Procured Equipments		Spare parts for water treatment equipments, maintenance tools for water treatment plant, water quality analysis equipments, equipments for water treatment plant operation etc	As planned.
Technical Guidance on Operation and Maintenance of the New Water Treatment Plant		Period: 4 months, the number of trainees: 17	Almost as planed (period: 4 months, the number of trainees: 13-21)
Technical Guidance on Information Management (customer data, plant operation data etc)		Period: 2 months, the number of trainees: 17	Almost as planed (period: 2 months, the number of trainees: 17-21)

Source: Basic Design Study Report, JICA Internal Documents, Answer to Questionnaire

Table 3: Outputs of the Project Constructed and Procured with Egypt's Budget (Planned/Actual)

Planned	Actual
Securing the land for the construction site of the water treatment plant	As planned.
Clearing, levelling and reclaiming the site of the water treatment plant	As planned.
Providing facilities for the distribution of electricity	As planned.
Executing the construction work for water transmission mains from the new water treatment plant to each town/village	As planned. (completed the construction of approximately 20 km of water transmission mains by the end of December 2006)
Executing the construction work for water distribution facilities (construction of new lines and replacement of old lines)	As planned. (completed the construction and rehabilitation of approximately 97 km of water distribution lines by June 2006)

Source: Basic Design Study Report, JICA Internal Documents, Answer to Questionnaire

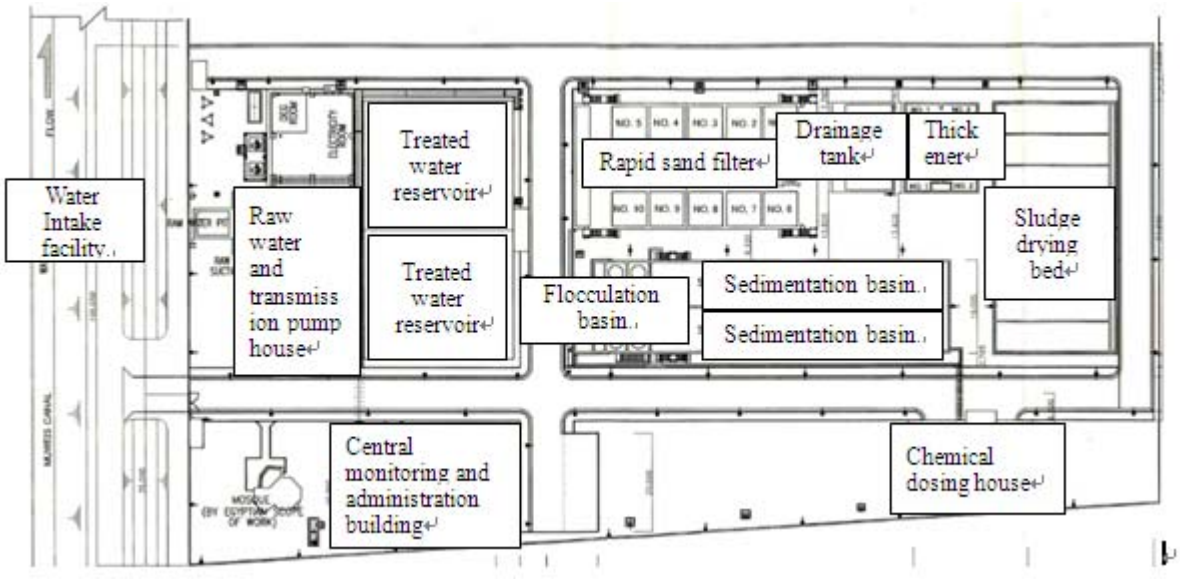

Figure 1: Overview of the Hihya Water Treatment Plant

Source: Edited based on the general layout of the water treatment plant in the basic design study report

Outputs of the project were almost as planned. However, there was no clear mention in the basic design study report about planned figures for water distribution lines from the water treatment plant to end users, which were to be constructed with Egyptian budget. According to NOPWASD, while the majority of the construction works of water distribution lines was completed in 2006, the construction works to cover all villages in Hihya Markaz continued until June, 2010. Based on reasons that there is no precise planned figure of water distribution lines, that the amount of water deficit due to incomplete provision of water distribution lines was less than 10% of water demand according to the Table 1: "Demand and Supply of Daily Life Water in Hihya Markaz" in "3.1 Relevance" and hence that the majority of the construction works seems to have been completed in 2006, outputs of the project are evaluated as having been produced as planned within the project period.

