Kingdom of Tonga

FY 2021 Ex-post Evaluation Report of Japanese Grant Aid Project

"The Project for Upgrading of Wharf for Domestic Transport"

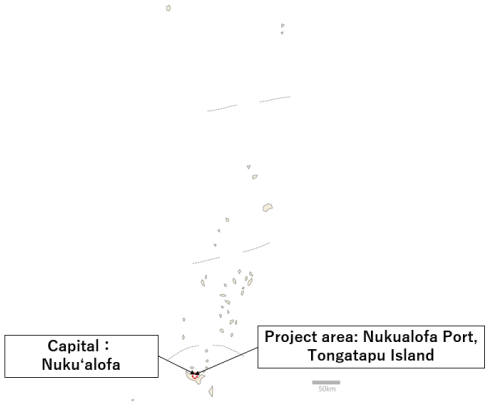
External Evaluator: Keisuke Nishikawa, QUNIE CORPORATION

0. Summary

This project aimed to improve the efficiency of international and domestic cargo handling operations and ensure the safety of passengers by constructing a new wharf for large domestic transport vessels at the port of Nuku'alofa, Tonga's capital. While there was no specific coordination or synergy expected between this project and other JICA projects or support from other organizations during the planning and implementation period of this project and the effects of inter-project linkages were not observed, the project was consistent with Tonga's development plan and needs at the time of planning and ex-post evaluation, and was also found to be consistent with Japan's ODA policy at the time of planning. Based on the above, its relevance and coherence are high. Regarding the project implementation, the outputs were mostly as planned, and although the project period slightly exceeded in real terms, the project cost was within the plan. Therefore, the efficiency of the project is judged to be high. Regarding the effectiveness of the project, while qualitative effects such as shortening of unberthing / berthing operations, improvement of cargo handling efficiency, improvement of passenger comfort, and assurance of safety were fully realized, the overall generation of quantitative effects was significantly delayed due to the substantial delay in the commencement of use of the new wharf by a large domestic transport vessel. In addition, one of the indicators, "volume of cargo handled," was substantially lower than the target, and economic effects and revitalization of cargo and passenger transport were not fully observed. Therefore, although there were some force majeure events associated with the global spread of the new coronavirus from the beginning of 2020 and the huge volcanic eruption in January 2022, the overall effectiveness and impact of the project as a whole were moderately low, as some aspects were not necessarily achieved as originally envisioned. Regarding the sustainability of the effects of the project, although the environmental monitoring system needs to be improved, no issues were found in terms of policy and system, organization and institution, finance, risk response, and operation and maintenance, and thus the sustainability of the effects of the project is considered to be high.

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

1. Project Description



Project location map
(Source: External Evaluator)

Domestic wharf developed in this project[1]
(Source: External Evaluator)

1.1 Background

Tonga is an island nation of more than 170 islands, comprising four archipelagos from the south: Tongatapu, Ha'apai, Vava'u, and Niuas. Of these, the Tongatapu Islands are home to the capital city of Nuku'alofa, where more than 70% of the population resides. The port of Nuku'alofa, located in the capital, consisted of the Queen Salote Wharf, mainly used by international cargo ships and large domestic transport vessels, the Vuna Wharf, used by international passenger ships, and the Faua Wharf, used by small domestic transport vessels. Large vessels such as MV Otuanga'ofa, a domestic transport vessel playing a central role in inter-island transport within Tonga (a 53-meter-long, 1,534-ton cargo and passenger vessel procured through the FY 2008 Grant Aid), were berthed at the Queen Salote Wharf, where passengers were embarking and disembarking in the container yard. This caused a safety issue due to the complicated flow lines between cargo handling operations and passengers. In addition, the efficiency of cargo handling was poor because different cargo handling procedures for international and domestic cargo were conducted at the same Queen Salote Wharf. In response to these issues, the Tongan government set as its future port development plan the goal of improving the efficiency and safety of international port logistics and domestic cargo and passenger transport.

