

Analysis of the Process behind “The Project for Construction of Manmunai Bridge” in the Democratic Socialist Republic of Sri Lanka

A bridge of hope for peace after the civil conflict: the background of the construction project

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Prologue

(1) Introduction

I believe that many of us do not necessarily know much about the assistance that Japan provides to foreign countries. While we, including myself, have learned at school that the Japanese government has provided Official Development Assistance (ODA) to help social and economic development in developing countries, I did not understand what was specifically done under ODA until I was involved in it. After World War II, it was assistance from foreign countries that supported the reconstruction of Japan. Now, Japan, which has been reconstructed and achieved significant economic growth, is expected by countries that seek economic development to provide assistance to these countries in the same way Japan received in the past. What kind of assistance has Japan provided? It covers a wide range of activities from manufacturing goods to building capacities of human resources, including construction of roads and bridges, and support to education, agriculture, fishery, and public health. Among these activities, I would like to talk about a bridge constructed at Manmunai in Sri Lanka.

In 2018, when I visited the place where the bridge was constructed for the ex-post evaluation¹ by the Japan International Cooperate Agency (JICA), I saw firsthand that the bridge constructed with the assistance from Japan was useful and local people welcomed and appreciated it very much. As a Japanese and a development assistance practitioner, I was very happy to know how Japan's assistance was useful and appreciated. Now, I will introduce how the bridge was planned, designed, and constructed, and how it affects local people through the story I will tell you. I will focus particularly on consultants for supervising construction work and contractors, and address the background of the project and challenges and solutions during the construction, describing the story from a viewpoint of consultants and contractors. The reason why I adopted such a viewpoint is as follows. When I conducted the ex-post evaluation, I found that (i) the project had been implemented with close cooperation between the contractors and local workers even at a difficult time, i.e., immediately after the end of civil conflict; and that (ii) as the project was completed within the original budget and deadline although the original design was significantly changed. I believed that we could learn many things from decisions, measures, and processes taken in this project and apply such knowledge to other projects in the future. I analyzed the process based on interviews and observations, and partly adopted the ethnographical method². However, here is a caveat: as I was unable to visit Sri Lanka after the ex-post evaluation because of time constraints, I did not manage to collect sufficient comments from local people.

(2) Historical background and significance of the project

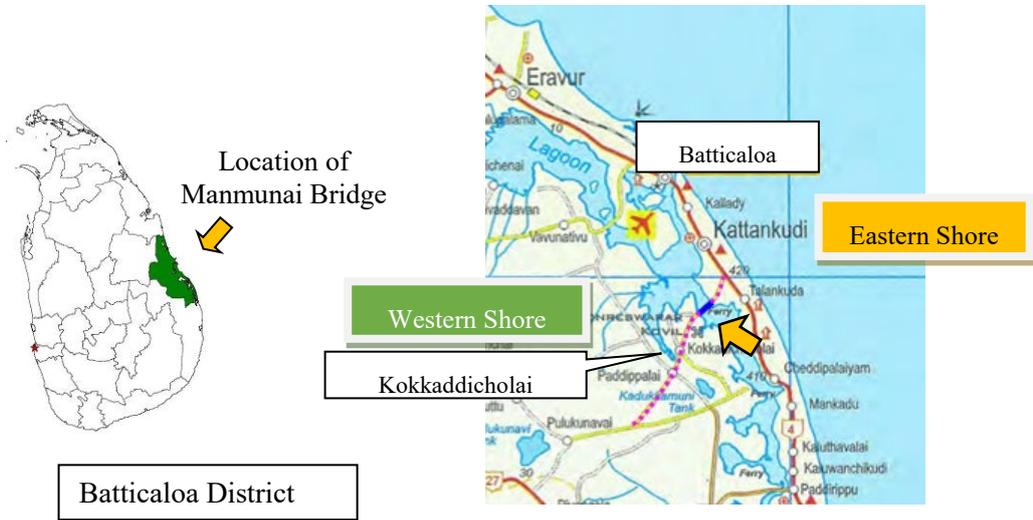
Sri Lanka saw a civil conflict over a period of almost a quarter of a century from 1983 to 2009. The country is a multiethnic state with a population of 20 million that consists of Sinhalese (75%, mainly Buddhists), Tamils (15%, mainly Hindu), and Moors (9% mainly Islam).³ The origin of the conflict comes from a divide and rule policy taken by the British government when Sri Lanka was a colony. Under the policy, Tamils received more favorable treatment. However, after the independence, Sinhalese were favored on the rebound. The historical background stimulated the dispute between government army and the "Liberation Tigers of Tamil Eelam" (LTTE), which was an armed anti-government group formed by some Tamils mainly living in the North and

¹ JICA performs an ex-post evaluation from such viewpoints as effectiveness, sustainability, and impact, to comprehensively assess completed projects and verify if the outcomes effectively work as planned.

² The researcher puts oneself in the environment of research to join and record through participant observation what actions and conversations were taken by people concerned and relevant. Based on the information, the research output shall be drawing out the targeted event, society and culture.

³ <https://www.mofa.go.jp/mofaj/area/srilanka/data.html> (25th/January/2019Access)

Eastern Provinces. It developed the 26-year armed conflict and the government army finally ended in May 2009 immediately after assistance for the project was requested to Japanese government. The Eastern Province was one of a center of battles between government army and LTTE for a long time that claimed more than 70,000 lives, and is a place where Manmunai Bridge that is introduced here was constructed.



Project Location Map

Location of the Bridge Constructed in the Project

The civil conflict was not waged uniformly throughout the country, and the situation varied depending on areas. In the Eastern Province where the bridge was constructed in this project, the rule by the LTTE ended in July 2007, and this area required recovery and development even though the civil conflict did not end completely. This area had been dominated by the LTTE for a long time; thus, the level of development was very low because of the civil conflict. At the time of the planning, rehabilitation of pavement and roadbed, improvement of roads including widening, and replacement of old bridges as well as improvement of accessibility to economically vibrant coastal areas for the formerly conflict-affected inland were urgently needed to bring about the socio-economic recovery of the area. While this area was severely affected by the tsunami disaster caused by the Sumatra Earthquake of December 2004, priority was given to rehabilitation of trunk roads. Implementation of reconstruction activities in the Eastern Province was generally lagging behind the other provinces. As the Manmunai area is adjacent to the area where the LTTE was based, reconstruction in this area was delayed compared to other areas in the Eastern Province. Against this backdrop, in April 2009, this project was requested by the Sri Lankan government and scheduled to be implemented.

Batticaloa District, where the construction of Manmunai Bridge was planned, is one of the central locations in the Eastern Province, and the west and east areas were divided by the Batticaloa Lagoon, which is narrow and extends 50 km from north to south. Because of such geography, residents had to use a ferry that was inconvenient and dangerous to go to the other side of the lagoon. It was Manmunai Bridge that connected both sides of the lagoon, consisting of a PC⁴ bridge with the width of 9.8 m, bridge length of 210 m, and a span length of 15 m, and a causeway⁵ of 488 m.

When JICA forms and conducts a project in an area affected by a conflict, the local level analysis

⁴ PC means Prestressed Concrete, a type of concrete that has strong resistance against cracks.

⁵ A raised way across wet ground connecting to the bridge.

is done by the Peace Construction and Poverty Elimination Section of the Industrial Development and Public Policy Department⁶ at the Tokyo headquarters of JICA, in cooperation with a local office in each country concerned. In 2009, JICA had conducted preliminary surveys by collecting information and conducting analysis for 15 countries around the world including Sri Lanka. The Eastern Province is the most complicated area with regard to ethnic groups and religions in Sri Lanka, which has a hybrid ethnic composition consisting of Tamils (main), Muslims and Sinhalese. As each village has a different ethnic composition, it is sometimes possible that a village has no contact with an adjacent village. Therefore, when forming and implementing the project, JICA was very careful not to favor a certain ethnic group and but to facilitate interaction between the ethnic groups. In the Manmunai Bridge project, the bridge was expected to yield benefits not only to a certain community, but to all the residents. As it was the first bridge of JICA project constructed after the civil conflict and a project toward the next stage, JICA treated it as a memorial project and as a symbol of recovery after the end of the civil conflict. The project was planned with high expectations as a “bridge of hope.”

