Suez Canal Improvement Project

Source: Oriental Consultants Global Co., Ltd.

Reasons for taking up this project

Egypt's Suez Canal is a man-made canal connecting the Mediterranean Sea and Red Sea. The current canal, which was first excavated at the end of the 19th century by the former French diplomat Ferdinand de Lesseps, was later expanded in a series of improvement projects. Along with the Panama Canal, the Suez Canal is an extremely important waterway for global shipping. Approximately 10% of the world's ocean freight moves through it.

The Japanese government assisted in the 1975 expansion of the Suez Canal by making a 38 billion yen loan for the first expansion project. Prior to that, however, Japanese engineering and construction companies had contributed to the expansion efforts in 1961 by contracting with the Suez Canal Authority.

The Japan Society of Civil Engineers is discussing the Suez Canal development project for the following reasons.

1) Overseas development by Japanese companies is currently being promoted by both the public and private sectors, but Japanese companies earned a good reputation by winning major projects in Egypt soon after Japan started making yen loans in 1958.
2) Moreover, in the wake of the oil crisis in Japan, these successes led to the yen loan-funded Suez Canal construction project (starting in 1975) and became early prototypes for Japanese official development assistance (ODA).
3) Given the Suez Canal's critical role in Japanese and global shipping, the accomplishments of ODA and Japanese firms have been remarkable, and we can see an extraordinarily broad spectrum of accomplishment on a regional level as well.
4) Furthermore, in addition to the expansion projects made possible through yen-based loans to the Suez Canal Authority, there are many good examples of ongoing economic and technological collaboration, including development studies by the Japan International Cooperation Agency (JICA) and the transfer of unique Japanese technologies through the dispatch of experts.

1 Project Background

Formation Stage

1869	The Suez Canal was opened to vessels of all nations.
1958	A Japanese ODA survey team was sent to ascertain the state of the canal.

After its excavation by de Lesseps, the Suez Canal was operated as a corporation. In 1875, however, Egypt handed over the operating company to Britain to satisfy its foreign debt obligations. Later, Egypt's President Nasser nationalized the Suez Canal in 1956, which touched off the second Middle East War, sometimes called the Suez crisis.

Between the time it opened in 1869 and when the expansion projects began in the early 1960s, the Suez Canal was deepened from 10 meters to 15.5 meters; the maximum ship size it could accommodate went from 5,000 DWT to 80,000 DWT; and space for multiple lanes was added.

The Egyptian government came up with the "Nasser Plan" to develop the canal starting in 1960. This would turn the canal into a multi-lane waterway approximately 160 km in length.

A Japanese ODA survey team was sent to Egypt in 1958 to ascertain the state of the canal. This was the first action taken in the direction of Suez economic cooperation, and technology exchanges between Japan and the Suez Canal Authority progressed as Japan sent experts to Egypt and Egypt sent trainees to Japan from 1960 on.

2 Project Chronology

Execution Phase

1961-1967	A project financed with Suez Canal Authority funds was undertaken.
1967	The third Middle East War broke out and the canal had to be closed after some large warships sank.
1975	The Japanese government assisted expansion of the Suez Canal by making a 38 billion yen loan for the first expansion project.
1977	Expansion of the Suez Canal continued under the aegis of economic cooperation, with an additional yen loan.
1975-	Japanese government extended a significant amount of technological cooperation along with the economic cooperation. Cooperation, including a canal expansion plan, a safety navigation plan, Regional development plan, Tunnel and Bridge construction plan and so on.

2.1 Development by the Suez Canal Authority in the 1960s

A project financed with Suez Canal Authority funds (hereinafter, the "SCA project") was undertaken between 1961 and 1967. Japanese engineering and construction firms, which had no major overseas project experience at the time, won contracts for and delivered projects that involved major technological challenges, such as excavating bedrock that was much harder than originally anticipated. The projects progressed with difficulty, as the dredging ships that had been built for the project

required many modifications. This became the basis for Japan's dredging technology, which has since become highly regarded around the world. In addition, many engineers and workers, along with their families, were sent to the Suez, and the work was unprecedented from a logistics perspective as well.

Figure 1: Location of The Suez Canal

The Japanese competed with many overseas firms for the first phase of the SCA project. But in the second and third phases, the Japanese firms won negotiated contracts, which was unheard of at the time. The first phase began in 1961, and the project was completed in 1967, after the second and third phases.

A fourth phase of the SCA project was planned. Yet, the third Middle East War broke out just when the contract was being awarded, and the Suez Canal had to be closed after several large warships sank in it, which brought construction to a halt and caused the construction firms to leave.