The existing Faua Wharf (a wharf for small domestic transport vessels) at Nuku'alofa Port did not allow large vessels such as MV Otuanga'ofa to berth and was not equipped with a passenger terminal or boarding ramp for loading and unloading. Therefore, a dedicated wharf was necessary for large vessels to berth.

[1] The ship on the right in the photo is MV Otuanga'ofa, which was built under the Grant Aid "The Project for Construction of the Inter-Islands Vessel" (FY 2008).

1.2 Project Outline

The objective of the project is to improve the efficiency of the port through separating international and domestic cargo handling operations and ensure the safety of passengers getting on and off the vessels by constructing a new passenger terminal, wharf and basin etc. as well as a wharf for large domestic vessels at Faua Wharf of the Nuku'alofa Port in Tongatapu, thereby contributing to the revitalization of passenger and cargo transportation in Tonga.

Grant Limit / Actual Grant Amount	3,320 million yen / 3,209 million yen
Exchange of Notes Date / Grant Agreement Date	June 2015 / June 2015
Executing Agency(ies)	Ministry of Infrastructure
Project Completion	March 2018
Target Area	Nuku'alofa Port, Tongatapu Island
Main Contractor	TOA Corporation
Main Consultant	Oriental Consultants Global Co., Ltd.
Basic Design / Preparatory Survey	August 2014 - March 2015
Related Projects	<Grant Aid> The Project for Provision of a Port Service Vessel (1993) The Project for Construction of the Inter-Islands Vessel (2008) <Other international organizations, aid agencies, etc.> (World Bank) Transport Sector Consolidation Project (2009-2018) (Asian Development Bank) Outer Islands Small Jetties Project (2013-2015) (New Zealand) Pacific Maritime Safety Programme (2011-)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa (QUNIE CORPORATION)

2.2 Duration of Evaluation Study

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

Duration of the Study: September 2021 - January 2023

Duration of the Field Study: August 4 - 18, 2022

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

3.1 Relevance/Coherence (Rating: ③[3])

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with Development Plan of Tonga

At the time of planning of this project, Tonga's development policy was the *Tonga Strategic Development Framework* (2011-2014), and one of the priority areas was the development of properly planned and maintained infrastructure, and the implementation of the *National Infrastructure Investment Plan* was identified as a means of implementing it. The 2010 version of the *National Infrastructure Investment Plan* included the improvement of ports and terminals for international port logistics and domestic inter-island transport, and the 2013-2023 version will continue to implement the plan. The plan also emphasized the importance of increasing safety and resilience related to inter-island transport in maritime activities, which would require investments in infrastructure and complementary efforts to improve capacity, facilities, and systems.

At the time of ex-post evaluation, the T*onga Strategic Development Framework* (2015-2025) is positioned as a national-level development plan, with the provision and maintenance of comprehensive, sustainable, and successful infrastructure and technology as one of its seven priorities. Specifically, the goal is to provide reliable, safe, and affordable transportation services and improve the movement of people and goods between islands.

The *National Infrastructure Investment Plan* (2013-2023) remains as a valid investment plan at the time of ex-post evaluation under the same framework. The following are other investment plans that are identified as the ones related to this project at the time of ex-post evaluation: a management plan for the Ministry of Infrastructure (hereinafter referred to as "MOI") and the Ports Authority Tonga (hereinafter referred to as "PAT"), an overall long-term development plan for the Port of Nuku'alofa, and a recovery plan after the massive volcanic eruption in January 2022.

- MOI Management Plan and Budget Summary (FY 2022/23 - FY 2024/25)
  MOI's Management Plan. For the maritime and port sector, the plan states that the goal is to achieve safe, secure, and affordable domestic and international maritime transport, and to support the expansion of economic activities in the maritime transport sector, as well as to develop legislations and provide supervision and support for the

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ④: Very High, ③: High, ②: Moderately Low, ①: Low

sector as a whole.

- PAT Three-Year Business Plan (2023-2025)
  PAT's Business Plan, developed in June 2022. The provision of more reliable, safe, and accessible transportation services is one of its goals based on the *Tonga Strategic Development Framework* (2015-2025), which also emphasizes the participation and inclusion of vulnerable people.

