Kingdom of Tonga

Ex-post Evaluation of Japanese Grant Aid Project

"The Project for Construction of the Inter-Islands Vessel"

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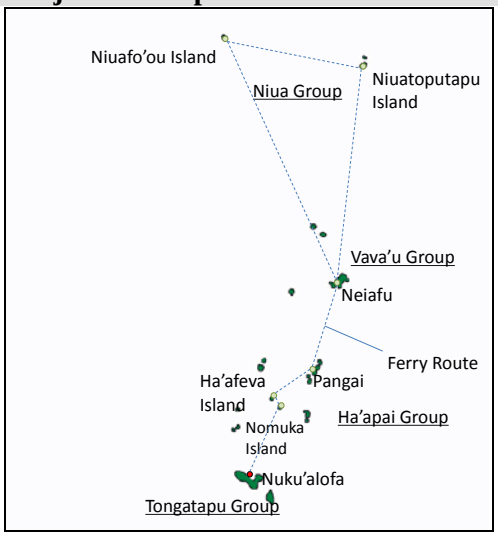
0. Summary

In this project, a ferry and related equipment were procured to make maritime transportation safer and more reliable for passengers. This project, which supported stable operation between outer islands, was consistent with the development plan and needs of Tonga, as well as the priority areas of Japan's ODA policy. Therefore, the relevance is high. With regard to effectiveness, the project increased capacities and made transport safer for maritime passengers and cargo, which facilitated the smooth flow of goods between the capital and outer islands, meaning that its effectiveness and impact are also high. With respect to the project implementation, while the project components were implemented as planned and the project cost was also mostly as planned, the project period exceeded the plan due to re-tendering procedures following a tender failure. Consequently, efficiency is fair. In terms of sustainability, there were no particular issues in the structure of operation and maintenance as well as operational techniques, coupled with an improvement of financial conditions to a level where the vessel replacement fund was building up. The procured vessel was generally well-maintained, but partial issues were observed, particularly in the electrical repair of some equipment. Therefore, the sustainability of the project was fair.

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

1. Project Description



Project Location

Ferry procured under the project

1.1 Background

In the island nation of Tonga, maritime transportation has become an indispensable element of social infrastructure for transporting people between islands and supplying the goods required for regional development. Regular air and shipping services have been provided between the capital of Nuku'alofa and outer islands, with shipping services accounting for 47% of passenger transportation and almost 100% of cargo transportation at the time of project planning. For the general public of Tonga, economical shipping services were an important means of transport and the Government of Tonga had contracted with the Shipping Corporation of Polynesia (hereinafter referred to as SCP), wholly owned by the government, by leasing the government-owned vessel MV Olovaha (955 gross tons, built in West Germany in 1981) which provided regular services to the islands, including the northernmost Niua Group. However, MV Olovaha had frequent breakdowns due to her old age and repair costs were high, leading to the critical condition where stable and safe operation was difficult. Moreover, despite such deteriorated conditions, MV Olovaha was forced to operate overloaded, exceeding the load line to meet the high transportation demand.

A privately-owned ship MV Pulupaki (675 gross tons, built in Japan in 1989 and sold as a used vessel to Tonga in 2002) was being operated alongside MV Olovaha in the shipping line to the Vava'u Group in the central area of Tonga. While MV Pulupaki had a passenger transportation capacity 1.7 times larger than MV Olovaha, its cargo transportation capacity was half that of MV Olovaha, meaning it was unable to cater to the sufficient maritime transportation demand of the country.

To resolve the critical maritime transportation conditions, which represent a lifeline for the Tongan people as well as regional development, it was essential to construct a new vessel to replace MV Olovaha and procure related cargo handling equipment (e.g. forklifts, containers).

1.2 Project Outline

The objective of this project was to make marine transportation in Tonga's domestic route safer and more reliable by procuring an inter-island vessel and necessary equipment.

Grant Limit / Actual Grant Amount	1,676 million yen / 1,672 million yen
Exchange of Notes Date	June 2008
Implementing Agency	Ministry of Public Enterprises

	(Operation) Friendly Islands Shipping Agency: FISA[1]
Project Completion Date	October 2010
Main Contractor	ISB Co., Ltd.
Main Consultant	Fisheries Engineering Co., Ltd.
Basic Design	December 2007
Detailed Design	None
Related Projects	[Grant Aid] The Project for Provision of a Port Service Vessel (FY1993) [Other Donors] Australia: Pangai Harbour Development (1994 – 1996)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: September, 2013 – September, 2014

Duration of the Field Study: March 12 – 23, 2014 and May 12 – 17, 2014

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance to the Development Plan of Tonga

At the time of project planning, Tonga's development plan 'Strategic Development Plan Eight 2006/07 – 2008/09' listed 'Upgrade inter-island sea transport services by introducing a new ferry' as one of the strategies in the 'Goal 3: Promote sustained private sector-led economic growth', out of eight major development goals.

In the 'Tonga Strategic Development Framework (TSDF) 2011-2014', a development plan effective at the time of ex-post evaluation, 'appropriate, well-planned and maintained infrastructure that improves people's everyday lives' was deemed an important 'Outcome Objective 3', with concrete strategies stating improvement in air and sea transport services, both domestically and internationally. Also, in the 'National

[1] The owner of the provided vessel MV 'Otuanga'ofa is the Government of Tonga and the Ministry of Public Enterprises (MPE) is the responsible ministry. However, the 'Implementing Agency' in this evaluation report refers to FISA, under MPE, as it administers overall operation and maintenance.