2.2 Restarting the Project with Yen Loans

While the canal was closed, global ocean freight was forced to take alternative routes, and crude oil shipment, in particular, were impacted in many ways, and becoming one factor in the skyrocketing price of crude oil. Also during that time, ships became larger, and for Japan, an oil importer, the re-opening of the Suez Canal held great significance and became an urgent issue. The Japanese government (via the Overseas Economic Cooperation Fund (OECF)) provided a loan of 38 billion yen in 1975, which restarted the operation as phase one of the Suez Canal expansion project. This project involved several Japanese firms because of tied procurement terms. Previous minesweeping operations had been inadequate, so many mines and unexploded bombs from the Middle East wars had to be disposed of first. The scale was without precedent even among domestic Japanese construction projects, and a great deal of labor was expended before it was completed.

Expansion of the Suez Canal continued under the aegis of economic cooperation, with an additional yen loan from the Japanese government in 1977 and JICA-sponsored development plans (Suez Canal Phase 2 Expansion Plan Survey, 1980; Suez Canal Navigational Safety Plan Survey, 1986).

2.3 Continual Technological Support in Conjunction with Economic Cooperation

Japanese government extended a significant amount of technological cooperation along with the economic cooperation it gave to the Suez Canal. Many cooperative projects were done in parallel with canal development and met

with great success, including various kinds of technological cooperation to improve the management capabilities of the Suez Canal Authority, the sending of hydraulics experts to resolve the problems of sand drifts at the canal's Mediterranean end, the construction of the Ahmed Hamdi Tunnel connecting the Sinai Peninsula with the Egyptian mainland and the Suez Canal Bridge, and a proposal to develop the Gulf of Suez region.

3 Project Characteristics

3.1 Long-time Partnership with the Suez Canal Authority and its link with Economic Effectiveness and Technological Cooperation

Development financed by yen loans and the concomitant technological cooperation of various types and over many years yielded results with respect to both the infrastructure and the operation of the Suez Canal. In addition, this process spurred technology transfer, so it is a prime example of the self-reliance that is characteristic of Japanese-style aid.

3.2 Promotion of Japanese Companies' Overseas Business

Construction projects by Japanese engineering and construction firms in the 1960s, along with the later expansion of Japanese ODA, became good case studies for overseas success by Japanese engineering and construction firms. Thanks to the yen loan-financed Suez Canal project and its tied terms, other Japanese engineering and construction firms, trading companies, and other businesses set up operations in Egypt. Although yen loans later became untied, then were subsequently tied again (through STEP, etc.) with changes in the international cycle, the Suez Canal project, which occurred at the beginning of ODA, was a strong impetus for many Japanese firms to venture overseas.

4 Lessons Learned

4.1 Appreciation of Japanese Cooperation

Behind the Egyptian government's acceptance of Japanese ODA projects were the political relationships between Egypt and other countries during the conflicts in the Middle East. The existence of a relationship of trust between Egypt and Japan from these projects and the technological cooperation focused on technology transfers from Japan that aimed to support self-sufficiency were major factors as well.

4.2 Advances in Maritime Civil Engineering Technology

The issues experienced in the process of widening and deepening the Suez Canal that required crisis management, such as removing mines and other hazardous

materials, contributed greatly to the development of dredging and construction technologies at Japanese firms from the 1960s onward.

References

1) The Overseas Coastal Area Development Institute of Japan (OCDI) 30-year history and related JICA surveys (Suez Canal Expansion Plan Survey, 1975; Suez Canal Expansion Plan Survey, 1980; Suez Canal Navigational Safety Planning Survey, 1985; Gulf of Suez Coastal Development Plan Survey, 1986; etc.)
2) Penta-Ocean Construction Co., Ltd. website
3) Penta-Ocean Construction Co., Ltd.
4) Overseas Coastal Area Development Institute of Japan

Roundtable discussion

Biography

Yasuji Kakimoto
Born in 1950. Joined Penta-Ocean Construction Co., Ltd. in 1974. Engaged in renovation of Suez Canal since 1975. Worked in Singapore and Hong Kong since 1986. Became the Director of the International Business Division in 2004 and Executive of the International Business Unit in 2013. Retired in 2016.

Takanobu Enoki
Born in 1939. Joined the Mizuno Gumi Co., Ltd. since 1957 and in Penta-Ocean Construction Co., Ltd. in 1967. Engaged in renovation of Suez Canal in 1961 and 1975, and continued in other overseas construction mainly in Iraq, Diego Garcia and Indonesia. Moved to Yoshin Construction Co., Ltd. in 1986. Retired in 1998.