- 20-Year Conceptual Master Plan
  The plan presents a future development concept for the integrated development of the port area of Nuku'alofa. At the time of ex-post evaluation, the plan had not yet been documented, and an image of the development was presented in a video.

- Hunga Tonga = Hunga Ha'apai Volcano Eruption and Tonga Tsunami (HTHH Disaster) Recovery and Rehabilitation Plan (2022-2025)
  The recovery plan was announced by the Prime Minister's Office on March 4, 2022 after the major eruption in January of the same year. The port is also included in the list of recovery targets because it was partially damaged. However, it is not a large-scale renovation plan, but mainly focuses on cleaning up eruption debris.

The MOI, as the ministry that oversees shipping infrastructure, supervises and supports the provision of stable maritime infrastructure services, and the domestic wharf developed under this project is positioned as an important core infrastructure for this purpose. PAT also emphasizes in the management plan to further improve its financial position as well as to realize reliable, safe, and accessible transportation services for all people, and this project is consistent with this direction. The 20-Year Concept Master Plan calls for the integrated development of the coastal area over the next 20 years, and the wharf developed in this project is part of this plan. It is positioned as a hub for domestic passenger and cargo transport.

Based on the above, the project is consistent with the direction of Tonga's national development plan, infrastructure development plan, and other related plans at the time of planning and ex-post evaluation.

3.1.1.2 Consistency with Development Needs of Tonga

At the time of planning of this project, Nuku'alofa Port did not have a wharf where large

vessels for domestic transport could berth and unberth, and large vessels for domestic transport were using part of the international wharf (Queen Salote Wharf). Since there were no adequate facilities for passengers to embark and disembark or to wait, the wharf had a dangerous mix of passenger and cargo flow lines.

The implementation of this project has secured a domestic wharf where multiple large vessels can berth at the same time. As a result, a part of the international wharf is no longer in use, and the risk of passenger and cargo traffic crossing has been eliminated. The wharf developed in this project still plays a significant role in maritime traffic to and from remote islands at the time of ex-post evaluation. The number of passengers, cargo volume, and the number of vessels entering and leaving the port in recent years are shown below, and the wharf constructed in this project also plays an important role as a port that meets these needs for movement and transportation.

Table 1: Tonga's Domestic Transport Data

Fiscal year	2017/18	2018/19	2019/20	2020/21	2021/22
Number of domestic passengers (persons)	104,887	121,569	58,652	90,794	68,185
Domestic cargo transport volume (tons)	31,913	39,313	25,794	34,123	24,184
Number of vessel arrivals and departures (times)	1,031	1,376	588	970	659

Note 1: Fiscal year is from July to June of the following year.
Note 2: Total of arrivals and departures at the port
Source: Information provided by PAT

The number of passengers, cargo transport volume, and vessel arrivals and departures have all declined since FY 2019/20 compared to previous years due to the restrictions placed on domestic transport following the outbreak of COVID-19 and a decrease in vessel operations following the massive eruption in January 2022. However, the domestic wharf at Nuku'alofa plays a key role to cater for most of Tonga's domestic maritime transportation, and the domestic wharf developed in this project is a highly needed facility for Tonga's domestic cargo and passenger transportation, both at the time of planning and at the time of ex-post evaluation.

3.1.1.3 Appropriateness of the Project Plan and Approach

The MV Otuanga'ofa (1,534 tons), a cargo and passenger vessel for domestic transport provided under JICA's grant aid “The Project for Construction of the Inter-Islands Vessel” (FY 2008), was renting a part of the international wharf as there was no wharf where the vessel could berth. In addition, there were safety issues at the wharf in terms of cargo and

passenger flows, and this project was designed to resolve these issues. In this respect, this project played a role in making safer and more effective use of the vessel provided by "The Project for Construction of the Inter-Islands Vessel," and also enhanced the effectiveness of the project itself by allowing the vessel to use the wharf developed by this project. In this sense, the approach of this project is considered to have been appropriate.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

At the time of planning of this project, Japan had identified the expansion of economic activities as a priority issue in its country assistance policy for Tonga, and had decided to develop an "Economic Infrastructure Development and Maintenance Capacity Enhancement Program." In addition, the "JICA Country Analysis Paper for the Pacific Region" also identified the development of shipping infrastructure as one of the priority issues.