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

[3] ③: High, ②: Fair, ①: Low

Infrastructure Investment Plan 2013-2023', maritime transport is seen as an indispensable infrastructure and it is explicitly stated that the government prioritises efforts to ensure continuous shipping services. It also refers to the dredging of channels and berths as a priority development area.

Accordingly, development policy has indicated the consistent importance of infrastructure development while improving maritime transportation services has been prioritised. This means that this project can be considered in line with these policies.

3.1.2 Relevance to the Development Needs of Tonga

At the time of planning, shipping services accounted for 47% of passenger transport and almost 100% of cargo transport and represented a daily lifeline for people travelling between the capital and outer islands. They were also an indispensable element of social infrastructure for the regional development of the outer islands. The MV Olovaha, owned by the government at the time, was operating on most of the marine transport routes to outer islands, together with MV Pulupaki, but the vessel experienced frequent delays and cancelations due to breakdowns, given its 25-year age after construction. The private vessel MV Pulupaki originally had half the cargo-carrying capacity of the MV Olovaha. In addition to the shortage of goods transport capacities, continued it was considered that the vessel would not be able to be stably operated sooner or later due to improper maintenance.

Also at the time of ex-post evaluation, the implementing agency and the government ministries concerned (the Ministry of Public Enterprises and the Ministry of Infrastructure) observed the strong needs for maritime transportation in the island nation of Tonga, which handles approximately 49% of passenger transport and almost 100% of cargo transport. Most maritime transport between these islands has been undertaken by MV 'Otuanga'ofa, procured under this project, as well as two private vessels[4]. However, as the private vessels are old, there is a high demand for MV 'Otuanga'ofa's stable operation. In particular, MV Pulupaki has deteriorated much further than the project planning period and is often receiving directions for repairs from the Ministry of Infrastructure due to its safety shortfalls. It has become difficult to operate the vessel stably at all times.

In the beneficiary survey[5] of the passengers of MV 'Otuanga'ofa, it was confirmed that as high as 91% considered the ferry a lifeline for the Tongan people and important

[4] MV Pulupaki and a small cargo vessel, MV Sitka, which came into service in 2010

[5] An interview survey with 100 passengers on MV 'Otuanga'ofa procured under this project was conducted (35 respondents lived in Tongatapu, 12 in Ha'apai, 36 in Vava'u and 16 in Niuas). The interview survey concerned the level of ferry improvement, safety, comfort, reliability, effects on the local economy and society, importance of maritime transportation, etc.

for developing the outer islands.

Based on the above, this project can be considered consistent with the development needs of Tonga; both at the times of project planning and ex-post evaluation, as this project has played a role as core infrastructure underpinning the majority of maritime transportation which is indispensable for Tonga's society and economy.

3.1.3 Relevance to Japan's ODA Policy

Based on the five development priority areas (Economic growth, Sustainable development, Good governance, Security, and People to people communication and exchange) declared at the Fourth Japan-Pacific Islands Forum Summit Meeting held in 2006, Japan positioned 'Economic growth (Infrastructure, etc.)', 'Sustainable development (environment, health and education)' and 'Good governance (enhancement of the administrative capabilities, etc.)' as key cooperation areas for Tonga. As this project was designed to support 'Economic growth', one of Japan's priority areas for the entire Pacific region, and the corresponding cooperation area for Tonga 'Economic growth (Infrastructure, etc.)', it can be considered highly consistent with the ODA policy at the time.

This project was in line with Tonga's development plan during the planning and ex-post evaluation, and maritime transportation needs in the island country of Tonga have also been considerable. In addition, this project, which supported the development of infrastructure spawning economic growth, conformed to Japan's ODA policy at the time. In light of the above, the relevance of this project is high.

3.2 Effectiveness[6] (Rating: ③)

3.2.1 Enhancement of Transportation Capacities

It was expected that services with excessive passenger numbers and/or overloading at the time of planning would be eliminated through this project. The following changes were observed regarding the passenger capacity: changes in cargo-carrying capacities, eliminations of services with excessive passenger numbers and overloading.

[6] Sub-rating for Effectiveness is to be put with consideration of Impact.

Table 1: Changes in Transportation Capacities (MV Olovaha and MV 'Otuanga'ofa)

Indicator	2006 (Plan)	2010 (Target)	At the time of Ex-post Evaluation (Actual)
	MV Olovaha	MV 'Otuanga'ofa	
Passenger Capacity	340	400	400
Number of Services with Excessive Passenger Numbers	4	0	3 (FY2011/12) 3 (FY2012/13)
Cargo Weight	200 tons	400 tons	400 tons
Number of Services with Excessive Cargo Weight	47	0	0 (FY 2011/12) 0 (FY2012/13)
Total Number of Services	53	-	60 (FY2011/12) 62 (FY2012/13)

Source: Data Provided by the Implementing Agency

As shown in Table 1, the passenger capacity increased from 340 to 400 and the cargo-carrying capacity from 200 to 400 tons by implementing this project. However, while the passenger capacity increased to 400, several services still carried excessive passenger numbers during the Christmas season, etc. The main cause is that more passengers than the capacity sometimes board the vessel as a result of the lack of accurate information sharing on passenger numbers due to the insufficiency of coordination between the ticketing agents of the implementing agency in outer islands, and some passengers changing destinations after boarding beyond their original disembarkation point, leading to stretches with excessive passenger numbers on board. Conversely, the cargo-carrying capacities increased substantially and no further cargo overload occurred since the service commenced.