Water Intake Facility

Sedimentation Basin

3.2.2 Project Inputs

3.2.2.1 Project Cost

The grant limit at the time of basic design study was 2,843 million yen, on the other hand, the actual grant amount was 2,781 million yen, and it was lower than planned (98% against the plan). The planned Egyptian budget was 1,144 million yen[8], while the actual cost was 625 million yen[9], and it was lower than planned (55% against the plan). The reason for the large reduction of the project cost financed with Egyptian budget was due to the reduction of construction cost of water distribution lines (while NOPWASD explained that the budget was estimated more than actually needed at the time of basic design study, the fact that the construction of water distribution lines was not completed at the time of project completion (January, 2007) seems to be another reason for the reduction of the project cost).

3.2.2.2 Project Period

The planned project period at the time of basic design study was 31.5 months in total (3.5 months for detailed design and 28 months for preparation, civil works and trial operation)[10]. On the other hand, the actual project period was 29.5 months in total (3.5 months for detailed design and 26 months for preparation, civil works and trial operation), and it was shorter than planned (94% against the plan) . The reason for the shorter project period was due to efforts made by contractors to proceed construction works efficiently through an increase of workforce.

Both project cost and project period were within the plan, therefore efficiency of the project is high.

3.3 Effectiveness (Rating: ③[11])

3.3.1 Quantitative Effects

3.3.1.1 Population Served and Percentage of Population Served

The table below shows the baseline data in 2002, target figures for 2010 and actual figures in 2010 of the number of population served and the percentage of population served in Hihya Markaz.

[8] "Basic Design Study Report on The Project for Water Supply Development in Northwest Part of Sharqiya Governorate in the Arab Republic of Egypt" P.163

[9] Calculated as multiplying 32.93 million LE of the total cost by the average exchange rate of 1LE=18.98 yen (the average exchange rate of the period of 2004/6/10-2007/1/16).

[10] "Basic Design Study Report on The Project for Water Supply Development in Northwest Part of Sharqiya Governorate in the Arab Republic of Egypt" P.155

[11] The rating of the project's effectiveness takes into account the evaluation of the project's impact.

Table 4: Population Served and Percentage of Population Served

(Unit: population served: person, percentage of population served: %)

Indicator	2002 (baseline)	2010 (planned)	2010 (actual)
Population Served	175,000	223,360	229,996
Percentage of Population Served	90	100	100

Source: baseline data in 2002 and target figures for 2010: basic design study report, actual figures in 2010: answer to questionnaire

The actual number of population served exceeds the planned figure, as the population of Hihya Markaz, where the project was implemented, has been increasing more than estimated at the time of basic design study. According to the basic design study report, the estimated percentage of population served before the project was 90%. However, a beneficiary survey was conducted in the ex-post evaluation study (for the detailed results of the beneficiary survey, see "3.3.2 Qualitative Effects" and "3.4 Impact"), and more than 50% of respondents replied that the major source of their daily life water five years ago (in 2005) was other than tap water inside their houses and/or offices such as purchasing water from water vendors and obtaining water from wells etc, since the quality of tap water inside their houses and/or offices was aggravated. Thus, the substantive percentage of population served seems to have been much lower than 90% before the project. On the other hand, according to Sharqiya Potable Water and Sanitation Company (SHAPWASCO), which is responsible for operation and maintenance of the Hihya water treatment plant, the actual percentage of population served in 2010 is 100%, however, according to the results of the beneficiary survey, the actual percentage is 96.7%[12]. Thus, the actual percentage of population served does not seem to have reached 100% yet, however, it has been largely improved compared with the situation before the project.

3.3.1.2 Amount of Water Supply

The table below shows the baseline data in 2002, target figures for 2010 and actual figures in 2010 of the daily average amount of water supply (both of Hihya Markaz as a whole and per capita).

Table 5: Daily Average Amount of Water Supply

(Unit: Hihya Markaz: m^3/day, per capita: L/person/day)

Indicator	2002 (baseline)	2010 (planned)	2010 (actual)
Water Supply (Hihya Markaz)	17,680	35,000	37,000
Water Supply per Capita	101	157	161

Source: baseline data in 2002 and target figures for 2010: basic design study report, actual figures in 2010: answer to questionnaire

Note: The actual figure of water supply in 2010 includes both the amount of water supplied from the Hihya water treatment plant (35,150m^3/day) and the modified compact unit (1,850m^3/day).