(Project Plan)

1. Background of the Project Formation

Now, I will describe how the project was formed. The seed of the project was sown by Ichioka, from Central Nippon Expressway Company Limited (hereinafter referred to as “NEXCO”)⁷ Central and sent to Sri Lanka’s Road Development Authority (hereinafter referred to as “RDA”) as a long-term expert of JICA (road administration advisor) from May 2008 to May 2011. At that time, JICA sent experts in the transportation sector to Sri Lanka a few years at a time for more than a decade with support from the Ministry of Land, Infrastructure, Transport and Tourism (hereinafter referred to as “MLIT”), and Ichioka was the fifth long-term expert for strengthening the road sector. He was assigned to the Planning Department of the RDA and was mainly responsible for advising and instructing on new projects, transportation management that could mitigate traffic jams, maintenance of national roads, operation of highways, and safety management for highway construction. One of the new projects supported by Ichioka was the Manmunai Bridge project, which was formed as a grant aid project.⁸

In June 2008, Ichioka was asked by the planning manager of the RDA to form a Japanese grant aid project. As mentioned above, development of the Manmunai area had lagged behind because of the long-term civil conflict. This request was made in response to a strong need among local people. Although the government and various countries supported the reconstruction of infrastructure such as roads in Sri Lanka after the conflict ended, a ferry was the only means of transportation to go to the other side of the lagoon in the Manmunai area. Ferries were operated two to three times per hour from 6 a.m. to 6 p.m., on which too many people and carriages were loaded. When a flood occurred, the stream of the lagoon became very fast and the ferry sometimes could not be operated. Additionally, as the Manmunai area is hot throughout the year, it was very hard for people to wait for the ferry in the hot weather. As the RDA was concerned about this situation and put great emphasis on social and economic infrastructure that enabled mid- and long-term economic development, it strongly hoped to build a bridge over the Manmunai Lagoon.

⁶ The name of the section at the time.

⁷ Collectively refers to three highway road companies established following the privatization of Japan Highway Public Corporation.

⁸ A type of financial contribution granting capital to support a developing country that constructs facilities and/or procures machines and materials for its socio-economic development.



Use of ferries before the bridge was constructed

The RDA submits a list of requests for donor-supported projects to the Ministry of Finance of Sri Lanka in every August. As a project is unlikely to be accepted if it does not have the scale and expected effect that are appropriate for assistance provided by Japan, Ichioka wanted to help the RDA by coordinating and conducting a preparatory process. Although a request for constructing three bridges in the Eastern Province was submitted, very little information on these places was available. Ichioka, who had recently arrived in Sri Lanka at the time, was uncertain how to go about by such a situation. However, after holding discussions with people responsible for infrastructure at the JICA Sri Lanka Office and at the Embassy of Japan, Ichioka started thinking that it was better to focus on one bridge based on the assistance history, the support policy for roads in the future, and the budget of similar projects. Then, Ichioka advised the RDA to jointly conduct an on-site survey before submitting a request by the RDA in August,⁹ and checked the number of ferries operated, the number of users, traffic, the length of roads, and the government's road policy and transportation network plans in three proposed places to choose one place that seemed to have the highest needs and be most effective. At the same time, he shared information in advance and made a report to concerned people at the RDA, JICA and the embassy for smooth formation of the project. Although the request, together with information based on the on-site survey, was submitted to the Ministry of Finance by the RDA to get budget allocation, the authority to decide which project to be implemented with the budget rested with the planning department of the RDA located in Colombo. It goes without saying that Ichioka played a key role by negotiating with the planning department in advance for the formation of the project.

The Eastern Province was lagging behind the other provinces with regard to assistance, as control by the LTTE had just ended. Therefore, if high priority infrastructural assistance was provided in a timely manner, it would be very effective and significant. In addition, a bridge is more visible and can be a symbol of the friendship between Japan and Sri Lanka. Accordingly, constructing a bridge by JICA in the Eastern Province with that timing also seemed to be very significant from Japan's viewpoint.

⁹ The schedule of on-site survey by Ichioka is based on the interview with himself.

<Timeline of the Project>			<History of Sri Lanka>
2007			The fall of the East. The battle ended in the East side of the island for which development became possible. Peace came there two years earlier than the North side of the island.
2008	Jun.	Ichioka conducted an on-site survey for helping RDA prepare a request document.	
2008	Aug.	RDA submitted a request document to the Ministry of Finance. Sri Lanka requested Japan for assistance.	
2009	May	Preliminary survey that checked the size and outline of the project.	The end of the civil conflict was announced.
2009	Sept.		The fall of the North. The number of internally displaced persons was 300,000. Unlike the East, it was not possible to normalize the situation of the North immediately.
2010	Jul.	Public bid announcement for a consultant supervising construction work --> Chodai was selected.	
2010	Aug.	A JICA joint preparatory survey team made the first visit to Sri Lanka, and conducted a sample geological survey (boring exploration).	
2011	Feb.	A JICA joint preparatory survey team made the second visit to Sri Lanka.	
2011	Sept.	The Japanese government promised Sri Lanka to implement the project. (An exchange of notes and grant agreement were executed)	
2012	Mar.		Japan Overseas Cooperation Volunteers (JOCV) were sent to the East (Ampara). It was a symbolic event because JOCV would not be sent until peace of the area was ensured.
2012	Jun.	Public bid announcement for a contractor --> Wakachiku was selected. Construction began.	
2012	Jul.	Boring exploration was conducted for all the places where abutments and piers would be placed, and the span length was partly changed and modified. Based on such changes, piles were manufactured, imported, and installed.	
2013	Nov.	The subsequent load test of piles revealed that the pile did not have sufficient bearing capacity. Upon re-examination, it became necessary to change the pile length and type of pile.	
2014	May	Construction completed.	

2. Approval of Project

Then, a preliminary survey was conducted once the project was formally requested. The JICA headquarters survey team conducted the survey in cooperation with several of its staff members from Sector Department and consultants, and Ichioka joined a meeting of the team and accompanied some survey visits. In the survey process, the necessity of constructing a bridge was confirmed and the following points were also checked for the three proposed places, in addition to the preliminary survey by Ichioka: the appropriate location, size, environmental considerations, traffic, consistency with local development plans, whether resettlement of residents is required or not, and safety such as whether any land mines are there or not.

On the other hand, different opinions were indicated regarding the width of the bridge. As construction of roads connecting to the bridge was supported by the Asian Development Bank (ADB), it seemed appropriate that the bridge would have the same width as that of the roads. Some pointed out that, if the bridge width was wider than the road width, it would be regarded as an excessive investment without a justifiable reason. However, Ichioka strongly insisted that the bridge width should be wider in order to have a walkway. The reason is that there are various transportation means whose speeds differ significantly, such as automobiles, three wheelers, bicycles, ox carts, and pedestrians in the Manmunai area; thus, it was necessary to ensure the safety of pedestrians. Additionally, unlike roads, the bridge width could not be expanded easily after construction. Therefore, Ichioka strongly insisted that the plan of the bridge should foresee the future at the design stage.

3. Final Design That Is Different from the Result of Preliminary Survey

However, the JICA survey team concluded that it was appropriate that the bridge should have a narrow width without a walkway, after considering the necessity of having the same standard as

the roads funded by ADB and the adequacy of widening only the bridge. Ichioka was very disappointed at the conclusion of the survey team and was concerned that “An accident may happen because of a bridge supported by Japan. Why should we construct a dangerous bridge?”

The purpose of the preliminary survey is to determine the outline and size of a project, estimate the budget, and collect information for preparing a work instruction document.¹⁰ Then, the work instruction document was presented to consultants who made a bid on the project. In the bidding process of the project, a joint venture consisting of Chodai Co., Ltd. (hereinafter referred to as “Chodai”) and Oriental Consultants Co., Ltd. (hereinafter referred to as “Oriental Consultants”)¹¹ won the bid and conducted a joint preparatory survey for determining the details and estimated cost.

It was Yasui at Chodai who was responsible for the joint preparatory survey and the general plan of designing the bridge. He is a veteran designer who laid out many bridges including Manmunai Bridge. Many bridges that he designed are listed in the *Record of Bridges Constructed by Japanese Engineers All Over the World in 2015* that was issued commemorating the 60th anniversary of JICA’s international cooperation.

Although the proposed bridge did not have a walkway in the preliminary survey, the bridge actually constructed has one. Generally, it is rare that the design determined in the preliminary survey is significantly changed in the joint preparatory survey, unless any new fact is found or the design standard changes. However, Yasui proposed to change the design, as the bridge proposed following the preliminary survey was not useful for the region.