Photo 1: Main Cabin (Economy Class)

The basic operational indicators for passenger numbers and cargo transport volume from the planning period to the post-project period changed as shown in Table 2.

Table 2: Operational Performance (MV Olovaha and MV 'Otuanga'ofa)

		Plan (MV Olovaha)			Ex-post Evaluation (MV 'Otuanga'ofa)		
		2004	2005	2006	FY2010/11	FY2011/12	FY2012/13
Passenger numbers (persons)	Northbound	—	—	—	6,029	15,703	18,801
	Southbound	—	—	—	7,184	19,277	17,740
	Total	7,800	8,980	11,360	13,213	34,980	36,541
Cargo Transport Volume (tons)	Northbound	—	—	—	2,746	9,862	14,814
	Southbound	—	—	—	1,177	7,071	5,349
	Total	10,300	12,500	13,900	3,923	16,933	20,163
Number of return trips		49	50	53	29	60	62

Source: Basic Design Report, Data provided by the Implementing Agency
Note 1: A 'Financial Year' is from July to the following June
Note 2: As the MV 'Otuanga'ofa went into service in December 2010, the data for FY2010/11 is for approximately six months.

As no additional new demand was expected to be generated in this project, the operational record five years after the commencement (in 2015) was considered to be approximately the same as that of 2005. However, as shown in Table 2, it was confirmed that both passenger numbers and cargo transportation volume had already considerably exceeded the 2005 actual values in FY2011/12.

There was an aspect that part of this increase was due to difficulties in private vessels operating almost the same route in providing safe and stable services. In 2009, when MV Princess Ashika, which was operated to replace the MV Olovaha after its decommissioning, sank (as described later in Box 1), demand for the private vessel MV Pulupaki temporarily soared. However, as the government devoted MV Ajang Subuh temporarily and MV 'Otuanga'ofa went into service at the end of 2010, passenger numbers and cargo volume on private vessels, lacking sufficiently safe and stable operations, have been declining. Particularly the heavily deteriorated private vessel MV Pulupaki lost passengers and cargo in 2013[7].

According to the implementing agency and the Ministry of Public Enterprises, etc., it was significant for the government to guarantee stable operations of the state-owned vessel in Tonga, consisting of a number of outer islands. It is also considered important that the government sufficiently secures its own means of transport to provide various public services in the outer islands and undesirable to outsource the operation to a private profit-centred firm. In light of the public nature as a means of transport for the people and the importance of providing public services, it was confirmed that the government had a policy of handling maritime transportation as a minimum. This is considered a pragmatic view, reflecting the need to provide services in a country with a number of small outer islands.

[7] As operational data on private vessels is confidential, only the result of qualitative analysis is described in this report.

Box 1 Sinking Accident of MV Princess Ashika

MV Olovaha was planned to be decommissioned after this project was implemented. However, problems with its electrical and mechanical systems had already intensified and the Government of Tonga deemed it inappropriate in terms of safety and maintenance cost to operate the vessel until MV 'Otuanga'ofa was procured. The government purchased a replacement vessel MV Princess Ashika from Fiji (constructed in Japan in 1972 and serving as Olive-maru in the Setonaikai until being sold to Fiji in 1984) to serve until the procurement, and it started operations in June 2009 on the same route as MV Olovaha. However, on 5 August, only on its 5th voyage, it sank between Nomuka and Ha'afeva islands several hours after departing Nuku'alofa, and 74 passengers, including a JICA Senior Volunteer, lost their lives.

While there were several factors behind the sinking, such as the fact that crew members did not provide adequate evacuation guidance and the difficulty in escaping from the cabins due to the vessel structure, investigative results conducted by the Royal Commission after the accident concluded that the root cause of the accident was the purchase of a deteriorated vessel unsuitable for open sea operations and inadequately maintained, with an initiative led by the Minister of Transport of that time.

This accident considerably shocked the Tongan society and one result saw many passengers preferring to remain outside in the open areas during the voyage. During the voyage from Nuku'alofa to Pangai as part of the ex-post evaluation survey, it was observed that many passengers remained on the outside deck or in the corridors, with few in windowless cabins on lower floors. Both the boarding experience as well as the beneficiary survey seemed to underline acute awareness of the importance of ferry safety following this accident.

MV Princess Ashika before sinking
Source: Webpage of Radio Australia
（http://www.radioaustralia.net.au/international/2010-01-26/tongan-ferry-sets-sail-despite-unseaworthy-declaration/201774）

Aboard MV 'Otuanga'ofa
(Staying along the outside corridor)

3.2.2 Realisation of Safe Operation

At the time of planning, the expectations were that 'Dangerous operations due to overloading would be eliminated, and a safe and smooth means of maritime transportation ensured' by implementing this project.

Since this project was implemented, no cancelations due to sudden breakdowns have

occurred, according to the implementing agency, which shows that scheduled and stable operations have been realised. Also, no overloading cases have occurred, as shown in Table 1. The beneficiary survey indicates that 94% of respondents said that vessel operations became safer and 86% felt that reliable operation had been attained. Accordingly, much higher safety and reliability were perceived compared to MV Olovaha.

An increase in passenger capacity was examined for some time as a measure to counter the issue of excessive passenger overcrowding, and the implementing agency increased the capacity of life rafts and life jackets up to 600. However, the problem was the insufficient width of corridors, since the vessel was designed to accommodate 400 passengers, and it was concluded that increasing the passenger capacity would be difficult due to the vessel structure. In addition, no emergency evacuation measures such as a slider were equipped to enable mass passenger evacuation immediately. The concern was to ensuring sufficient evacuation routes for 600 passengers, and the capacity was eventually brought back to 400. With passenger safety in mind, it is considered necessary to increase the number of services during peak seasons instead of increasing passenger capacity under the current vessel conditions to prevent excessive overcrowding.