This project provided support for the port, which is an economic and social infrastructure, and was in line with the priority areas of Japan's assistance to the Pacific region and Tonga at the time of planning.

3.1.2.2 Internal Coherence

No other JICA projects were being planned or implemented when this project was planned and implemented. Therefore, no linkage between JICA projects was envisaged, and no particular internal coherence was identified.

3.1.2.3 External Coherence

At the time of planning of this project, related projects were the World Bank-supported Transport Sector Consolidation Project (2009-2018), the Asian Development Bank (ADB)-supported Outer Islands Small Jetties Project (2013-2015), and the New Zealand-supported Pacific Maritime Safety Programme (2011-). In addition, the Vuna Wharf, which forms part of the Port of Nuku'alofa, was upgraded in 2012 with assistance from China.

In the World Bank-supported project, only partial improvement of ports in outer islands was implemented in the maritime transport sector; in the ADB-supported project, only safety assessments were conducted and routes were set up for safe navigation of ships. In the New Zealand-supported project, training was provided on search and rescue in the event of maritime accidents and response to oil spills. In addition, support was provided for the improvement of navigation facilities in domestic harbors, and measures were taken to prevent ships from running aground or colliding. Furthermore, it was confirmed that PAT

installed additional navigation aid facilities at the domestic wharf developed under this project after the project was completed, thereby enhancing the safety of navigation.

As a whole, no specific linkage with these projects was envisioned when this project was planned, and each was implemented independently, but the result was an improvement in safety in Tonga's maritime transport sector. In particular, PAT's installation of additional navigation aid facilities is considered to have increased safety within the new wharf after the project was completed.

The wharf developed in this project was planned from the beginning to be a robust facility that could withstand cyclones and other natural disasters, and was expected to contribute to the realization of sustainable shipping as a highly resilient infrastructure facility. In fact, the new wharf is a highly resilient infrastructure, and in terms of consistency with the international development framework, the new wharf is in line with the ninth goal of the Sustainable Development Goals (SDGs), “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation” in that it developed a highly resilient infrastructure.

This project is consistent with Tonga's development policy and sector plans at the time of planning and ex-post evaluation, and is also responsive to development needs. In addition, although no specific linkage or synergy with JICA projects or other donors' projects was envisioned and no specific outcomes were confirmed, this project was judged to be in line with Japan's ODA policy at the time of planning.

Therefore, the relevance and coherence of this project are high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

This project involved the construction of a new domestic passenger terminal, wharf, and basin at the Port of Nuku'alofa. Specific components planned and implemented were as follows.

Table 2: Planed and Actual Components of the Project

Facility	Plan	Actual
Breakwater	Extension: approx. 250 m	253 m
Wharf	3 berths (2 berths L = 90 m, 1 berth L = 135 m)	3 berths (2 berths L = 90 m, 1 berth L = 135 m)
Boarding ramp	2 locations	2 locations
Ancillary facilities	Mooring poles, fenders, car stops, etc.	38 mooring poles, 34 fenders, 88 car stops, etc.
Routes and basin	Dredging (water depth -4.0 m)	Dredging (water depth -4.0 m)
Cargo handling yard	Including 8 LED yard lighting lamps	Including 8 LED yard lighting lamps
Passenger terminal building	Building area 2,100 m^2, solar panel	Total area of 2,100 m^2, solar panel
Entry road, parking lot	Asphalt pavement, road lighting	Asphalt pavement, for 102 cars
Exterior	Sidewalks, covered passenger walkways, drainage ditches, fences, green space	Sidewalks, covered passenger walkways, drainage ditches, fences, green space
Security guard room, garbage collection point	One-story building, 2 locations each	One-story building, 2 locations each
Navigation aids	2 beacon lights, 1 guiding light	2 beacon lights, 1 sector light

Source: Preparatory survey report and materials provided by JICA

The items borne by the Japanese side were generally implemented as planned. However, the following main changes were observed.