Takuzo Miyahara
Born in 1940. Joined Penta-Ocean Construction Co., Ltd. in 1958. Engaged in renovation of Suez Canal since 1965 and 1977. Moved to Penta-Ocean Dredging Co., Ltd. in 1989. Became Vice President and Representative Director in 1997. Retired in 2007.

Yoshifumi Ariuke
Born in 1948. Joined Penta-Ocean Construction Co., Ltd. in 1972. Engaged in many constructions in addition to the renovation of Suez Canal in Egypt since 1971. Held a major position at the domestic branch office in 1997. Retired in 2011.

Takaaki Yamamoto
(formerly of Penta-Ocean Construction Co., Ltd.)
Born in 1951. Joined Penta-Ocean Construction Co., Ltd. in 1973. Engaged in renovation of Suez Canal since 1978. Held a major position at the domestic branch office since 1993. Moved to Penta-Ocean Dredging Co., Ltd. in 2007. Became President and Representative Director in 2010. Retired in 2017.

(1) Background

Kakimoto: This project took place over a very long time span. I think the Suez Canal improvement project we got in August 1961 was our first involvement with the Suez Canal Authority [“SCA”]. We were so eager to get an overseas project that we sent the new dredging ships to Egypt before we were even given the contract. We then got the contract for the first phase of the project; the second and third phases we got as no-bid contracts. We then placed a bid for the fourth phase in June 1967. The third Middle East War broke out on the same day as the bidding, and I heard anecdotes that the bid arrived while the war was going on. After that, the canal was closed for eight years, and President Anwar Sadat announced its reopening in 1975, along with a project to widen and deepen the canal so that it could accommodate larger ships. This, in effect, was the fourth phase that we had bid on during the war. The scope of the project changed after that, and what we call the new Suez phase 1 project and the new Suez phase 2 project were scheduled to continue. The new Suez phase 1 project was to take the depth of the canal from 14.5 meters to 19.5 meters, with the phase 2 project further deepening the canal to 24 meters. However, these were never implemented because it was decided to prioritize multiple lanes over depth. Today I’d like to hear from those who were involved in the Suez Canal project at that time.

(2) A Dredging Project of the Utmost Difficulty

Miyahara: I still remember excavating the hard bedrock in the first project. At the time, small dredgers were being used for digging during the "first Suez" phase, but the cutter chip heads that were being used to excavate the bedrock kept breaking, and we somehow got it done despite the repeated ladder cracking. We had to create various workarounds for situations where things just didn't work as they normally do.

In addition, the water levels of the Mediterranean Sea and the Red Sea are different, and the Suez Canal has tides that push ships along. Because of this, it was hard to moor the boats with spuds, so they were always at an angle. This made our work very difficult, and we often had to go by our instincts.

The next project, from 1977 to 1979, was called the new Suez phase 1 project. It took place after the war, and preparations were difficult, with unexpected accidents occurring frequently. The biggest accident was when the dredge ship, the No. 2 Suez, sank.

The third project, which ran from 1990 to 1993, was integration and construction planning to for the southern area project. This project was unique. The width of the dredging was only 20 meters. Conventional dredging methods didn't work, and we had to come up with many workarounds.

Enoki: Certainly, the battle with the bedrock continued. It couldn't be excavated using regular cutter blades. In a neighboring section, a U.S. ship was doing the dredging, so we ordered parts from the U.S. so that we could use the same equipment, and this improved our efficiency.

Yamamoto: I was responsible for surveying. We created a surveying team, and had four people, along with four local engineers and ten laborers, in Ismailia alone. This one group consulted with the SCA in the implementation of pre-surveys, interim surveys, completed amount surveys, final surveys, etc., of six sections.

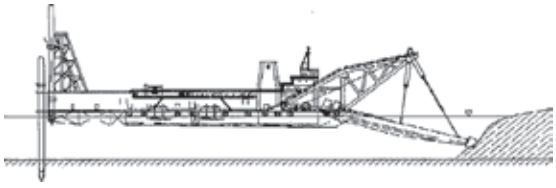

Figure 2: Cutter Suction Dredger

Photo 1: Dredger

Photo 2: Cutter Head
Source: References 3)

Ariuke: The dredging project for the southern area started at the northern end, and the farther south we went the harder the bedrock became. This resulted in damage to our ladders. In Japan, repairs normally would have taken three months, but with the SCA's help, we finished in one month. I don't think we could have done it without the SCA's help.

Kakimoto: In early 1976 we began dredging with a ship called the Suruga. Even though this ship was large, at more than 100 meters long, it shook like a leaf as the work was being done. We were afraid that the ladders would fall if we kept it up. Letting a 300-ton ladder fall into the Suez Canal would be a major accident, so we worked with the SCA and changed the dredging location.