3.3 Impact

3.3.1 Intended Impacts

At the time of planning this project, two points were expected; Transportation of goods from the outer islands to urban areas would be promoted, leading to increases in cash income in outer islands as well as the increased inflow of commodities to outer islands to promote tourism development and improve living conditions.

Photo 2: Embarkation / Disembarkation Scene in Lifuka Island

With regard to the transportation of goods between Tongatapu, where the capital Nuku'alofa is located, and the outer islands, stable operations have been realised with the start of services by MV 'Otuanga'ofa, promoting passenger and cargo transportation. An interview survey with commercial facilities in one of the outer islands, Lifuka, during the ex-post evaluation confirmed that many inhabitants were now receiving goods as planned. The beneficiary survey also revealed that 74% of them

perceived socioeconomic changes after the MV ‘Otuanga’ofa came into service. The main responses were that agricultural and marine products of outer islands could be transported stably to Tongatapu, and that stable and regular shipments of imported goods from Tongatapu had become possible.

Conversely, given the lack of substantial change perceived such as a significant cash boost for the outer islands and/or an impact on tourism development, it was difficult to fully identify the macro-level effects. However, this project is considered to have underpinned cash-income opportunities in the outer islands and tourism-related activities.

MV ‘Otuanga’ofa extends its service to cover the Niua Group, in the northern part of Tonga, several times a year, which has become a valuable means of travel and transport for the people of the Group[8]. Some respondents to the beneficiary survey highly appreciated the ensured operations to the Niua Group. The implementing agency provides additional services to meet the needs of outer- island residents on special occasions such as events or church conferences. During the field visit of the ex-post evaluation, a case of flexible response was observed that an original Tongatapu-Vava’u route was extended to the Niua Group, reflecting the high operational demand.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

Preventive measures against marine pollution were planned by installing an oily water separator, a sewage tank and a low-NOx emission engine on the ferry to be procured under this project. The ex-post evaluation confirmed that this equipment had been installed based on the International Convention for the Prevention of Pollution from Ships. No negative impact on the natural environment has been observed as there have been no spillage incidents such as fuel since operation commenced.

Annual fuel consumption of the procured vessel is shown in Table 3, with 11,000–12,500 litres consumed per voyage. As the implementing agency in charge of operation and maintenance was changed, as described later in ‘3.5.1 Institutional Aspects of Operation and Maintenance’, fuel consumption records of MV Olovaha could not be traced, which meant the status of fuel-efficiency improvement could not be assessed.

[8] The operated route is normally between Tongatapu Island (Nuku’alofa) and Vava’u Island (Neiafu).

Table 3: Fuel Consumption of MV ‘Otuanga’ofa

	FY2010/11	FY2011/12	FY2012/13
Amount of fuel (litres)	359,827	680,048	688,252
Number of services	29	60	62
Average fuel consumption per voyage (litres)	12,408	11,334	11,101

Source: Information provided by the Implementing Agency

3.3.2.2 Land Acquisition and Resettlement

In this project, as the ferry was constructed in Japan, before being sailed and handed over to Tonga, it was confirmed that neither land acquisition nor resettlement occurred. The same is true of the port facility MV ‘Otuanga’ofa berths.

3.3.2.3 Other Impacts

As information was obtained prior to the ex-post evaluation survey, suggesting occasional delays in the operation of MV ‘Otuanga’ofa, questions were asked to the implementing agency on punctuality. According to them, operational delays sometimes occurred due to several factors such as: (1) Following delays in the arrival of cargo to be loaded at the ferry wharf and loading work commencing behind schedule, which resulted in departure delays, (2) Considerable time was required to load and unload cargo at outer islands without wharves, and (3) There were cases where the MV ‘Otuanga’ofa could not depart due to the presence of another ship berthed adjacent in the port. Issues with cargo operation have been significant. As some of such factors can be solved by developing wharves, securing an assigned quay with sufficient space and developing wharves in the outer islands seemed a medium- to long-term challenge.

By implementing this project, transportation capacities have been increased in terms of passenger numbers and cargo volume, and no overloading case has ever occurred. While several services a year still carry excessive passenger numbers during peak seasons, it can be judged that the initial objective of this project is generally considered to have been achieved, since such cases only represent a small proportion of the overall project effects. The safety of maritime passenger and cargo transport also improved substantially with this project, and no cancelations due to sudden breakdowns occurred. In addition, interviews and beneficiary surveys confirmed that stable operations had facilitated passenger travel and cargo transportation between the capital and outer islands as planned, helping stabilise the lives of outer island residents.

In light of the above, this project has largely achieved its objectives; therefore, its

effectiveness and impact is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

In this project, a ferry operating between Tongatapu island and other outer islands was procured. As shown in Table 4, the ferry was constructed mostly in accordance with the plan and self-cruised to arrive in Tonga in October 2010 as scheduled.