4. Design Not Originated from Japanese Viewpoint but Based on Local Needs

The conclusion of the preliminary survey that was conducted prior to the joint preparatory survey differed from the one of the joint preparatory survey conducted by Yasui and other design survey team members. Resolving the differences became an issue. The major differences were the following four points: (1) Width of the bridge (whether a walkway would be constructed or not); (2) Total length of the bridge, (3) Length of the bridge girder, and (4) Type of pier.

(1) Width of the bridge (whether a walkway would be constructed or not)

The roads connecting to Manmunai Bridge were constructed with support from ADB. The conclusion of the preliminary survey was that the width of the bridge should be the same as the one of the roads. On the other hand, the proposal by Yasui was the same as the one by Ichioka, insisting that the width of the bridge should be wider than that of the roads. The reason was that, while the roads constructed with support from ADB had a 5-meter pavement, the lifetime of the bridge was close to 100 years. Yasui believed that the road should be wider, assuming that this region would develop in the future and the road would become a trunk road. Additionally, if the bridge was designed with the same width as the roads supported by ADB, a walkway could not be made.

Previously, Yasui saw a situation in Papua New Guinea where people could not get past an oncoming large vehicle on the bridge and jumped into the river. His belief is that “If a bridge that is also used by pedestrians has no walkway, it has a critical defect.” In Manmunai, while many bikes and cars would pass the bridge, Yasui believed that some would cross the bridge on foot, as this area was poor. Although the Japanese standard requires 1.5 m for a walkway, 75 cm is enough for pedestrians. Yasui proposed that the width of the walkway on Manmunai Bridge would be 1.2

¹⁰ A document indicating the tasks delegated to a private consultant, etc. among the entire tasks assumed by JICA. The consultant submits a proposal on the project to JICA based on this work instruction document and other materials provided by JICA.

¹¹ In the preparatory survey, Oriental Consultants conducted a survey on natural conditions related to the construction of the bridge such as climate, hydrology, landform, and geological features.

m. However, as JICA has already conducted the preliminary survey and approved its conclusion, it was very hard to withdraw the conclusion and change the width. Consequently, it took half a year to obtain approval of the change from all the people concerned. In particular, expanding the width of the bridge meant increasing the budget. Because a rough budget was determined after the preliminary survey, everyone thought it was very difficult to change the width. That was another reason why it took such a long time to change the design.

In grant aid projects conducted by Japan, the width of the bridge is sometimes a problem. When the Japanese government grants funds, the adequacy of the project costs is precisely checked. In addition, countries that need grant aid usually have poor road standards. As there are also many cases where roads connecting to a bridge have not been developed yet, a project manager tends to determine that the width of the bridge should be the same as that of the connecting roads that already exist. However, as the lifetime of a bridge is long, it is very dangerous if the roads connecting to the bridge are expanded in the future and, as a result, the width is suddenly narrowed at the entrance of the bridge. Additionally, if no walkway exists, an inspector of the bridge, who is responsible for bridge maintenance, may suffer a dangerous situation at the time of inspection. Therefore, having a walkway was the point Yasui could not compromise on as a supervising consultant. Yasui has many experiences where he was instructed to reduce the width of a bridge. However, in each instance, he continued persuading the people concerned and succeeded in constructing bridges with a walkway.

(2) Total length of the bridge

In the preliminary survey, the proposed bridge was longer than the actual one as it was connecting the shorelines on both sides of the lagoon. In Japan, it is considered a foregone conclusion to construct a bridge that is over the shoreline in both sides, as it poses less environmental burden. However, the bridge proposed by Yasui was 210 m, which was shortened from 300 m of the original one. For this purpose, creating a causeway by reclaiming 50 m of the shoreline on both sides made it possible to shorten the length of the bridge. Yasui had already checked at the time of the joint preparatory survey whether local people actually wanted a bridge that was over the shoreline on both sides and whether a causeway could be constructed without posing too much environmental burden. A causeway may impact the volume of water and the ecosystem of the lagoon. For the volume of water, the survey team found that the bridge located upstream was 210 m and that any bridge constructed downstream did not need to be longer. Additionally, as the shallow of the lagoon was less than 2-meter deep, it would have no serious problem if reclaimed. As for the construction of a causeway and impact on the ecosystem, the survey team held discussions with a professor at a local university whose specialty was the local natural environment, people from the Ministry of Environment and Natural Resources and the RDA, and local fishermen, and concluded that a causeway would not significantly impact the environment and would be acceptable to the local people.

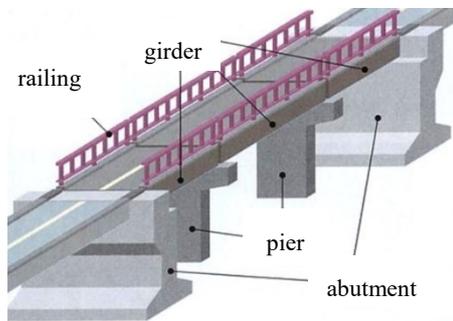
In Japan, the size and length of a bridge over a river must comply with the standards provided for by the Water and Disaster Management Bureau of MLIT. When constructing a bridge without infringing the rules, the length of the bridge is automatically determined. On the other hand, as almost of all rules of rivers are undeveloped in developing countries, it is necessary to make a plan based on the conditions and needs of each region. Although the simplest way is to construct a bridge that is over the shoreline on both sides, the cost is higher if the bridge is longer. When calculating the cost of constructing a bridge, it is generally based on the cost per square meter (m²) of the bridge. Therefore, the general understanding is that the larger the square measure of the bridge, the higher the cost. To reduce the cost while fulfilling various needs and conditions, it is necessary to closely understand the local conditions as well as obtain the consent of local people. Yasui strongly felt that, to build infrastructure that would not cause a problem in the future, it was critical to align the needs of local people with the way of thinking of the Japanese side.

(3) Length of bridge girder

Yasui proposed a shorter bridge girder (the part over the pier) of 15 m. The larger the bridge is, the bigger construction machines are. In Japan, it is easy to procure heavy machines anywhere. However, in Sri Lanka, they are very difficult to procure even in Colombo, the largest city in the country. Yasui thought that it was important to plan a bridge that did not require large heavy machines and could be constructed with materials that would be locally procured.

(4) Form of pier

The bridge has a simplified base and adopts a pile bent design that has room between piers, which can be constructed more easily with lower costs. In Japan, many rivers have rapid stream. Therefore, the pile bent type bridge that has room between piers is prohibited, because trash from upstream may build up between the piers. In Mannunai, the lagoon has no waves and water flows slowly. Therefore, Yasuda judged that a pile bent type bridge posed no problems.



Name of each part of the bridge



Pile bent part of the bridge

The background of the design shown in (3) and (4) was based on the design concept “Simple is best” held by Yasui. His belief was based on his experience: When constructing a bridge abroad, matters that are not envisaged in Japan may appear after designing. The simpler the design is, the easier the modification can be made. Yasui also thought that making a technically complicated bridge is not always “good assistance” for a developing country. In the case of Japanese rivers, the shape of a road is determined along with the conditions of rivers, ship routes and railways, and the design of a bridge is finally determined based on this shape. Thus, if conditions are severe, it is necessary to construct a bridge with very sophisticated techniques. However, in the case of developing countries, limitations associated with the construction of a bridge are usually less than in Japan, and it is possible to design and build a bridge more freely.

Yasui said that “The Japanese can construct a bridge by bending it if necessary, even if there are many limitations and difficulties. However, in developing countries, if we change the place where a bridge is constructed, we can construct a simpler bridge with lower costs. As it is difficult and costs more to construct a curved bridge, we should try to draw a line (of a planned bridge) as straight as possible to reduce the costs. Overcoming difficulties is required in Japan, but we do not have to do it overseas. If we can do things with a simpler method, it is better to do so. There is nothing wrong with a bridge looking shabby. The role of a bridge contractor is to construct a bridge that helps people who have had difficulties to go to the other side of the river.”

Kojima, a staff member of the Economic Infrastructure Department at JICA (at the time of the Preparatory Survey) who was responsible for the project, gave her impression during the joint preparatory survey: “While JICA sought to narrow the width of the bridge, Mr. Yasui had a policy, saying ‘A bridge with no walkway has a defect in its structure, as it does not have room for

pedestrians on the bridge when they want to get out of the way of cars’ and ‘Technicians usually want to make something excellent, but they should consider the local conditions and the budget to make the appropriate choices.’ Thus, he gave explanations to JICA based on this policy. At that time, I had started working for JICA only three years before, and Mr. Yasui’s remarks made a lasting impression on me.”