- Change in length and wall thickness of passenger terminal building foundation piles (to avoid future problems due to lack of support)
- Modification of the fence enclosure extension in the embankment area (due to the need to enhance the privacy of facilities and residences in the vicinity of the new wharf)
- Change in the reclamation height at the boundary with the adjacent Faua Wharf and associated change in drainage plan (changes associated with the development of the exterior of the building)
- Change of kitchen layout and furniture specifications in the passenger terminal building

The above changes were made to further enhance the durability, safety, and convenience of the project facilities, while taking into consideration the facilities and residents living near the wharf.

In addition, as the items to be borne by the Tongan side, it was agreed between the two countries to mainly implement the following items.

- Obtaining environmental permits, construction and installation permits, implementing

tax exemptions, and covering banking fees

- Provision of temporary yards
- Disposal of wrecks and miscellaneous materials in Faua Wharf
- Implementation of related work (planting work, installation of poles for power distribution, installation of electricity meters, telephone internet wiring work)

In fact, it has been confirmed that all of these items borne by the Tongan side were implemented as scheduled, and there were no particular problems.

Solar panels on the roof of the passenger terminal building
(Photo by External Evaluator)

Covered passenger walkway
(Photo by External Evaluator)

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was planned to be 3,336 million yen, consisting of 3,320 million yen for the Japanese side and 16 million yen for the Tongan side.

The actual project cost on the Japanese side was 3,209 million yen (construction cost: 3,028 million yen, design and supervision cost: 180 million yen), although it was difficult to ascertain the amount borne by the Tongan side. Therefore, in this ex-post evaluation, only the project cost on the Japanese side was used. Although the cost borne by the Tongan side included the cost of office furniture and refrigeration/freezers, it was confirmed that these were actually installed at the direct expense of the shipping companies and tenants that occupied the building.

Based on the above, the actual amount of this project was 97% of the plan, which was within the plan.

3.2.2.2 Project Period

The period for this project was planned to be 33 months, including the detailed design and bidding period. The actual project duration was 34 months, from June 2015 to March 2018, as shown below.

Grant agreement signed: June 2015
Detailed design period: July 2015 - December 2015 (including bidding period)
Construction period: February 2016 - March 2018

In fact, due to the impact of the construction interruption caused by the super cyclone that hit Tonga in February 2018 (Instantaneous maximum wind speed: 78m/s), construction was completed in June 2018, and additional work was carried out until December 2018 to restore the damage and prevent future damage. In addition to the suspension of construction due to the cyclone damage, the project was also required to undergo multiple modifications during pre-completion inspections, making it difficult to complete construction as originally planned; however, the project was expected to be delivered in March 2018 without damage from the cyclone. Therefore, it can be said that the completion of the project was possible in March 2018. As described above, the project completion was determined to be March 2018 and the project period was judged to be 34 months from June 2015 to March 2018 (103% of the plan).

Based on the above, it can be said that the actual period for this project slightly exceeded the plan.

The output of the project was almost as planned. Although the actual project cost on the Tongan side was unknown, the project cost on the Japanese side was within the plan. The project period, excluding external factors such as the damages caused by the super cyclone, was slightly longer than the planned period.

Therefore, the efficiency of the project is high.

3.3 Effectiveness and Impacts[4] (Rating: ②)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects

At the time of project planning, the project's operation and effect indicators were set at 90 times/year, 45,000 tons/year, and 45,000 passengers/year for the number of 1,500-ton class vessel leaving and arriving at the new wharf, the volume of cargo handled, and the

[4] The impact is also taken into account in determining the effectiveness of the rating.

number of passengers carried, respectively. The actual values of these indicators were confirmed in the ex-post evaluation and are shown in Table 3.