Table 4: Comparison of Original and Actual Outputs

	Original	Actual
Passenger capacity	400	400
Cargo weight	400 tons	400 tons
Overall length	53.0m	53.0m
Gross tonnage	1,500 tons	1,534 tons
Main engine	735kW(1,000ps)×2	735kW(1,000ps)×2
(Equipment) Dry container	54	54
(Equipment) Reefer container	8	8
(Equipment) Forklift	2	2

Source: Basic Design Report and Completion Report

At the time of planning, the following elements associated with the implementation of this project were planned to be undertaken by Tonga:

- Enhancing fenders along the Nuku'alofa Wharf
- Widening of wharf ramps at Nuku'alofa, Pangai and Neiafu Wharves
- Dredging of Ha'afeva Wharf (to be examined and determined by the Tongan government)
- Fitting shelves and workbenches at the implementing agency workshop
- Installing electric receptacles at the wharf for reefer containers

Among these items, the field visit revealed that an improvement in Nuku'alofa Wharf (paving of the apron, adding fenders), widening wharf ramps and improving the workshop had been implemented. With respect to the electric receptacles for reefer containers at the wharf, sufficient implementation procedures were not taken during a series of procedures to dismantle SCP following the sinking accident of MV Princess Ashika, and they were ultimately not installed. However, as described later, most of the reefer containers broke down before the electric receptacles had been installedafter that. Therefore, the electrical receptacles were not necessarily required. As non-installation

has a minimal impact on the realisation of project effects, it is not regarded as a seriously negative factor in the evaluation judgement.

Dredging of Ha'afeva Wharf, yet to be decided at the time of planning of this project, was deemed unnecessary following a survey by the Tongan government. Subsequently, the wharf broke after a storm and the port itself is not currently used[9].

3.4.2 Project Inputs

3.4.2.1 Project Cost

The cost of this project to be borne by Japan was planned to be approximately 1,676 million yen, with another 16 million yen planned as implementation expenses to be borne by Tonga.

The following table summarises a breakdown of the planned and actual costs contributed by Japan:

Table 5: Comparison of Original and Actual Project Costs

(Unit: million yen)

Breakdown	Original		Actual	
Vessel Construction	1,549	1,626	1,541	1,621
Cruising	26		29	
Equipment Procurement	51		51	
Designing and Supervision	51		51	
Total	1,677 (E/N amount: 1,676)		1,672	

Source: Basic Design Report and Completion Report

Note: Table 5 is based on the planned costs and a breakdown in the Basic Design Study[10].

The actual project cost was 1,672 million yen (Japanese side), which was confirmed as within the planned amount (100% of the plan). Conversely, the cost borne by Tonga had not been sorted out and remained unclear due to the dismantlement of the implementing agency at the time as well as the reorganisation of government ministries. Consequently, the evaluation of the project cost was based on a comparison of the Japanese portion.

[9] The MV 'Otuanga'ofa anchors off-shore and a small boat carries passengers and cargo.

[10] The planned cost subject to the comparison in the ex-post evaluation is based on the amount described in the Exchange of Notes (hereinafter referred to as E/N). However, as the breakdown of the E/N amount (1,676 million yen) was not confirmed in this project, the amount shown in the Basic Design Report formulated during the project planning is used to compare each cost item. This amount and the E/N amount are both 100% of the plan (rounded to the closest whole number).

3.4.2.2 Project Period

The period of this project was expected to be approximately 20 months (4 months for the detailed design and 16 months for the vessel construction, cruising and equipment procurement). The actual project period was 28.5 months from June 2008 until October 2010, 8.5 months longer than originally planned. The main factor was the initial tendering failure of this project[11], which meant the project cost had to be reviewed again and also prompted adjustment of the re-tendering timing. The actual re-tendering was held nine months later. Therefore, the actual period turned out to be 142% of the plan.

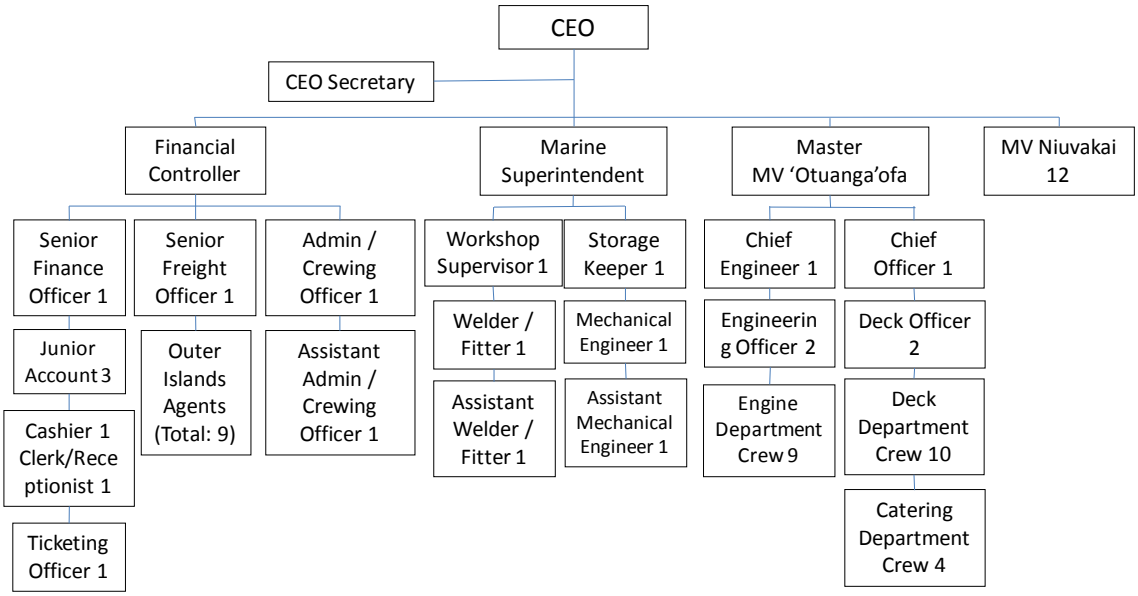
The above results show that while the project cost was within the plan (100% of the plan), the project period exceeded the originally planned period by 8.5 months, given the extra time required to review the project cost and for the re-tendering process following the tender failure (142% of the plan). Therefore, the efficiency of this project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