[12] Among the total number of valid response of 213, 206 households/offices had water connection, and thus the percentage of population served was 96.7% (206 divided by 213).

Apart from the Hihya water treatment plant, a modified compact unit is currently used in order to meet the increasing demand for water in Hihya Markaz due to population growth and improved living standards. The actual amount of water supply in 2010 both in terms of water supply in Hihya Markaz as a whole and per capita has been largely improved compared with that of before the project and exceeds the planned figure. However, the quality of water supplied from the compact unit modified with Egyptian budget is low compared with that of water supplied from the Hihya plant, since the water purification process is simplified in the compact unit (for example, flocculation and sedimentation are carried out in the same basin). According to SHAPWASCO, some complaints have been reported from the residents who were supplied water from the compact unit. Budget allocation for the expansion of the Hihya water treatment plant as early as possible would be necessary in order to solve this problem and meet the water demands for 2011 onwards.

Modified Compact Unit (flocculation and sedimentation basin)

3.3.1.3 Water Quality

The TDS (Total Dissolved Solid) concentration of groundwater, which was the major water source before the project in 2002, was 800 mg/L on average, and the TDS concentration of water supplied from the Hihya water treatment plant was targeted at below 500 mg/L after the project completion. According to SHAPWASCO, the current TDS concentration of water supplied from the Hihya plant is 220 mg/L and achieved the target.

3.3.2 Qualitative Effects

A beneficiary survey was conducted in order to evaluate the project qualitatively[13]. The overview of the survey results is presented below.

[13] The beneficiary survey was conducted in a following manner. Time: May, 2011, place: Hihya Markaz (Hihya City and 28 villages), the number of samples (valid responses): 213 in total (residents: 182, small and medium companies: 31)

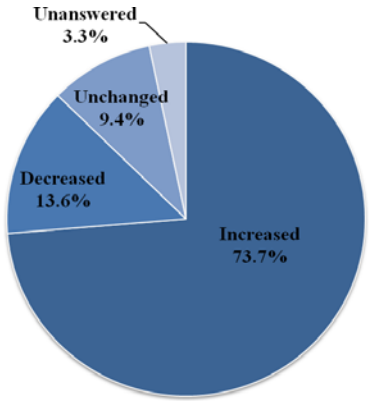

Figure2: Change in the amount of water supply after the project

Note: respondents who did not answer do not have water connection at home/office

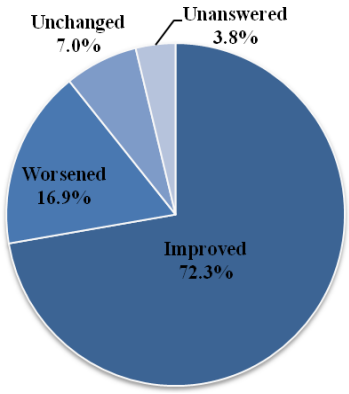

Figure3: Change in water pressure after the project

Note: respondents who did not answer include those who do not have water connection at home/office

More than 70% of respondents replied that the amount of water supply increased and water pressure was improved after the project. However, 58.7% replied “No” to the question, whether beneficiaries are satisfied with the current amount of water supply, and 55.4% replied “No” to the question, whether beneficiaries are satisfied with the current water pressure. As there is a tendency for water not to reach sufficiently two or more steps of buildings, 82.6% of respondents installed water pumps at their home and/or offices (by doing so, water shortages are more or less resolved). As more than half of respondents are not satisfied with the current amount of water supply and water pressure, there is a room for improvement.