Table 3: Target and Actual Values of Effect Indicators of the Project[*1]

		Baseline value	Target value	Actual (fiscal year[*2])			
		2014	2021	2018/19	2019/20	2020/21	2021/22
			3 Years After Completion	Completion Year	1 Year After Completion	2 Years After Completion	3 Years After Completion
Number of 1,500-ton class vessels berthing and unberthing at the new wharf (times/year)[*3]	TTIV[*4]	0	90	0	0	0	97
	QS[*5]			149	67	111	0
	Total			149	67	111	97
Volume of cargo handled at the new wharf (tons/year)	TTIV	0	45,000	2,449	8,158	14,016	19,509
	QS			21,977	12,640	11,773	0
	Total			24,426	20,798	25,789	19,509
Number of passengers at the new wharf (persons/year)	TTIV	0	45,000	33,056	22,110	22,346	44,754
	QS			30,842	15,877	26,948	0
	Total			63,898	37,987	49,294	44,754

Source: Ex-ante Project Evaluation Paper, data provided by PAT

Note 1: All target and actual values for indicators are for domestic routes.

Note 2: The data held by the executing agency were compiled on a fiscal year basis (July to June of the following year), so the actual data are for the fiscal year.

Note 3: The indicator at the time of planning was the number of berthing, but since only the number of berthing and unberthing was available as an actual value, the indicator was changed to the number of berthing and unberthing, and the target value was changed from "number of berthing: 45" to "number of berthing and unberthing: 90."

Note 4: The official name of the new domestic wharf developed in this project is The Taufa'ahau Tupou IV Domestic Wharf, named after the former king.

Note 5: Abbreviation for Queen Salote International Wharf; the 1,500-ton vessel MV Otuanga'ofa used part of this wharf until mid-2021.

As for the status of each indicator at the time of ex-post evaluation, the number of 1,500-ton class vessels berthing and unberthing at the new wharf and the number of passengers at the new wharf reached the target values, while the volume of cargo handled at the new wharf fell far short of the target value.

The only 1,500-ton class vessel in Tonga's domestic shipping fleet is MV Otuanga'ofa, which was provided through grant aid in the past, and the new wharf (TTIV Wharf), which was developed through this project, has been in use practically since FY 2021/22. Since the vessel was using the Queen Salote Wharf (QS Wharf) until FY 2020/21, the effects of the new wharf were not realized until three years after the completion of the project[5]. The water depth inside the new wharf is four meters at low tide, which is considered sufficient for

[5] However, cargo handling and passenger use of the new wharf had already started by several domestic vessels of less than 1,500 tons other than MV Otuanga'ofa, and some of the effects of the new wharf had already been generated.

MV Otuanga'ofa with a draft of three meters. However, the Friendly Islands Shipping Agency (FISA), which operates the vessel, took the position that the water depth was not necessarily sufficient and that sufficient dredging by the dredger[6] purchased by PAT was essential for the new wharf to be put into service, given the safety concerns for navigation. The MOI, on the other hand, stated that since the project was carried out as planned and the water depth was sufficient, FISA should have started using the new wharf earlier. After various adjustments, a berthing test of MV Otuanga'ofa at the new wharf was conducted in 2021, which confirmed that the wharf could be used safely, and FISA subsequently moved from the QS Wharf. Although it was difficult to make a technical judgment in the ex-post evaluation on whether the water depth of the berthing area was sufficient, the evaluation of the project effects, including the amount of cargo handled and the number of passengers, concluded that the effects of the project were significantly delayed.

The volume of cargo and passengers handled domestically is expected to increase to 45,000 tons and 45,000 passengers at the new wharf once the project was completed, and the 1,500-ton class and smaller vessels that had been using a portion of the QS International Wharf were completely transferred to the domestic wharf. However, for the domestic wharf, there is also Faua Wharf in addition to the new wharf, and not all domestic passenger and cargo transport was moved to the new wharf[7], as Faua Wharf continued to be used by smaller vessels[8]. Furthermore, with the global spread of COVID-19 from the beginning of 2020, severe travel restrictions and other measures were implemented even within Tonga, which had no infected cases at the time, resulting in a decrease in the number of voyages, limiting the number of passengers per voyage[9], and the suspension of operations following the massive eruption in early 2022. They limited the use of the new wharf, and as a result, the volume of cargo handled, in particular, fell far short of the target. Although some of these factors are considered to have been caused by force majeure, as a whole, some aspects of the project did not necessarily produce the effects as originally envisioned.