While the organisation overseeing operations at the time of planning was SCP, it was dismantled in 2010 as part of shouldering responsibilities for the accident in which the MV Princess Ashika sunk, while FISA was established the same year in time for the launch of services by MV 'Otuanga'ofa. FISA was a public enterprise under the jurisdiction of the Ministry of Public Enterprises, and has been positioned as an organisation undertaking the operations of MV 'Otuanga'ofa, as procured under this project. As illustrated in Figure 1, FISA can be broadly divided into an administration department, a workshop department and a department to operate the vessel. It had 71 staff members at the time of ex-post evaluation with an increase of 12 staff members as the operation of domestic cargo vessel MV Niuvakai started in March 2014. Of all the staff, the MV 'Otuanga'ofa's crew numbered 30, and the number of workshop staff was 7. FISA continuously employed three staff – a well-experienced senior freight officer, an administration / crewing officer and a ticketing officer, when SCP was dismantled. According to FISA, the continued employment contributed to the smooth commencement of operations.

[11] The main reason for the tender failure was the indication of possibilities in the construction time schedule submitted by a bidder unable to complete construction within the E/N time limit. During the tendering process of a contractor, factors such as the potential for delay in the delivery date of steel and main engines and scheduling risk for the construction of the vessel to be provided in parallel with another vessel under construction at the time.



Source: Information provided by the Implementing Agency
Note: One position each for the CEO, CEO Secretary, each department manager and Master. Numbers shown after other positions indicate the number of staff in those positions.

Figure 1: Organisation Chart of the Friendly Islands Shipping Agency

On MV 'Otuanga'ofa, seven crew members under the Captain had international qualifications and abundant experience, while FISA's CEO and Marine Superintendent also have a lot of experience in managing international shipping operations. Accordingly, no issues in terms of organisational structure and crew number were observed. MV 'Otuanga'ofa has been operated between the outer islands on the same route and schedule as MV Olovaha by these crew members since it started operations. Also, as described earlier, flexible operations such as increased services during peak seasons or occasional charter operations in response to requests are undertaken. With regard to the structure of FISA, it was confirmed that responsibility to ensure at least maritime transportation would be taken by the government, taking into account the public nature as a means of transport for citizens as well as the importance of public-service provision. This suggests that the position of FISA as a public enterprise to operate MV 'Otuanga'ofa will remain unchanged.

3.5.2 Technical Aspects of Operation and Maintenance

At the time of planning this project, SCP had a small workshop conducting daily maintenance, but advanced repairs of machines and equipment were ordered to Fiji or New Zealand. SCP was planning to introduce the Preventive Maintenance Programme (hereinafter referred to as PMP), a system in which various parts of the vessel would be regularly inspected and certain parts replaced before they broke down, for the vessel to

be procured. It was judged that SCP had sufficient functions and skills to implement the programme as well as the required techniques to handle the vessel.

Although it was not possible to measure the changes in technical capacities for operation and maintenance at the times of planning and ex-post evaluation, as the organisation itself is not the same due to the sinking accident of MV Princess Ashika, the following points were confirmed:

- Three crew members seconded from the navy (navigation officer, electrician and engineer) [12] who were invited to Japan for handling the training of MV 'Otuanga'ofa before its procurement, worked on the vessel for approximately one year after the hand-over then returned to the navy. According to FISA, the handover process to the crew hired by FISA was satisfactory.
- MV 'Otuanga'ofa was operated without major accidents since its operation commenced. Coupled with the lack of any problems that would affect operations, it was considered that FISA has capacities to conduct certain inspections and repairs. When a small accident occurred (collision with a rock underway in the Niua Group in May 2014), FISA reported this to Japan immediately and requested that Nippon Kaiji Kyokai (ClassNK) inspect the damage, which shows that FISA is aware of appropriate countermeasures required when accidents occur.
- Training programmes were regularly provided to staff members. They take training sessions once or twice a year on customer services, accounting, stock management and business administration at the Tonga Business Enterprise Centre (TBEC), which are run by the Tonga Chamber of Commerce and Industry. In addition, the Chief Engineer and crew sometimes take courses on marine engineering and evacuation management in New Zealand. Also, according to FISA, evacuation drills are conducted by the crew basically every Saturday.

Based on the above, it is considered that FISA has a certain maintenance techniques, as exemplified by the lack of any cancelations due to sudden breakdowns, and efforts to improve capacities were observed. However, as described in '3.5.4 Current Status of Operation and Maintenance', technical skills on electrical systems remain insufficient and there is also the issue of an inability to repair breakdowns sufficiently and promptly, apart from the items covered by PMP.

3.5.3 Financial Aspects of Operation and Maintenance

At the time of planning this project, government subsidies to cover operations to the

[12] After the accident of MV Princess Ashika in August 2009, SCP was under the investigation by the Rotal Commission and was not practically structured to run the vessel. Therefore, the naval officers assumed the role in the meantime.

less-populated northern Niua Group were provided, but SCP had an independent accounting system, whereby all other costs, including fuel expenses, would be paid out from vessel operation revenues. SCP's financial conditions at the time were approximately 5% in the red on average between 2004 and 2006, due to the costly maintenance and repair associated with the deterioration of MV Olovaha in addition to fuel costs being the factor for the worsening operating balance.