Enoki: The SCA was dredging places with softer bedrock and contracted out the work for the harder bedrock. Unfortunately, we didn't make much on this.

Kakimoto: I have a story about unexploded shells. There is a work area partway through the canal, where we were told to be careful because there were land mines. I think they were called "human mines," a new type of land mine that would maybe only take off a person's leg, but not kill them. So my first impression was "This is a tough place to work!"

Enoki: When we were setting up the work area, we had no idea where the land mines were, and so we used a bulldozer to run over them and make them explode. Then we could walk around the site. Also, when the dredging began, a bomb exploded when a pump ship sucked it up from the bottom of the canal. That was really scary.

Kakimoto: The project started with the dredger Suruga. Another dredger, the Number 2 Suez, got to the Canal two or three months later. When I had just arrived, I went to see the SCA's disposal of unexploded ordnance. The army had collected these bombs at the bottom of the canal and exploded them. Although none of the mines were large, they had a mountain of unexploded bombs.

When the first explosion went off, the Suruga stopped. I reported to the superintendent that a bomb had exploded in the pump ship. But stopping the ship would result in a huge loss of millions of yen per day, so it would be a big deal. When I asked obliquely what the ship's captain had said, it was something like, "Take the responsibility and stop it," and "I'll take the responsibility afterwards." The ship was quickly taken apart and inspected, then resumed operations. But from that time on, we were very careful to sweep for mines and bombs. We did that right away.

Kakimoto: I think we had a great sense of mission. The superintendent at that time was about 48 years old. He decided to stop the ship, and no one was hurt, but the casing of the ship was damaged several times later on.

We needed war insurance for dredging, and a representative from Lloyd's paid us a visit. When he went to see the Suruga, we had wrapped a couple of layers of blankets around the pump piping to protect the steel plate.

We easily got the insurance, but it gradually became more expensive.

Enoki: There wasn't any protective steel plate that we could use. We went around Cairo and bought up all the steel plate to make a cover.

Kakimoto: We had trouble with these bombs later in Singapore, so this know-how was very useful then. Divers also would wrap their arms around the unexploded bombs and bring them out of the water.

Yamamoto: That was the way things were done back then. They picked up a lot of bombs. It took about three months. We were on the ship too, and the divers would leave the bombs on the ship and then go back into the water. It was scary.

Kakimoto: The pier was a mountain of bombs!

(3) Life on the Suez

Kakimoto: We had no idea beforehand what life in Egypt would be like.

Enoki: The town of Suez had bomb holes in its walls. The walls of the hotel were also full of holes from the war.

Kakimoto: The only foreigners were U.N. peacekeepers and us Japanese.

Miyahara: I had just happened to go portside when war broke out. I went straight to Cairo and left for Rome on a plane chartered by the Japanese government. I was so surprised that a war had started.

Enoki: That job was made possible by a yen-based loan.

Kakimoto: The oil-producing nations had stopped exporting oil in 1973, and Japan's economy was hurting because it couldn't import any oil, so Deputy Prime Minister Miki went to Egypt and made various promises. He committed to the development of the Suez Canal, which turned into a major project. After the Middle East War, daily necessities were hard to come by. At the time, this was heralded as an "overseas project for everyone," so we went and didn't come home for two years. Some even took their families along for two years.

Ariuke: Sharing information is easy nowadays, but back then we could only make a telephone call once a month. And even that was only for three minutes.

Kakimoto: There weren't any telephones or fax machines back then.

Ariuke: I got a letter that said "our child is sick," but that was from two weeks before.

Yamamoto: The escort ship, the Mochizuki, came into the Canal and on a somewhat elevated point on the Sinai Peninsula side put up a large Japanese flag made from a three-meter square white sheet. Everyone on the ship was wearing white uniforms, and a brass band was playing. It was very impressive.

Kakimoto: The town had been destroyed in the war, and it was uninhabitable. There were about 120 Japanese, and we needed lodging, so it was a real problem. We succeeded in renting half of a building in a church compound occupied by British nuns.

Photo 3: Suez Canal in current
Source: References 4)

Enoki: This brings back memories of mutton and chickweed.

Kakimoto: Our box lunches were almost always the same for a couple of years. The cooks couldn't change their repertoire because they couldn't get their hands on anything else.

Yamamoto: We had coolers, but they were actually just boxes. When the lunches came, they were so warm that I thought they were rotting. I remember that's why we fried everything before we ate it.