In the case of assistance to developing countries, particularly grant aid projects provided by Japan, construction works and material procurements are usually done by a Japanese supervising consultant or a contractor. Accordingly, while their involvement ensures the quality of the Japanese structure, the advanced technical ability they have sometimes does not fit the local situation of the developing country. I think that this point should be carefully considered. As a result of Yasui’s strong opinion that a walkway was needed, the final design of the bridge was as follows: total width of 9.8 m with a walkway of 1.2 m and a carriageway of 3.7 m in each side; total length of 210 m (14 piers with a girder length of 15 m); simplified base; and a pile bent type that has room between piers. It was four years later that the bridge with this design was constructed over the lagoon in Manmunai in Sri Lanka.

(Implementation of Project)

5. Institutional Arrangement for Construction

The responsibility for grant aid projects including this one is assumed by the local government who is a client of the project. This time, the RDA was responsible for the project. As mentioned in Section 1, the supervising consultant Chodai designed the bridge in consideration of local needs and various conditions. Then, after bidding, a contractor, Wakachiku Construction, Co., Ltd. (hereinafter referred to as “Wakachiku”) carried out the construction works under the agreement with the RDA. Wakachiku checked the required quality, shape, and construction process of the bridge and conducted safety management and cost calculations. When construction started, based on the design specification Chodai supervised Wakachiku for design quality, shape, and construction process.

What framework is adopted for implementing construction works is at the sole discretion of the contractor, and Wakachiku has its standard framework for construction work. Under the framework, a project manager (PM) is generally responsible for the project and leads the construction works. A project director (PD) is assigned under the PM and works as an advisor. The PD is responsible for procuring imported goods and coordinating with the local government. Additionally, the head of its Sri Lanka office supports visa issuance and custom clearance.

In this project, Omori was appointed as PM. He had a wide range of experience as a PM in various construction projects, including the construction of bridges and roads, mountain development, grading of land, construction of water supply and sewage facilities, development of housing lot, and modification of rivers. Omori is recognized by people surrounding him as strong-willed but very gentle. To enable every member to work smoothly at the site, he listens to opinions of every member and always considers a better working environment and methods. Even if there is something that does not go well on the site, he never loses his temper.

The person appointed as PD was Tatsumi, who had a wealth of experience in Sri Lanka. At that time, Tatsumi had lived in Sri Lanka for approximately 16 years, was well-known in the country, and had the trust of locals everywhere. Tatsumi was the industrious type, always cared about others, and was also a natural worrier. While respecting Omori’s authority, Tatsumi sometimes made a call to construction workers to check the progress of the work and asked the workers whether any problems had occurred or if there was anything he could help with. Tatsumi also carefully read the agreements and the specifications, understood the important points and

conducted negotiations considering issues to discuss and confirm, and how the project was proceeding. Tatsumi was very good at English. Ms. Tamara, head of the responsible section at the RDA, said that she could easily communicate with Tatsumi and other members from Wakachiku.

As an assistant to the PM and PD, a Sri Lankan engineer named Waruna was assigned as a chief engineer who was employed by Wakachiku's headquarters. His role in the project was to support Omori and Tatsumi, give technical instructions on-site, and support the preparation of a construction plan and other technical documents. It was the third project in which he had been involved in Sri Lanka and he communicated the intention of the Japanese staff members to local staff members and workers very well.

Under Omori, a technical staff member named Yoshida was assigned who was responsible for daily work instructions and on-site safety management. Yoshida gave technical instructions to local workers such as how to use tools, how to check the work accuracy of normal lines and height, and managed working hours. Yoshida also had experience in constructing bridges in Sri Lanka before this project, and in working in conflict zones. Yoshida is very strict both to himself and others. Although he sometimes gets angry when instructing people, his instruction is based on his warm heart and many workers respect and like him. While Omori is a very gentle person, Yoshida is very strict. Because of this contrast, Yoshida said that "We are like the carrot and the stick." In addition to Yoshida, some short-term technicians were also assigned.

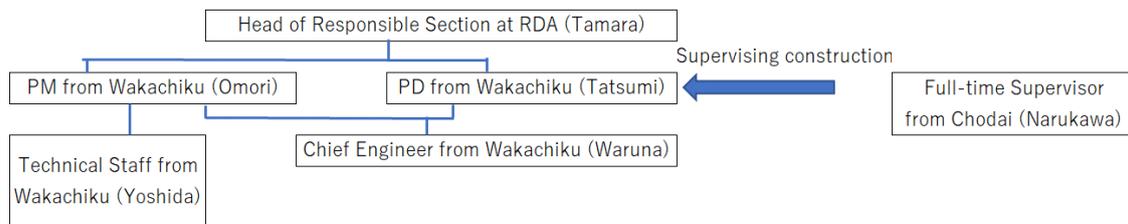
Furthermore, from Chodai, which was a supervising consultant and designed the bridge, Narukawa was assigned as a full-time supervisor. Narukawa had worked in a general-contractor construction company and moved to a construction supervising consultant company 17 years ago. Since then, he has been involved in planning and construction supervision of JICA grant aid projects. Thus, he has ample experience and fully understands JICA's procurement system. The role of Narukawa was to ensure that the construction work was done in accordance with the specifications, as well as consult with Omori to find solutions if a problem was found on-site. Omori said of Narukawa "He (Narukawa) is very practical and does not require any unnecessary things. He always told us what was necessary for the work, and what could be delayed. Of course, I sometimes disagreed with him, but he finally agreed to move the work forward under the contractor's (Wakachiku's) responsibility."

While the construction quality standard of JICA adopts the Standard Construction Specifications defined by MLIT, local standards and rules are also respected if available. As this project was conducted under two different standards, the BS Standard that is a U.K. one generally accepted in Sri Lanka and the Japanese Standard, many difficulties arose. Omori said that "This project was successfully completed because we had Mr. Narukawa." Narukawa did not compromise on the construction site, and ordered the reconstruction of a high-cost structure if it did not conform to standards. On the other hand, Narukawa understood challenges faced in the construction process, and gave constructive advice and forward-looking advice. He worked with a feeling of "Working with Wakachiku."

A key person on the Sri Lanka side was Tamara, head of responsible section at RDA. Tamara is a small and slim woman and has ample knowledge of engineering. She is also very good at project management. She is responsible for ODA projects aided by foreign countries and is a decision-maker. At a monthly meeting among the contractor, the supervising consultant, and RDA staff members, the participants discussed the progress of the work, the reason for delay if the schedule was delayed, and follow-up measures. Tamara gave her opinions on issues to discuss and finally approved. Regarding various problems on-site that needed to be addressed by RDA, Tamara indicated a solution at the meeting and gave instructions to an RDA person in-charge at the construction site.

Actually, the project framework was different from the standard one Wakachiku usually adopts. Under the general framework, a PM is a head and a PD is under the PM. However, in this project,

the positions of PM and PD were parallel. The reason for such an irregular framework was that, although Omori had much experience as a PM, he had little experience abroad. Therefore, Omori mainly focused on the on-site tasks. On the other hand, Tatsumi came and went between the construction site and Colombo to hold discussions with the RDA as well as procure materials. Such tasks are usually not included in the PD's responsibilities. Omori was authorized to make decisions on almost all things concerning construction processes or money. He was able to focus on such decision making, as Tatsumi handled many issues outside of the construction site.



Based on this framework, flexible staff allocation and division of roles meant that everyone could do their best in each position in an undisturbed environment. “I was lucky because Mr. Tatsumi was there. We experienced so much trouble on the construction site,” Omori said. In addition to delegating tasks that each of them could not handle by themselves, Omori and Tatsumi trusted each other and delegated tasks to each other if it was possible, which led to effective site management.

Narukawa also said “Compared to other operators in a grant aid joint project, Wakachiku has a wealth of experience and allocates the right person to the right place. The quality and the number of staff members are in proportion to the quality of works. It is very rare to find an operator who can provide such an ideal framework. We highly valued Wakachiku’s capability to closely control the construction process, quality management, and safety management, and have good and quick communications.”

6. Safety Measures

6-1. Constructors with ample experience in Sri Lanka

Wakachiku has an office in Sri Lanka where a permanent staff is available, and has a track record of many successful cases in Sri Lanka. Before Manmunai Bridge, Wakachiku handled work in Sri Lanka such as the construction of Jaffna Hospital¹² and Mannar Bridge.¹³ At the time of bidding for Manmunai Bridge, Wakachiku had an advantage, as it was responsible for the construction of Jaffna Hospital that was near to completion. As Wakachiku could effectively use machines and steel used for Jaffna Hospital, it could reduce the costs, leading to it winning the bid. Furthermore, when the construction of Manmunai Bridge was decided on, the civil conflict had not yet ended. As Wakachiku constructed Mannar Bridge in the line of fire, it was accustomed to carrying out construction work during a civil conflict. Omori received various advice from the project manager of Mannar Bridge about delivery of materials during the civil conflict. There were many checkpoints and they were suspicious that the materials might be used for weapons when delivering them, which made deliveries very difficult.