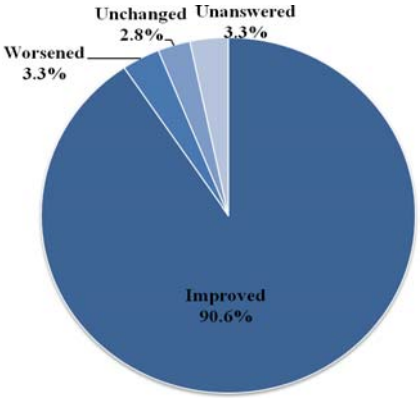

Figure4: Change in water quality after the project

Note: respondents who did not answer do not have water connection at home/office

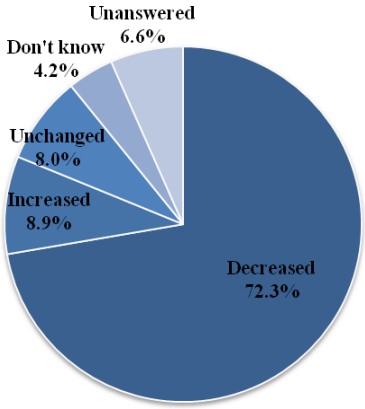

Figure5: Change in frequencies and duration of water stoppage after the project

Note: respondents who did not answer include those who do not have water connection at home/office

Water quality was greatly improved after the project, and more than 90% of respondents replied that the currently supplied water has no colour, no taste, and no odour. Moreover, more than 70% replied that frequencies and duration of water stoppage were decreased after the project. While

approximately 80% replied “Yes” to the question, whether beneficiaries still face water stoppage, approximately 60% replied that they rarely have water stoppage, and approximately 20% replied that they have water stoppage once to three times per week. As for durations of water stoppage, approximately 40% replied that the duration is two to three hours per stoppage, approximately 20% replied that the duration is 0.5 to 1.5 hours per stoppage, and approximately 10% replied that the duration is three to four hours per stoppage. Furthermore, 85% of respondents are satisfied with the project. Thus, while there is a room for improvement regarding the amount of water supply and water pressure, residents were forced to cope with insufficient amount of water whose quality had been deteriorated overtime before the project, as explained in “3.1.2 Relevance with the Development Needs of Egypt”. This project achieved the increased amount of water supply, improvement of water pressure and quality, and reduction of frequencies and duration of water stoppage, and benefits brought to the residents seem to have been significant.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Reduction of the Rate of Ineffective Water Volume and Unaccounted-for Water Volume

According to the basic design study report, in Hihya Markaz the unknown water volume rate was estimated approximately 40% before the project, of which the leakage rate was estimated approximately 30%, and the leakage rate was to be reduced by almost 10% after the project. However, executing agencies do not have data on the leakage rate in Hihya Markaz as a whole. According to the completion report (2009) of “the Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO”[14], which was implemented from 2006 to 2009 with Japan’s technical cooperation, the leakage rate of the pilot area in Hihya Markaz (the south-east part of Hihya City) was reduced by 10.9% (from 24.3% to 13.4%)[15]. However, the number of population served in the pilot area is 8,484[16], which is only 4% of the number of population served in Hihya Markaz as a whole, which is 229,996 (2010), and thus the leakage rate in Hihya Markaz as a whole cannot be estimated. On the other hand, according to SHAPWASCO, the sum of the rate of ineffective water

[14] The objective of the project was to improve management and capacity of operation and maintenance of SHAPWASCO, and major activities were to reduce leakages from water distribution lines, to reduce unaccounted-for water volume by replacing water meters, and to diffuse Standard Operational Procedure (SOP) in water treatment plants. The project component to reduce unaccounted-for water volume included a part of Hihya Markaz (south-east part of Hihya City) as a pilot area, and replacement of broken water meters, provision of leakage detection equipment and leakage water treatment etc were carried out in the pilot area.

[15] “The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO” completion report P.4-20

[16] “The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO” terminal evaluation report P.3-10

volume[17] and the rate of unaccounted-for water volume[18] in Hihya Markaz is 28% (2010). While it is not appropriate to simply compare the figure with the unknown water volume rate of before the project, the rate of ineffective water volume and the rate of unaccounted-for water volume seem to have been improved compared with those of before the project, based on the fact that water distribution lines were constructed and rehabilitated in Hihya Markaz, that technical guidance on information management (customer data, plant operation data etc) was provided, and that the above mentioned technical cooperation project contributed to the reduction of the rate of unaccounted-for water volume.