(4) Lessons of the Suez Canal Projects

Miyahara: I think dredging ships became more advanced because of the Suez Canal projects. The large dredging ships made by Japanese companies afterward were a result of the Suez Canal projects. When I think about the timeline of development in dredging ships, there are two main points. One is bedrock dredging. We had many struggles because we began with that one small ship. We proved that profiting from bedrock dredging requires a more rugged dredging ship. The other is sediment dredging. Although we had a hard time with bedrock dredging, most of the dredging involved sediment. Even so, I was surprised that the Europeans were about 30-40% more efficient.

Later we built a large sea trailer (a type of drag-suction dredger) in the Netherlands. It was a cutting-edge vessel. We then improved its mobility and built another one that had about three times the power of the Suruga, which allowed us to take on global markets. When I look at the history of our dredging ships, it all began when we took on the challenge of the Suez Canal dredging project, so our involvement in the Suez Canal projects was very important.

Kakimoto: Technology transfers are key to overseas projects. The Egyptians that we hired back then went on to be successful in other areas. Egyptian professors at the United Arab Emirates University tell people, "My uncle worked on the Suez Canal." There are connections everywhere. We undoubtedly trained those people, and

even the president said, "Learn from the hard work of the Japanese."

Ariuke: They saw the work we did and said they wanted Japanese ships, not European ships.

Kakimoto: The dredging done by Japan was perhaps small in comparison to that of the Europeans, but in the Suez Canal projects we did seven of the 13 areas without taking a break.

Enoki: After we dug up the bedrock, the SCA even asked us if we were really able to excavate that.

Kakimoto: A lot of people in the company wanted to go to the Suez Canal. Some people even joined the company so that they could go there.

Enoki: When we were awarded the project, human resources told me to get a team together. I got what I thought were good people from our ships and took about seven of them with me.

Ariuke: I was in Egypt for 12 years and was recently in the Middle East for another five years. Based on these experiences, when I think about what the Suez Canal meant, I think it was our contribution to peace. When we started working on the Suez Canal, the Middle East War was already over. At that time, Egypt was hurting financially in many respects.

(5) Interactions with Egyptians

Ariuke: Islam in Egypt has the reputation of being under the influence of extremism, but it is actually calm and peaceful. When we Japanese went there after the Middle East War, we were regarded as being serious and hard working. Nowadays, when the Chinese do a project there, they bring all their own workers. We hired locals, and that's a big difference, I think.

Kakimoto: This project was successful because of the support we received from those awarded the contracts, the military, and the embassy. In 2006, while Admiral Fadel was Chairman of the SCA, I paid them a courtesy call, and they greeted me warmly.

Enoki: They can probably do the work on their own now.

Kakimoto: Exactly. They told me, "Do you know we have many dredging ships now? We can lend them to you anytime!" After that, I went to a Japan-Egypt Joint Business Council meeting in Cairo. It was a very large meeting, attended by many business people led by Shigeo Nagano, who was president of the Japan Chamber of Commerce at the time. Last January I paid a courtesy call to Chairman Mansour during a joint meeting in Cairo. Even today, if I say I want to meet with the chairman, I can do so right away. The current chairman sent me a very kind letter when he retired in March. He said "The project in 1975 modernized the Suez Canal. It was the most efficient canal project. We still cannot forget it."

Ariuke: I had a chance to talk with Admiral Fadel about an Arctic sea route when he was SCA Chairman. That was in 1992, and now it is becoming reality. The Northern Sea Route started operating in 2014. He was afraid it would reduce traffic in the canal. He is really a forward thinker.

(6) Summary

Kakimoto: What should never be forgotten about this project is that we needed the major push we got from the Japanese government through official development assistance (ODA) to make this large-scale overseas aid project a success. We had local assistance from the embassy as well, and this all helped to make the project go well. At the time, the motivation for getting on the Suez Canal project was that this would be an all-Japan venture, and that it would do away with the depressed mood in the dredging industry. In addition, the enlarged canal allows passage of full loads from 70,000 tons to 150,000 tons. I believe this project contributed to international logistics and the global shipping business and moreover engendered pro-Arab and pro-Japan sentiments in the ties between Arabs and Japanese. President Sadat said many times, "Learn from the hard work of the Japanese." This project cost more than 100 billion yen, and thus I believe it was the impetus for other Japanese engineering and construction firms to go overseas. About 300 people from Japan were involved, all of whom can take pride in saying that they "dug the Suez Canal." Many young Japanese in recent years are hesitant to go abroad and do hard, sweaty work, but I think the wonder of creating something with others is to be found in abundance in this project. I wish to close by conveying that message to our youth.

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