Adachi, who was responsible for the project at the JICA Sri Lanka Office at that time, said that

¹² The official name is the “The Project for the Improvement of Central Functions of Jaffna Teaching Hospital” (2005-2007: Detail Design, 2010–2013:Project implementation).

¹³ The official name is the “The Project for Construction of New Mannar Bridge and Improvement of Causeway” (2007–2010).

“Even during the civil conflict, Wakachiku succeeded in completing the construction of Mannar Bridge earlier than planned period, which resulted in them earning the trust of the RDA. At that time, foreign assistance was very much needed, and excellent workers and construction machines were eagerly sought because of a rush of construction works. Therefore, donors vied with each other for contracting with good subcontractors. Wakachiku had local workers who were trained during the Mannar Bridge project and related to the supply chain. Rich experiences of Wakachiku who understood local situation was very much useful for the Manmunai bridge construction.”

6-2. Safety problems associated with construction after the civil conflict

When the construction of Manmunai Bridge started, the civil conflict had just ended, but the political situation was still unstable. Passport checking was conducted nearly 10 times on the route from Bandaranaike International Airport to the center of Colombo. A curfew was issued and demonstrations occurred in the Eastern Province where Manmunai Bridge was located. As the location of the bridge construction was an inconvenient place, it took time to deliver a patient to a hospital if any accident happened. Thus, JICA made its best efforts for safety management. Elections are often when ethnic issues tend to surface. Immediately after the end of civil conflict, it was impossible to hold an election in the Eastern Province. Under such circumstances, the Peace Construction and Poverty Elimination Section of the Industrial Development and Public Policy Department at JICA’s Tokyo headquarters analyzed factors that might cause problems and conveyed the result to the people concerned. All the local information was delivered to JICA’s Vavuniya contact office located in the North, which can be easily accessed from the East. Based on the information collected, JICA analyzed a trend of what factors could impact the construction works. Kawamoto, who was responsible for the analysis in the Peace Construction and Poverty Elimination Section of the Industrial Development and Public Policy Department said that “As the Eastern Province fell earlier than the Northern Province, I was concerned that any event in the Northern Province might spread to the Eastern Province. Additionally, I was also concerned about the increasing Muslim influence in the Eastern Province. The LTTE was a well-controlled organization during the civil conflict. Thus, to carry out the project, we obtained information on where mines were buried directly from LTTE members in addition to expert analysis. We were very careful and made our best efforts to maintain safety.”

6-3. Found trench mortars and rifles

Immediately before the start of the construction, unexploded shells of trench mortars were found near the material warehouse. During the civil conflict, the west side of Manmunai Lagoon was occupied by the LTTE, and the east side by government forces, and bullets flew between both sides. Of course, before starting the construction, a process to eliminate mines and unexploded shells was put in place and the Sri Lankan government carefully checked the site. However, as this place often suffers floods, unexploded shells that had sunk into the upstream river bank were probably carried downstream owing to the bank’s collapse. All the people involved in the construction were very surprised when unexploded shells were found. Although shells had no risk of explosion, people were concerned whether there were any other risks or hazards. Therefore, the work was suspended two to three weeks for risk analysis. Wakachiku immediately reported this incident to the RDA and JICA, and the police and the army excavated the shells and re-examined the site. JICA sent a request to Tamara of the RDA, who took measures to ensuring the safety of local workers and conducted a safety education class led by a professional from an unexploded shell disposal organization. Soon after, the work resumed. Omori recalled this incident and said that “Everything was addressed quickly. The key point was prompt communication. I immediately contacted Mr. Narukawa, Tatsumi, and the headquarters of Wakachiku. Tatsumi also promptly reported to the RDA and JICA. Mr. Adachi swiftly made a decision and addressed the incident.”

Furthermore, after unearthing unexploded shells, many rifles and bullets were found. As if

waiting to be discovered, these had sunk down on the west side of the construction site. It was possible that residents had had rifles for their safety during the chaotic days after the civil conflict ended. If it was found that they were in possession of a rifle during a sudden house search, they might have faced dire consequences. In addition, if they had left the rifles near their houses, the area itself would be blamed. Therefore, the local residents probably left the rifles near the construction site. Although it was a difficult time, Adachi, who then belonged to the JICA Sri Lanka Office, said that “Although the historical background was different from now, we were very encouraged that Wakachiku had the experience to operate a business during a civil conflict.”

7. Difficulties during Construction

7-1. Manufacturing of piles

The piles of a bridge are especially important parts in its fundamental structure. Although high-quality piles could be procured from Japan, Wakachiku wished to procure inexpensive piles as good as Japanese ones. First, they considered whether they could manufacture them in Sri Lanka, and when they could not find any companies capable of manufacturing piles with the required qualities, they searched for such companies in neighboring countries. After narrowing down the targets to Malaysia and Vietnam based on prior information, Tatsumi went to candidate manufacturing plants to check the quality of products. Then, a manufacturing plant in Vietnam was taken on based on reliable information that the plant had a technical partnership with a Japanese manufacturer. After concluding a contract, a staff member was stationed at the plant to monitor product quality, and to send photographic data of the pile manufacturing processes. Tatsumi also visited the plant on a regular basis to check their supervision practices in order to ensure quality control.

7-2. Design change of piles

(1) Boring exploration

When designing piles, the type, diameter and length of a pile are determined by comprehensively considering various factors such as the ground and the bearing capacity. In this project also, the ground, including the nature of the soil and the layers, had to be investigated and a boring exploration was conducted in the joint preparatory survey. After a boring exploration was conducted by Chodai for tentative determination of the pile length, an additional exploration was conducted by Wakachiku during the construction in accordance with the contract. The contract specified three boring explorations, but Wakachiku, having ample experience in constructions in Sri Lanka, decided that it was better to conduct explorations on all the piers and abutments, and then conducted 15 boring explorations on all the points, which were not included in the contract so Wakachiku told JICA to implement boring exploration by self-pay. The length of piles would be determined according to the results of the tests conducted and samples of each layer collected. Although the length was the same for all 15 points in the original design, the length of piles needed to be changed depending on the location. Fortunately, the change of the pile length did not require any change in the budget amount because it was done by adjusting the length of each pile without changing the total length of the 15 piles. Although the responsibility and authority for the grant aid project lay with the Sri Lankan government, the approval by JICA’s Grant Aid Project Department was also required to change the design in order to check the validity of the design change. Regarding the procedure for changes, after Narukawa reported to the headquarters of Chodai, the responsible person for this project there acquired the approval for the changes from JICA. Tatsumi ordered the amended length of piles from the Vietnamese manufacturer in a timely manner to ensure construction started smoothly.

(2) Loading test

When the piles were manufactured, a loading test was to be conducted to check the stability of the bearing capacity of the actually installed piles by attaching a measuring instrument brought from Japan to those piles and adding loaded weight. Although the length of piles had been determined after examining the structure of the layers and the properties of the ground through the boring exploration, it would be necessary to check how the piles would sink by actually applying a load. The construction of the bridge was implemented in a natural environment, and what is more, in the water. Because it was expected that they would sink deeper than the results of the boring exploration on the occasion of the loading test, Tatsumi had ordered piles of a slightly longer length, and thought that they could cut the upper part if the driven piles were too long. He had also ordered extra piles just to be safe.

First, the piles were driven to a prescribed depth to check that they were in the bearing stratum. The loaded weight provided in the specifications was added. Then the piles began quickly sinking into the ground. Why did they sink without stopping like this? Everyone concerned could not hide their shock. After investigating the cause, it turned out that, although the design based on the results of the boring exploration was adequate, the bearing stratum on hard rock was a special stratum that does not exist in Japan, and is a layer that becomes soft when absorbing water.

“How much deeper should we drive the piles? We need to find the point where they stop steadily,” murmured Omori. As a result of repeating the loading test, the piles needed to be 3-4 meters longer. As this was longer than the extra length Tatsumi had reckoned, the design needed to be changed regarding the length of piles. Narukawa’s judgment was quick at this time, when he reported to the headquarters of Chodai the results of the loading test and the deficiency of bearing capacity to ask them to consider measures. Each staff member worked hard for a quick redesign by a Chodai designer, an approval for design change by RDA, rearrangement of pile manufacturing by Wakachiku, and customs clearance. However, Omori started to feel pressed little by little.