3.4.1.2 Changes in Frequencies of Water-related Diseases

Figure 6 shows the result of the beneficiary survey regarding frequencies of water-related diseases after the project. 35.2% of respondents replied "Yes" to the question, whether any members of their family or employees have had an incidence of water-related diseases, of which 60.1% replied that frequencies of water-related diseases were decreased after the project (major symptoms were diarrhoea, fever, vomiting, kidney failure and hepatitis etc). It cannot be said that the above achievement is attributable only to this project, as water-related diseases are caused by various factors apart from potable water supply systems, nonetheless, this project seems to have contributed to the achievement to some extent through improvement of water quality.

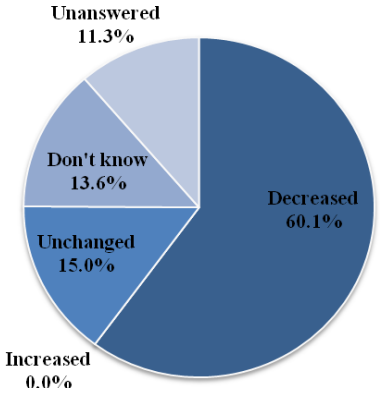

Figure6: Change in frequencies of water-related diseases after the project

3.4.1.3 Changes in Living Conditions

Figure 7 shows the result of the beneficiary survey regarding changes in living conditions after the project. 57.7% of respondents replied that their major source of daily life water five years ago was other than tap water inside their houses and/or offices such as purchasing water from water vendors and obtaining water from wells etc, and 78.4% replied that their living conditions were changed after the project. Examples of such changes are reduction of health

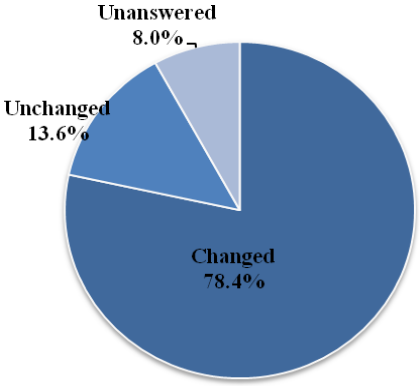

Figure7: Change in living conditions after the project

[17] Ineffective water volume: water volume that is ineffective in use (water volume not reached end users) due to leakages from water distribution lines etc.
[18] Unaccounted-for water volume: water volume of which water charge is not billed and/or collected, due to broken water meters and other reasons.

problems, improvement of sanitary and hygienic conditions at home and/or schools, saving of water purchasing fee, increased income, and higher degree of comfort etc.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

In the basic design study, it was planned to reduce environmental burden by stopping directly discharging sludge and backwashing water into canals, which was the prevailing practice in Egypt, and treating sludge by drying bed in the Hihya water treatment plant. Currently sludge is treated as planned. Moreover, according to NOPWASD, the results of environmental monitoring during the project implementation were reported to JICA. Furthermore, no negative impact on environment has been reported from the beneficiary survey.

3.4.2.2 Land Acquisition and Resettlement

In the basic design study, acquisition of approximately 4 ha of land was planned, and the land acquisition was completed before the commencement of the project, and approximately 15 households were affected by the land acquisition, according to NOPWASD. Compensation was paid for the affected households and some of them were employed as O&M staff at the water treatment plant. No major problem has been reported from the beneficiary survey.

3.4.2.3Other Benefits to Residents

In the beneficiary survey, approximately 20% of respondents replied that the project contributed to development of economic activities in Hihya Markaz. Examples of such development are increased employment during construction of the Hihya water treatment plant, and increased numbers of café, restaurants and car wash stations after the project.

This project mostly achieved overall goals of the project such as reduction of the rate of ineffective water volume and the rate of unaccounted-for water volume, and improvement of sanitary and living conditions of residents.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The Hihya branch of Sharqiya Potable Water and Sanitation Company (SHAPWASCO)[19] is responsible for O&M of the Hihya water treatment plant constructed by the project. The table below shows the comparison of the number of staff at the time of basic design study (the number of staff at the Hihya water treatment plant was the planned figure) and ex-post evaluation.

[19] Sharqiya Economical General Authority for Water and Sanitary Drainage (SHEGAWASD) was changed its name to Sharqiya Potable Water and Sanitation Company (SHAPWASCO) in 2005.