3.3.1.2 Qualitative Effects

When this project was planned, it was assumed that the implementation of the project would have the following four qualitative effects: (1) shortening the time for large vessels to berth and unberth, (2) improving the efficiency of cargo handling at the new wharf by

[6] The dredger was purchased in 2020 and more than two years had already passed since the project was completed.
[7] The difference between Table 1 and Table 3 shows the volume of cargo handled at Faua Wharf, which was 4,675 tons in FY 2021/22. In addition, as shown in Table 1, the domestic cargo volume for Tonga as a whole itself was less than 45,000 tons.
[8] The TTIV wharf was designed for relatively large vessels carrying domestic transport, and the wharf is too high for smaller vessels. Therefore, it was assumed that small vessels would continue to use Faua Wharf.
[9] Antigen tests were also conducted for domestic travels, especially in outer islands where the medical system is weak.

improving the yard and organizing cargo and passenger flow lines, (3) improving passenger comfort by improving the waiting room at the new wharf, and (4) ensuring passenger safety by installing a dedicated passenger walkway at the new wharf. The status of these effects confirmed at the time of ex-post evaluation was as follows.

(1) Reduction in berthing and unberthing time for large vessels
Although no record of the time required for berthing and unberthing was available, the new wharf provides ample turning space and quay walls of appropriate height, allowing for more efficient berthing and unberthing operations. As a result, it can be said that time savings have been realized.
(2) Improvement of cargo handling efficiency in the new wharf through yard development and rearrangement of cargo and passenger flow lines
It was confirmed that cargo and passenger flow lines were separated and that multiple vessels can work on cargo handling at the same time.
(3) Improvement of passenger comfort by upgrading the waiting area at the new wharf
Compared to the situation before the project was implemented, visitors can now wait for ferry departures in the waiting room with ample space, regardless of weather conditions.
(4) Ensuring passenger safety by installing a passenger walkway at the new wharf
Even under bad weather conditions, nothing affects both loading and unloading of cargoes, which improved both safety and comfort.

As described above, the qualitative effects envisioned at the time of planning have been fully realized in all areas.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The implementation of this project was expected to increase revenues from the terminal building at the new wharf and to have economic effects through employment promotion, etc., and to revitalize cargo and passenger transportation at Nuku'alofa Port as a whole.

In Tonga, the status of revenue increase and employment increase specific to the new wharf alone were not ascertained, and it was not possible to conduct a quantitative analysis in the ex-post evaluation. However, as indicated in the “Effectiveness” section, it is considered that sufficient economic benefits have not been generated through this project as the use of the new wharf was limited until FY 2020/21, and the project was also negatively affected by the COVID-19 and the massive volcanic eruption. Regarding

domestic cargo and passenger transportation, it was confirmed that the inefficient transportation situation before the project was implemented has been improved through the consolidation of the domestic cargo and passenger transportation bases in the entire Nuku'alofa Port to the new wharf and the adjacent Faua Wharf, but the volume of cargo and passenger transportation has not increased due to the effects of COVID-19 and the massive volcanic eruption.

Therefore, no particular economic effects or revitalization of cargo and passenger transport generated by the new wharf was confirmed at the time of ex-post evaluation, although it is expected that the anticipated impacts will become apparent in the future in domestic transport as cargo and passenger demand will increase due to the significant relaxation of entry restrictions in Tonga from August 2022.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

At the time of planning, the project was not large-scale, and its undesirable effects on the environment were judged to be not significant in the "JICA Guidelines for Environmental and Social Considerations" (April 2010), and the project was not going to be implemented in the area with sensitive characteristics and sensitive areas as listed in the Guidelines. The project was classified as Category B.