(3) Reorder of piles and response to changes

After the design change, Tatsumi flew to Vietnam immediately to thoroughly discuss the changed parts of the design with the Vietnamese plant. Although it was decided to add the part for the deficient length of piles by welding, this highly specialized welding was only done by qualified welders. Therefore, Tatsumi, using his connections in Sri Lanka, looked for highly skilled welders who built ships at a shipyard in Colombo to invite them to the construction site and ask them to do the work. Thanks to the fact that Tatsumi understood the culture and backgrounds of foreign countries including Sri Lanka, and was thoroughly familiar with local circumstances, he managed to flexibly handle the irregular design change through negotiating with parties concerned such as the welders and the pile plant. Meanwhile, because of the additional order of piles, the construction progress delayed more than one month, which induced an alarming atmosphere among the people on the Wakachiku side. In the case of a delay, additional labor costs for construction would most likely be borne by Wakachiku. Moreover, the occurrence of delays might disappoint the expectations of local residents, who were eagerly awaiting the completion of the bridge.

(4) Delay of construction

Normally, once piles are installed, the construction of piers and abutments follows, and the process is advanced. This time, however, there were no piles, which delayed the start of the process of piers and abutments from May to August, and stopped the process for three months in total. Omori decided to work night and day, and on holidays as well to make up for the delay. Out of concern for him, Tatsumi often visited Omori with some snacks to encourage him to “take a break no matter how,” and Tatsumi replaced Omori when there was a need to receive or attend to external visitors. With the cooperation of workers besides Omori, the delay in the construction

was caught up in the end.

8. Construction in a Multiethnic Environment, Communication with Local Workers

8-1. Local arrangement for construction

The local team for construction consisted of 40 to 50 construction workers in most cases and about 200 at a maximum, as well as engineers, secretaries and drivers. The workers who had participated in the construction of Jaffna Hospital were brought in because the subcontractors for the construction Wakachiku had taken charge of were excellent, and they had a trusting relationship with Wakachiku. There were many Tamils in the ethnic composition of the workers, of which locally employed Tamils accounted for 70%, Sinhalese for 20% and Muslims for 10%. Incidentally, the Eastern Province has a number of Muslims as well as Tamils, where there is a mosaic of ethnic groups blended. On the east side of Manmunai Bridge, there is a residential area of Muslims, and on the west side, one of Tamils. In view of this, the local workers of the Bridge construction were hired from each ethnic group, which proved that this project gave thought to the ethnic composition.

8-2. Communication beyond the differences in ethnic groups and positions

As seen above, although the construction site of this project had an environment where Sinhalese, Tamils and Muslims worked together, no problem occurred. There were distinct differences in the ethnic groups. The fact that Muslims prayed five times a day stood out somewhat on a construction site under strict time management where Tamils had a majority. As there were such differences, the lodgings were separated by ethnic group, so they could live without disturbing each other's life pattern.

Wakachiku rented an office and lodgings on site, where the office was on the first floor, and the lodgings were on the second. Because Manmunai in the Eastern Province was inconvenient for certain diets in Sri Lanka, they ate in a communal dining room. Omori said that "I suppose this led to good communication including their private and public opinions." At first, there was no intercommunication among Tamils, Sinhalese and Muslims during work. Although they talked in order to do what they were told to do, they did not interact. However, Wakachiku sometimes held a party to thank workers for their toil, and in the late stages of construction, Sinhalese, Tamils and Muslims all interacted beyond their ethnic groups at such parties. Moreover, Wakachiku provided recreation for workers in their spare time, such as a sports day and cricket matches to encourage communication. In this way, communication beyond ethnic groups increased. Recreational activities were also held with the RDA and construction supervision consultant staff, which made workers' tense and strained looks disappear during the construction, which was carried out in a peaceful atmosphere. Usually, there was no direct conversation between RDA/construction supervision consultants and workers, and workers remembered the faces of the RDA and construction supervision consultant staff that visited the site every day, but not the other way around. However, they started to communicate with each other through such parties and other activities, which led to the creation of an environment where they could easily communicate on the construction site.



A party with local workers

8-3. Management of locals by locals

Waruna, employed by the headquarters, and a Sri Lankan engineer employed locally, were both Sinhalese, who spoke no Tamil. Sinhalese and Tamil are totally different both in spoken language and scripts. Most locally employed Tamils spoke nothing but Tamil, thus the locally employed engineer learned Tamil to facilitate work instructions, and maintained communication. Furthermore, although Omori had complete responsibility for the construction site as the PM, the number of local workers to be managed was over 200 at the peak. As it was physically impossible for Omori to manage all of them, he employed a Tamil supervisor, to whom he granted authority on labor management to control who worked when and authority to allow overtime work. Generally, the more the service period is prolonged, the longer local workers can secure their employment, and workers tend to prolong their service by working sluggishly in a region with little work. Thus, he explained to the supervisor that allowing overtime work could ensure extra income in addition to the fixed wage, and provided direction not to work sluggishly.

8-4. Japanese mindset

The Tamils employed as workers in and around Manmunai were unskilled laborers at the beginning, and they had no idea what to do without knowledge on skills, procedures of construction and precautions. One of the most important things in construction is safety. However, as they had never been engaged in construction, they did not understand what “being careful with safety” meant. Wakachiku had a morning assembly at the construction site every day, where both Japanese and local workers had a meeting together to check the daily schedule and work details as well as safety precautions. For example, Yoshida confirmed work details by saying, “The bridge girders will be delivered today. Team 1 should receive them. Team 2 should clean the place where the girders are completed, and install the forms.” At the same time, he confirmed the roles at a morning assembly by saying, “Today we are going to crane a big object, so step away if you are close by. Who will give a signal? You will give a signal. Signal with your eyes finally. Even when you give a signal with your hand, your companion does not know if he does not see it. For the final check, both the operator and his companion should see the eyes of the indicator. Checking is obligatory,” and made workers simulate how to do the work. When providing explanations, he did not explain unilaterally, but made efforts to deepen the understanding of workers by connecting with their feelings such as encouraging them to imagine how their family would feel in case of an accident.

At morning assemblies, they also did radio calisthenics as done in Japan. This was a good starting point to switch the mindset from private life to work. When workers came to the site, they were obliged to wear a uniform, shoes and a helmet in the same style as in Japan, and those who

failed to do this were dismissed. Although, at first, workers were unwilling because this was bothersome, this became established gradually, and they learned the procedures of the construction site. Japan is strict about safety, and this project was carried out without changing this Japanese mindset or making any compromises on safety. This approach led to accident-free construction.



Radio calisthenics in the morning

With respect to quality control, the quality requirements from the RDA were confirmed to be understood by workers in a meeting before they engaged in work. Omori and Yoshida checked if such standards were observed on a daily basis. A meeting for construction work was held with the Japanese staff members and team leaders of each task at the site office from 1 p.m. every day, and explanations on inspection items necessary for the day and on inspection details and the standards were provided for workers in light of the specifications. Yoshida needed to explain over and over until workers understood that this quality was required and a fine finish was required. Workers apparently found it hard to understand why such a level of quality was required, so he repeatedly explained that work “made by Japan” could not be achieved without such a level. Once workers understood, they worked as instructed. The manufacturing of the mould, into which concrete was poured, required particular attention. At the beginning, the mould was not finely completed, and Yoshida and Waruna repeatedly gave guidance to workers. Although workers had not taken thought for the finished product even if the mould was deformed, Yoshida showed how to align the height of the mould by stretching a thread by himself in order to have workers learn by watching his example. It took about six months for them to learn.

It takes some time for Sri Lankans to become accustomed to working in a Japanese work environment. Japanese are strict about quality and time. Because it is common that Sri Lankans arrive 30 minutes later than the appointed time, initially it took time and effort to assemble workers before 8 a.m. at the site, where the starting time was 8 a.m. The concept of punctuality had to be implanted in workers again and again, and a strict measure was also taken, where a worker who came late was not allowed to work that day.