Table 6: The Number of Staff of SHAPWASCO

(Unit: persons)

Organization/Division	2002	2010
Hihya Branch	220	267
Of which Potable Water Supply Division	107	115
Of which Hihya Water Treatment Plant	82	39

Source: 2002: basic design study report, 2010: answer to questionnaire

At the time of ex-post evaluation, the number of staff of the Hihya branch has increased, however, the actual number of staff of the Hihya water treatment plant is kept less than half of the planned number, through self-reliant efforts to operate and maintain the plant efficiently. According to SHAPWASCO, the necessary number of O&M staff is secured, and as explained below, the Hihya plant was visited during the field study of ex-post evaluation, and all facilities were kept clean and well maintained, which suggests that the current number of O&M staff is sufficient for O&M of the plant. Thus, no major problem has been observed in the structure of O&M.

3.5.2 Technical Aspects of Operation and Maintenance

Among 39 staff of the Hihya water treatment plant, three are engineers, eight are chemists, 17 are technicians, and sufficient number of technical staff is assigned. Daily, weekly, monthly and yearly maintenance is carried out based on O&M manuals provided in this project and Standard Operational Procedure (SOP) prepared in "the Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO". When conducting periodical maintenance (such as monthly and yearly maintenance etc), workshops are held to check if staff understand tasks and procedures of O&M correctly. Moreover, according to SHAPWASCO, customer data, which was not managed properly before the project, is now centrally managed at the commercial department of SHAPWASCO headquarter, and the daily amount of water distribution is recorded and managed using flow meters set at the Hihya water treatment plant. Through these efforts and skills to detect water leakage acquired in the above technical cooperation project, the rate of ineffective water volume and the rate of unaccounted-for water volume have been reduced. Thus, no major problem has been observed in technical capacity of O&M.

3.5.3 Financial Aspects of Operation and Maintenance

Water charges of SHAPWASCO are kept low due to political reasons, while they have been revised after the project. The table below shows water charges before and after the project.

Table 7: Water Charges of SHAPWASCO

(Unit: LE/m^3)

User Category	2003 (before project)	2010 (after project)
Households (below 10m^3)[3)]	0.23	0.23
Households (below 20m^3)		0.31
Households (below 30m^3)		0.43
Households (below 40m^3)		0.45
Households (over41m^3)		0.50
Governmental Facilities	0.40	0.80
Small Enterprises	N/A	1.50
Large Enterprises	0.85	2.00
Construction Companies	N/A	4.00
O&M Charge	N/A	0.45
Tax	N/A	0.030

Source: 2003: basic design study report, 2010: answer to questionnaire

Note: both O&M charges and tax are added to the water charges and billed to customers.

SHAPWASCO's operating balance has been in deficit since before the project largely due to low water charges shown above. The table below shows operating revenue and expenditure of SHAPWASCO for the recent three years.

Table 8: Operating Revenue and Expenditure of SHAPWASCO

(Unit: LE)

	2008	2009	2010
Operating Revenue			
Water Revenue	72,926,736	82,383,709	100,403,574
Sewerage Revenue	22,795,481	29,743,524	38,229,475
Equipment Sales	9,633,292	11,110,235	16,050,985
Other Revenue	1,056	0	0
Total	105,356,565	123,237,468	154,684,034
Operating Expenditure			
Production Cost	109,577,534	131,279,490	164,387,506
Sales Cost	60,263,740	59,702,228	68,223,267
Total	169,841,274	190,981,718	232,610,773
Balance	- 64,484,709	-67,744,250	-77,926,739
Government Subsidy	16,920,000	26,000,000	12,594,678

Source: answer to questionnaire

According to SHAPWASCO, depreciation cost, which had not been booked before, has been included in production cost since SHAPWASCO became a public corporation, and the depreciation cost accounts for almost 30% of production cost (however, operating balance is in deficit even if depreciation cost is excluded from production cost). Labor cost also accounts for almost 30% of production cost. In the beneficiary survey, approximately 80% of respondents replied that water charges are billed and collected roughly once in two months, however, some beneficiaries complained

that reading water meters and billing are not conducted on a regular schedule. Reading water meters and collecting water charges on a regular schedule are necessary for improved management of SHAPWASCO.

On the other hand, annual O&M cost of the Hihya water treatment plant was estimated 3,422 thousand LE before the project[20], however, actual O&M cost is kept almost half of the planned cost due to self-reliant efforts to keep the number of O&M staff less than half of the planned number and efforts to reduce the consumption of chemicals and electricity in each process at the water treatment plant to less than half of planned volumes through the activities of the technical cooperation project. The tables below show actual O&M cost of the Hihya water treatment plant and water supply revenue of the SHAPWASCO Hihya branch.