The operating balance of FISA after the implementation of this project is indicated in Table 6. While 400,000 Tongan Pa'anga was provided from the government as assets in FY 2010/11, there have been no subsidies since then, and FISA has an independent accounting system, similar to SCP.

Table 6: Vessel Operating Balance

(Unit: thousand Tongan Pa'anga)

Financial Year	2010/11	2011/12	2012/13
Revenue			
Sales from freight	687	1,468	1,920
Sales from passengers	994	2,281	2,618
Government subsidy*	80	210	200
Other	59	283	333
Total	1,820	4,242	5,071
Expenditure			
Fuel & lubricants	686	1,315	1,333
Maintenance & repair	18	96	92
Crew cost	355	560	563
General administration	954	1,441	2,880
Other	19	203	44
Total	2,032	3,617	4,914
Balance	-212	625	156
Profit-revenue ratio (balance / revenue)	-11%	14%	3%

Source: Data provided by the Implementing Agency
Note: Subsidies for the operation of the Niua route (40,000 Tongan Pa'anga per voyage), but not for organizational management

Although a deficit in the operating balance was recorded in the first financial year (from December 2010 to June 2011), it subsequently improved substantially and it was confirmed that an accumulation in the fund for future vessel replacement was commenced in FY 2012/13. The major factor contributing to the improvement in the balance compared to the pre-project period was the realisation of significant reduction in the maintenance and repair costs. The proportion of entire expenditure, which used

to be an average of approximately 25% in 2004 – 2006, declined to a very low level at 1.9% in FY 2012/13. The major contributing factor seems to be, as well as the newness of the vessel, the averting of sudden breakdowns and repairs by steadily implementing the PMP.

While Table 5 shows that the general administration costs surged from FY 2011/12 to FY2012/13, this increase includes the amount of 1.2 million Tongan Pa'anga transferred to the vessel replacement fund. At the time of ex-post evaluation, some of the amount accumulated in FY 2013/14 had already been transferred and the fund balance was increased to 2 million Tongan Pa'anga. In the FISA's plan, the fund will be accumulated to 48 million Tongan Pa'anga in twenty years to replace the vessel smoothly. If the accumulation into the fund is implemented as planned, it is expected that in twenty years, the fund will have grown sufficiently to the purchase fund of a vessel similar to the one procured under this project, and a new vessel could actually be purchased before the vessel currently procured reaches the end of its service life in approximately 25 years.

Revenues from vessel operation (sales from freight and passengers) increased stably, supporting the sound management of FISA. However, fares of MV 'Otuanga'ofa were raised once in 2013, reflecting the global surge in fuel prices (an average 11% increase for an economy class ticket departing from Nuku'alofa). The fares are slightly higher than private vessels, but most passengers have been using 'Otuanga'ofa because of the background that, according to the interview survey, MV 'Otuanga'ofa is more comfortable and offers more stable operation.

3.5.4 Current Status of Operation and Maintenance

FISA has a small workshop in the headquarters and has been conducting on-board maintenance except for dry-docking of the keel. In this project, as well as procuring a ferry, containers and forklifts, a PMP was formulated as described in '3.5.2 Technical Aspects of Operation and Maintenance', whereby the items to be implemented to keep the vessel in good condition were specified together with the timeline (daily, weekly, monthly, yearly and every several years), such as greasing the cargo cranes (monthly) and checking the bow thruster shafting condition (yearly). In fact, the PMP was introduced right from the start of operations, with all inspections apart from dry-docking regularly conducted by the workshop staff and crew members and dry-docking in Fiji implemented once every year.

Photo 3: Engine Room maintained in clean condition

Photo 4: Inspection of the Engine Room

The PMP had not been introduced to MV Olovaha, and there were difficulties in addressing breakdowns as the vessel deteriorated. The actual confirmation of MV 'Otuanga'ofa's maintenance status during the ex-post evaluation study showed that the hull, engine, electrical system and equipment remained in good condition and the engine was also inspected and repaired as required. No cancelations due to sudden breakdowns had occurred since it started operation, and it can be said that the vessel has been operated generally in good condition. The workshop, despite its small size, basically seemed to be equipped with tools and equipment required to carry out inspection and repair work of the procured vessel.

However, it emerged that seven out of eight reefer containers, procured with the ferry, had problems, but the repair of the broken motors and the procurement of spare parts had not been independently carried out, rendering FISA unable to handle the breakdown of electrical systems sufficiently. In response, FISA purchased a larger second-hand reefer container to meet the demand. While there was concern over the repairing skills of electrical systems, the PMP implementation scope was limited and this programme has not been applied to electrical systems for which it was difficult to envisage the breakdown timing and to areas where periodical replacement of spare parts was not expected. FISA said that it was difficult to address these areas based on their current repair capacities but it was also very difficult to recruit an electrician domestically who would be capable of analysing the breakdown details correctly, procuring the right spare parts and performing repair work.

With regard to the ports in each location, the infrastructure facilities pertinent to this project, the Nuku'alofa Wharf has been developed and administered by the Ports Authority. Other outer island ports meanwhile, (such as Lifuka and Vava'u islands), which are under the jurisdiction of the Ministry of Infrastructure, are experiencing gradually shallower depths given the lack of an adequate dredger in Tonga, meaning ever-increasing amounts of sediment are disturbed at the bottom of harbours. Therefore, it is considered necessary that the Ministry of Infrastructure, as the responsible body, is

tasked with securing a dredger and constantly developing the harbour to facilitate MV ‘Otuanga’ofa’s safe operation.