8-5. Yoshida’s way

Yoshida took charge of surveying, machinery and manufacturing of materials such as concrete as a workman under the project manager Omori, and he provided local workers with instructions on the construction at the site in practice. The construction of Manmunai Bridge was his second construction in Sri Lanka after that of Mannar Bridge. In Japan, Yoshida had been mainly in charge of sewage at a subsidiary of Wakachiku in Kumamoto Prefecture after working for a local company in Kumamoto. He was assigned to the construction of Mannar Bridge after working for the headquarters of Wakachiku for seven years. Yoshida is tall, and has a loud voice and a strong

will. He has a scary look, which makes him look aggressive. When he becomes angry, he turns red and yells in the Kumamoto dialect. He did not mind doing the same also in Sri Lanka. He spoke poor English, and others made fun of his distinctive Japanese English by naming it “Yoshida English.” Yoshida is versatile and capable of giving instructions in any field, and has a strong will to accomplish excellent work without fail. His instructions were backed up by (1) a deep-rooted relationship of trust between Yoshida and local workers, and (2) the presence of Waruna.

(1) Deep-rooted relationship of trust between Yoshida and local workers

How did Yoshida, who was not good at English, build a trust with local workers? Yoshida spoke broken English for instructions at morning assemblies and in daily communication. When his words failed to express his intentions, he explained with a picture, or he let workers do their job first, and then he provided guidance and showed them how to do it by himself. There existed communication across a language barrier. Yoshida said that “I struggled to teach. At a morning assembly, I told workers with gestures that it would be dangerous to increase the speed of heavy equipment, which would lead to an accident. Eventually I got on heavy equipment by myself to tell them that it would be dangerous to operate it in such-and-such a way. Although, operators ignored me at first and tried to do in their own way, they gradually came to understand me.”

Yoshida often spoke Japanese even to Sri Lankans. Surprisingly, workers gradually understood his intentions as they spent every day together, even if they spoke different languages. A language represents the connection between words and their concepts. Workers understood the meaning of Yoshida’s expression, gestures and moves little by little, and started to connect them. You could say that this is a kind of “language” that would not be established without the deep-rooted trust relationship between Yoshida and local workers. Yoshida said that “At the beginning, workers were confused, but they started to understand what things meant. Japanese could be easier to understand than poor and incorrect English. They understood what a particular pronunciation meant after a while.” Workers also tried earnestly to learn from very experienced Yoshida.

Yoshida was very strict, and never cut corners on a job. When workers failed to do what Yoshida had told them to do, Yoshida gave them a warning without remorse. He sometimes raised his voice and scolded them. Nevertheless, no negative atmosphere had a lasting effect on workers or Yoshida, and they communicated again nonchalantly. Even if Yoshida gave tough guidance, workers understood that he instructed them in a quest for quality. Omori said that “Although Yoshida was strict, he was always surrounded by people.” Yoshida also showed concern for workers, and invited them to “go for a drink as it was getting hot.” Such concern and the character of Yoshida might be the reason that the relationship of trust between Yoshida and local workers developed.

(2) Waruna the bridge between Japanese and Sri Lankan

Waruna had a prominent presence. He was employed by Wakachiku in 2007, and gained field experience in Japan. This project was his third project in Sri Lanka. In this project, as a chief engineer, he dealt with the construction plan, preparation of technical documents, preparation of documents to be submitted to construction supervision consultants and subcontractors, preparation of monthly reports, and diverse issues that occurred on the site under the PM Omori and PD Tatsumi. He also played a coordinating role as a lubricant between the Japanese and Sri Lankans. Because he studied at a Japanese graduate school after finishing a Sri Lankan university, he spoke fluent Japanese, and was the right person to stand between Sri Lankan workers and Japanese staff members. He explained technical matters, which Yoshida or Omori apparently had difficulty explaining, to Sri Lankan workers. Yoshida said that “Waruna understood technical instructions as well, and then noticed and explained what workers had difficulty understanding. He determined and complemented where a little complement was needed.” Repeating quality-conscious detailed instructions was required in order to encourage workers to understand the Japanese quality proudly “made by Japan.”

The construction proceeded smoothly without major mishap only because Waruna understood the Japanese, and mediated for communication.

8-6. Harmonization

The way workers perceive the division of roles differs in Sri Lanka and Japan. Simple maintenance such as greasing up of heavy equipment is carried out by operators of heavy equipment in Japan. In Sri Lanka, on the other hand, specialized mechanics for heavy equipment handle such maintenance, and operators are only in charge of operation. Yoshida recalled that “Operators did not think the heavy equipment belonged to them because they did not even provide minimal maintenance by themselves. Accordingly, they handled the heavy equipment roughly, which was likely to lead to a breakdown. It took over one year to keep instructing them to provide maintenance by themselves until they finally started to do so.”

When Yoshida instructed a worker in charge of construction on a slope to “dig out the rock” when a big rock appeared right in front, he was told to “get the signature of the manager (Omori) because it was not indicated in the contract.” When he told a worker to “move this object there,” the worker craned the object by using a Unic (truck equipped with a crane), and moved it by putting it down violently. Although the contents were broken after being moved, the worker casually said, “Yoshida told me to move the object, so I did what I was told to do.” For good or bad, the workers do what they are told to do, and nothing more. While most Japanese workers, when instructed to dig dirt out, also make sandbags to prevent collapse, Sri Lankan workers just dig dirt out. Yoshida realized that Japanese “harmonization” depends on the environment in which you were raised.

Nonetheless, Yoshida tenaciously instructed workers by showing how to actually do the job by himself and told them to “do the work like I did next time.” He told workers to “pour concrete two or three times after pouring once in order to have the best result in paving,” and he showed them how to actually do the job by himself over and over, which encouraged workers to understand. Gradually, workers started to ask Yoshida, “Wasn’t it like this?” Yoshida took this seriously, and taught them by drawing a picture on occasion. Workers also made an adjustment if the idea they had was wrong, and brought their work again, saying, “I have done it. Please take a look.” Further, workers who were becoming accustomed started to do more than what they were told to do. Yoshida said that “At first they just dug dirt out, but workers who learned the skills and procedures helped surveying, once they understood the necessity for a survey after digging dirt out.” Once workers understood the processes and became capable of working on their own, the Japanese staff members only had to make an arrangement for the next process. Little by little, “harmonization” was born between Sri Lankan workers and Japanese workers.

8-7. Local issues and consideration for local residents

Wakachiku held a weekly meeting with the local RDA staff and construction supervision consultants as well as carrying out monthly safety patrols to reflect in the construction by identifying issues and considering measures. Thanks to the weekly meetings, issues which were likely to occur on the site and in the locality could be brought to the RDA’s attention beforehand, which facilitated negotiations with landowners in the neighborhood and coordination with the police precinct and nearby schools. As possible problems, noise, vibration, dust and the impact of running heavy vehicles were foreseen. Construction vehicles reduced speed to prevent noise and vibration. Water was sprinkled by a water wagon to prevent dust. To deal with the impact of running heavy vehicles, traffic guides were positioned at important points to guide traffic. Traffic guidance was also handled through patrolling by safety personnel besides the Japanese staff, and consulting the police. To control the speed of public vehicles in the neighborhood of a school, the RDA was requested to install humps (protruding objects installed on an asphalt road), which was carried out by them.

Moreover, Omori always kept care and consideration for the local people in mind. The only means that local residents had to cross the lagoon was a ferry until the bridge was open, and he pulled a stalled ferry to the opposite shore by towing it by a small boat used for the construction. He also planted mango trees to provide an oasis for the people on both sides of the bridge before the bridge was completed. Furthermore, when the residents submitted a written request to Omori to ask for the relocation and reconstruction of a Tamil statue and its small shrine on the east side of the bridge, he responded, “I would do that even without a written request,” although it had nothing to do with the construction, which showed what he was like.

In addition, Omori and Yoshida often visited a teahouse near the site to mingle with local people. As they consciously interacted on a daily basis, local people thought favorably of them in principle. However, even if they paid careful attention not to cause trouble, the construction sometimes triggered complaints from local residents without their realizing. Still, if local residents were discontent, they could directly complain to Omori and Yoshida, whom they knew very well. For example, there were complaints that a cloud of dust was raised before landfilling and dirt was left on the site, and demands to put crushed stones on an unpaved road and to properly clean it. Omori and his staff members responded with care, and occasionally talked to the residents to achieve their understanding through a locally hired Tamil worker. As the worker belonged to the same community as those residents, apparently it was easy to interface with them.

Such consideration for local residents and daily communication might have been one of the factors that a positive image of the bridge has been created and the bridge has been loved.

9. Opening Ceremony

In the eyes of Omori and Yoshida who were carrying out the construction, local residents seemed to realize that hope for the future was springing in such a small town while witnessing in person that the bridge was steadily taking shape. Omori had several chances to take a ferry to go over to the opposite shore during the construction period, and he himself was frequently asked “when would the bridge be completed and when would it become passable.” As the construction proceeded day by day, the expression of ferry passengers seemed to be becoming brighter.