Table 9: Actual O&M Cost of the Hihya Water Treatment Plant

(Unit: LE)

	2008	2009	2010
O&M Cost	1,540,055	1,581,401	1,840,126

Source: answer to questionnaire

Table 10: Water Supply Revenue of SHAPWASCO Hihya Branch

(Unit: LE)

	2008	2009	2010
Water Revenue	2,352,211	2,123,811	3,382,687

Source: answer to questionnaire

As shown above, taking the Hihya water treatment plant separately, O&M cost is covered by water supply revenue of the Hihya branch. However, water supply revenue of the Hihya branch is absorbed into SHAPWASCO's overall accounting and O&M cost of the Hihya plant is allocated from the account, and thus, SHAPWASCO's operating deficit should be improved in order to continue to secure sufficient amount of O&M cost of the Hihya plant in the future.

3.5.4 Current Status of Operation and Maintenance

The Hihya water treatment plant was visited during the field study of ex-post evaluation, and periodical O&M is conducted and facilities overall are kept in a good condition. However, according to SHAPWASCO, spare parts of the plant constructed by the project are Japanese-made and need to be imported from Japan (the same spare parts are not sold locally), but many spare parts have not been

Flocculator (the blue equipment in the middle)

[20] "Basic Design Study Report on The Project for Water Supply Development in Northwest Part of Sharqiya Governorate in the Arab Republic of Egypt" P.164

procured yet due to reasons that import procedures are complicated and that local agents are not available for some spare parts, while the list of Japanese spare parts agents is available. Consequently, two flocculators out of eight in total are out of order (while there is no negative influence on the amount of water supply yet, as SHAPWASCO operates the rest of flocculators with increased speed). While four years have passed since the start of plant operation and there are many other spare parts including those for aluminium sulfate injection pumps that need to be procured, they have not been procured due to above reasons. According to JICA Egypt Office, a local branch of the Japanese company that procured some facilities for the project exists in Egypt, and kinds of spare parts that can be procured through the branch need to be checked and the procurement procedure for spare parts needs to be established as early as possible in order to sustain effects achieved by the project.

Some problems have been observed in terms of financial status of SHAPWASCO and procurement of spare parts, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Relevance of this project is high, as the project is consistent with priority areas of Egypt's development plans and Japan's ODA policy, and moreover development needs for the project are high. Efficiency of the project is high, as both project cost and period were within the plan. Effectiveness of the project is also high, as the project more or less achieved targets in major operation and effect indicators and beneficiaries showed high level of satisfaction with this project. Sustainability of the project is fair, as some problems have been observed in terms of financial status of the O&M agency and the lack of procurement procedure of spare parts, while no major problems have been observed in the O&M system and technical capacity.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency (SHAPWASCO)

(1) While improvements have been made regarding the rate of ineffective water volume and the rate of unaccounted-for water volume, SHAPWASCO's operating balance is still in deficit, and following actions should be taken for improved management of SHAPWASCO; 1) revision of water charges in Sharqiya Governorate (to the level that can cover water supply cost), 2) self-reliant efforts in SHAPWASCO as a whole to reduce labour cost and electricity expense etc as has been done in the Hihya plant, 3) rehabilitation and renewal of water distribution lines in Sharqiya Governorate to reduce further ineffective water rates, and 4) regular water meter reading and improvement of water charge collection in Sharqiya Governorate including Hihya markaz.

(2) To keep relying on the Japanese side for provision of spare parts for a long time is unrealistic, and self-reliant efforts would be needed to check the procurement procedure with the Japanese side and procure spare parts independently.

4.2.2 Recommendations to JICA

Regarding procurement of spare parts, information on the local branch of the Japanese company that procured some facilities for the project should be provided to SHAPWASCO, and in case it requires a long time to procure spare parts that are urgently needed by SHAPWASCO, actions would be needed to provide these spare parts to SHAPWASCO.

4.3 Lessons Learned

Two flocculators out of eight have stopped operation as necessary spare parts have not been procured yet. Information on local agents that deal with necessary spare parts should be provided to O&M organizations in advance and locally available spare parts should be used as much as possible in the future projects in order to make it easier for O&M organizations to procure spare parts and conduct O&M independently.