The private vessel MV Pulupaki is heavily decrepit and its frequency of operation has declined since 2013. It was undergoing through welding repair work and could not be operated at the time of ex-post evaluation. The Ministry of Infrastructure expressed concern over the deterioration and safety of the vessel, and according to the Ministry, their inspectors have recently been pointing out items to be repaired all the time. It is possible that the vessel will not be able to function as a passenger/cargo vessel, and it is expected that a role MV ‘Otuanga’ofa playsin the outer island route will become more important.

As shown in the above analysis, no particular issues were observed in terms of the structure of operation and maintenance as well as the operational techniques of the vessel procured. Financial conditions improved rapidly since the initial deficit and reached a point where an accumulation into the vessel replacement fund could be started. In terms of the operation and maintenance status, the procured vessel was kept in good condition without any particular issues in terms of maintenance techniques of the vessel procured and with the introduction of PMP. However, FISA faces a problem for the repair of electrical systems - some of the equipment remained broken and much time was required for repairs, as seen in the case of reefer containers.

In light of the above, some problems have been observed in terms of technical aspects of operation and maintenance and conditions of electrical systems; therefore, the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

In this project, a ferry and related equipment were procured to make maritime transportation safer and more reliable for passengers. This project, which supported stable operation between outer islands, was consistent with the development plan and needs of Tonga, as well as the priority areas of Japan’s ODA policy. Therefore, the relevance is high. With regard to effectiveness, the project increased capacities and made transport safer for maritime passengers and cargo, which facilitated the smooth flow of goods between the capital and outer islands, meaning that its effectiveness and impact are also high. With respect to the project implementation, while the project components were implemented as planned and the project cost was also mostly as planned, the project period exceeded the plan due to re-tendering procedures following a tender failure. Consequently, efficiency is fair. In terms of sustainability, there were no particular issues

in the structure of operation and maintenance as well as operational techniques, coupled with an improvement of financial conditions to a level where the vessel replacement fund was building up. The procured vessel was generally well-maintained, but partial issues were observed, particularly in the electrical repair of some equipment. Therefore, the sustainability of the project was fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

4.2.1.1 Elimination of Services with Excessive Passenger Numbers during Peak Seasons

While the elimination of services with excessive passenger numbers was expected by increasing passenger capacity, such services were still observed during peak seasons such as Christmas. During such seasons, with the vessel's safety in mind, it is vital to take measures to avoid the problem of excessive passenger numbers by increasing the number of services of MV 'Otuanga'ofa or enforcing boarding restrictions.

4.2.1.2 Securing and Training Maintenance Engineers

It was observed that while MV 'Otuanga'ofa was generally maintained in good condition and stable and safe operations were realised, the breakdowns in electrical systems had not been fully addressed. It is desirable that an electrician with high-level expertise be secured and the capacities of existing engineers be developed to help ensure any breakdown can be smoothly repaired.

4.2.1.3 Need to Dredge Outer Island Ports

In the outer islands such as Lifuka and Vava'u, there is concern that the depths of wharves where the ferry berths will become insufficient, which could hamper the operation of MV 'Otuanga'ofa in future. While this is outside FISA's scope of business, it is considered necessary for the Ministry of Infrastructure to take the lead in dredging the harbours of outer islands to ensure safe and stable operation of vessels.

4.2.2 Recommendations to JICA

Although the Implementing Agency has been carrying out as much maintenance work as possible by introducing and implementing the PMP for the vessel procured, maintenance capacities need to be improved, particularly in terms of electrical systems.

Given the need for the implementing agency to secure engineers with high-level expertise by itself and undertake all repair work in the medium- to long-term, an appropriate engineer needs to be hired from outside. In addition, it is considered important for JICA to provide technical guidance to improve the skills of existing engineers in such areas to sustain the effects of this project.

4.3 Lessons Learned

4.3.1 Realisation of Stable Operations and Reduction in Financial Burdens by Introducing the Preventive Maintenance Programme

One of the factors underpinning the stable and safe operation of MV 'Otuanga'ofa is the introduction of a preventive maintenance programme (PMP), which was non-existent for MV Olovaha, to prevent breakdowns before they happen and maintain the vessel in optimal condition at all times. This programme was applied to the ferry procured from Japan to Samoa in 2010 and its introduction was also planned for this project. Implementing the programme steadily is assumed to pave the way; not only for stable and safe operations but also to alleviate financial burdens of this project through a consequent reduction in repair costs. Also, as described in '3.5.2 Technical Aspects of Operation and Maintenance', there are some areas not covered in the PMP where sufficient and prompt action is lacking, underlining the importance of PMP implementation. Therefore, introducing PMP and confirming that the implementing agency is capable of performing the programme when a vessel is procured is crucial.

4.3.2 Procurement of Equipment in Accordance with Repair Capacities and Spare Part Procurement Conditions in Island States

Among the equipment procured in this project, many of the reefer containers were unrepairable after they broke down. While the repair capacities of the implementing agency proved insufficient, the following points were also relevant at the time of planning this project: (1) The usage environment whereby container transportation and handling work would be done on an unpaved wharf and containers used under hot and humid conditions needed to be confirmed, and (2) Under circumstances of limited human resources in island states, when vessel-related equipment with electrical systems was procured, there was a need to determine the nature of detailed processes which would be practical in repairing and procuring spare parts once the equipment broke down. If a similar project is implemented in future, it is hoped that these points will be examined in more detail.

(End)