On April 19, 2014, the bridge was finally open. The long-cherished “bridge of hope” for which people had long waited, was built over Manmunai Lagoon. Crowds of people gathered. As the bridge was involved with the local reconstruction although it was not a big bridge, Mahinda Rajapaksa, then President of Sri Lanka, attended the inauguration ceremony. As the first crossing was scheduled after the inauguration ceremony, a big crowd of over 10,000 people in total, including over 7,000 local residents, came to the ceremony, which reflected the high level of their interest. Local residents all started to cross the bridge after the ceremony, and the row of people and cars stretched to more than one kilometer. All the parties concerned felt the pleasure of the people in the waves of local people, and were delighted and grateful to witness this scene.



A crowd of people rushing to the opening ceremony

Yasui, who was responsible for the general plan of designing the bridge, said that “Since I came overseas, I have learned that a bridge is a symbol of peace. (Although Manmunai Bridge was newly built,) bridges become the first targets of attack and most of them get destroyed once a war starts. When peace is achieved, the reconstruction of bridges is the first thing to be demanded. Construction of a bridge means that the region is peaceful. As a bridge contractor, I am deeply moved by the fact that our dream to enable people with difficulties in traffic to cross from one side to the other quickly and safely has come true.”

10. Impact on the Manmunai Area

The planning and construction of the bridge in this project improved the skills of local workers, and eliminated traffic accidents.

(1) Upskilling of local workers

At the beginning, locally employed workers just watched the work as they could not do anything. Despite that, after engaging in construction work for about two years, an unskilled labour was employed as an operator, a job with a higher salary, at his next work site. Workers improved their skills through the technology transfer from Yoshida and Omori, and 30 to 40 of them had the same or better job in their next work.

The following four points are what local workers obtained in particular:

- (i) Safety awareness: As a result of repeatedly encouraging them at everyday morning assemblies to consider the importance of life and the grief of their family if they got injured, workers became capable of carrying out work with safety in mind;
- (ii) Improvement of skills: Workers learned how to use tools, methods of confirmation of construction accuracy such as a normal line and height, approaches and knowledge of concrete cure, the piling construction method, construction supervision, and cleaning of the site;
- (iii) Punctuality awareness: At first, workers had no sense of time, and there was a big difference in the progress of the work with or without supervision by the Japanese staff members from the morning assembly until the cleanup after the work. However, they became punctual through the construction; and
- (iv) Importance of construction processes and arrangements: Although workers only did what they were told to do without thinking of the next process at first, they started to understand the processes of work, and to work by arranging the next necessary process.

Omori said that “Our thorough instruction led to the next business chance for workers and

companies, and the improvement of knowledge in the region. The skills and experience developed at the site worked to their advantage when placing a bid and changing jobs.” Local companies on the sideline also saw the Japanese staff work on the construction site every day, and they started to imitate good points. For example, when a Japanese secured a traffic lane for safety, they understood the aim and imitated the work. The Japanese way of working has started to take root in the region spontaneously. Through the construction in this project, human resources capable of high-level construction have been developed both for workers and subcontractors.

(2) No traffic accident

There was no single traffic accident related to the bridge from the opening of the bridge until May 2018. The RDA Batticaloa personnel responsible for the bridge said that “As there is also a sidewalk, pedestrians can safely go over the bridge. I am glad that there is a sidewalk because, without the sidewalk, a safe space could not be secured and an extra setup for checking would be needed if we checked the bridge in the future. As the two bridges constructed after Manmunai Bridge also have a sidewalk, I believe that the idea that a sidewalk is necessary to secure safety has been prevalent.” In 2018, three years after construction of the bridge, no traffic accidents occurred on the bridge. This is apparently owing to the commitment to quality by Omori, Yoshida and Narukawa as well as Yasui, who took an uncompromising attitude toward the sidewalk.

Epilogue

The impact of this project has become bigger than was assumed at the time of the project planning. The local residents’ expectations of the bridge were also big, and their joy was immeasurable when the bridge was completed. The new bridge was built in a region where the only existing transportation was a ferry, which connected the regions separated by the lagoon, and created a flow of people and goods. Finally, I would like to describe how local residents’ lives have changed and how they feel about the completion of the bridge, based on the information I gathered when I visited Manmunai in 2018.

(1) Interaction among ethnic groups after the civil conflict

The completion of the bridge has reportedly physically enhanced the movement of people, which has increased interaction among different ethnic groups in their daily life. Although Manmunai is in the Tamil region where most people speak Tamil, they hear Sinhalese and Muslim languages more than before the construction of the bridge. Active interaction of people has led to the increase of business partners, sellers and buyers of products, and further establishment of value chains.



People crossing the bridge

(2) Economic development

This region was an area left behind by development without prominent enterprises or resources, where the major income of the residents depended on agriculture, fishery and making construction materials. Their living was poor, and there were a number of people who barely made ends meet by living from hand to mouth. Before the bridge was constructed, people had had to take a detour by taking a wide road in good condition when delivering big goods to the eastern shore or in case of a flood, which made them drive 20-25 km longer. After the bridge was constructed, it has become easier to transport and deliver goods, and delivery of products including construction materials and farm products from the western shore, which was made once a day, is now made three to four times a day. Moreover, as the transport route became shorter, the fuel cost has been reduced, which has made the transport cost lower. They also said that the construction of the bridge has increased the supply of farm products in the market in Batticaloa.

Further, the second biggest apparel company in Sri Lanka called Brandix established a factory on the eastern shore of the bridge in June 2017. A personnel of the company said that the construction of the bridge was one of the key factors in establishing the factory there. Brandix has also provided new job opportunities for people on the western shore, and about a fourth of all employees commute from the underdeveloped western shore. This has enabled people on the western shore to get a job and earn a steady income.

(3) Women's independence and social advancement

The impact of Brandix has not only been made on the economy, but also on women's social advancement. Although most women in the Manmunai region traditionally stayed home because of a lack of work, women who started to work for Brandix have secured income, and such improvement of income has led to the improvement of their awareness about contributing to the family and the region, which has further led to their confidence and independence. A woman, who did not like speaking in front of people, said that since she started to work as a machine operator and became able to earn an income from the work she got, she has gained confidence. She also said that local people have respect for her now.

(4) Medical care

Before the bridge was constructed, ambulances and doctors also traveled by ferry because the only general hospital was on the eastern shore. According to the local residents, children who were bitten by a snake died as they were unable to get to a hospital in time. In 2018, however, medical institutions on the western shore were also developed that are able to deal with 30 emergency patients. The quality of medical care has stabilized and improved, as it has become easier for doctors and the staff to commute. A staff member, who commutes from the eastern shore, said that, although he formerly stayed overnight to work before the construction of the bridge, now he can commute every day. He also said that, since the construction of the bridge, part-time doctors (backup doctors) can come as needed, and medicine and medical equipment are delivered regularly.

(5) Education

Students prefer to go to a nearby school to which they can commute from home, and students on the western shore go to school on the western shore in principle, and this tendency has remained unchanged before or after the construction of the bridge. However, the construction of the bridge has enabled the employment of excellent teachers, especially math and science teachers, from the eastern shore, which has drastically improved the performance of students. Teachers who commuted by ferry from the eastern shore hardly ever arrive late now, and more and more students go to cram school on the eastern shore after school hours. Moreover, although there is no school higher than the ninth grade on the western shore, students can go to school on the

eastern shore more easily. They said that the number of students from the western shore, who formerly gave up going to school on the east side because of the difficulties in commuting, has tripled.



Schoolgirls who are pleased to be able to attend school on the east side

(6) At the end

Thanks to aid from Japan, a bridge was constructed in an underdeveloped region in Sri Lanka after the civil conflict. The only bridge in the region is this completed bridge. Most people have no idea what stories were behind the bridge's completion even if they see it. However, behind this, there were diverse dramas including incidents, stakeholders' discussions and measures to address them, concerns and aspirations of responsible people, various events and emotions arising from relationships among people, and relationships with local people.

A "bridge" has not just been a structure to cross over water. It has been a social infrastructure playing an important role to connect people with people, people with society, and people with goods. Through this story, I would be pleased if you could learn the meaning of the bridge constructed in the Eastern Province in Sri Lanka after the civil conflict, and the roles that the bridge has played. Even at this very moment, the bridge that Japan built is being used by local people, and is part of their life and community.