An Environmental Impact Assessment (EIA) was conducted before the project implementation and approved by the Ministry of the Environment in March 2015, prior to the commencement of the project. No special conditions were imposed, and as normal pollution countermeasures, it was planned that the contractor would perform regular vehicle inspections and maintenance and watering for air quality, install anti-pollution diffusion membranes for water quality, use low-noise equipment for noise and vibration, and implement regular inspections and maintenance of construction equipment and vehicles. In addition, MOI and PAT would work together to conduct regular turbidity and coral monitoring.

The ex-post evaluation confirmed that all of these items planned at the time of planning had been implemented. As for the compliance with the EIA during project implementation, according to the Department of Environment, regular checks were conducted by the officer in charge[10] and adequate measures were taken. In addition, even after the project was put into service, sewage was treated in septic tanks and subsequently collected and disposed of by the Waste Authority Limited. The conditions of corals were monitored through a

[10] Since no standards have been set in Tonga, the inspections were conducted in accordance with the standards set by Australia/New Zealand for air quality, noise and vibration, and the World Health Organization (WHO) for water quality, according to the inspectors.

diving survey once during the project as well as after the project was completed, and no particular problems were identified. It was also confirmed that no complaints had been received from residents regarding the natural environment.

Based on the above, it is considered that measures to mitigate impacts on the natural environment were implemented as planned in this project, and that adequate measures were taken as a whole. No particular negative impacts on the natural environment have occurred after the completion of the project, and there are no particular concerns.

2) Resettlement and Land Acquisition

Since this project was located in the port area owned and managed by the Tongan government, no land acquisition or resettlement was required. At the time of planning, there was a group producing materials for a traditional costume called Ta'ovala at the project site, and as a result of public hearings and adjustments, the group was going to move its base of operations to the west of the capital Nuku'alofa. The ex-post evaluation confirmed that the group moved its base to the west of Nuku'alofa and continued its activities as originally planned.

3) Gender Equality, Marginalized People, Social Systems and Norms, Human Well-being and Human Rights

The facilities developed in this project are designed and constructed to fairly benefit all people who travel domestically by ship, regardless of gender or age, and to enable those with mobility difficulties to move between the first and second floors by installing a ramp in the terminal building. In this regard, it can be said that there are no gender-related issues and no one is prevented from equitable social participation.

Although there was nothing of note in terms of social systems, norms, human well-being, or human rights, the waiting area in the terminal building is wide and has a high ceiling, so it was used for various parties, receptions, and other occasions besides its original purpose, where people could have a good time.

Waiting area used for reception
(Photo by External Evaluator)

4) Other Positive and Negative Impacts

As previously mentioned, Tonga experienced a massive eruption in January 2022, which caused very extensive damages, including the temporary disruption of communications.

The new wharf was also partially damaged by the ash fall caused by the eruption, as well as by the tsunami that swept through the area. However, the damage was minimal, and it subsequently played a central role in transporting relief supplies to the heavily damaged outer islands (especially the Ha'apai Islands) and in the evacuation of people in the outer islands to Tongatapu Island. In this respect, the new wharf was resilient to disasters and played a major role in the transportation of goods and passengers in the reconstruction after the massive volcanic eruption.

The effectiveness of the project was confirmed by the fact that the qualitative effects were fully realized, but there was a significant delay in the realization of the quantitative effects, and that the volume of cargo handled was well below the target level, even taking into account the influence of COVID-19 and the massive volcanic eruption.

Regarding the impacts, the economic effects and the revitalization of cargo and passenger transport were not fully observed. Although there were factors such as the restrictions on travel due to concerns over the outbreak and spread of COVID-19 and restrictions on operations due to the occurrence of the huge volcanic eruption, the wharf was not utilized at the expected level at the time of the ex-post evaluation due to delays in the relocation of MV Otuanga'ofa. There were no negative impacts for each of the other positive and negative impact items, and the impacts were being generated as expected.

Based on the above, it is concluded that the effectiveness and impact of the project are moderately low.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

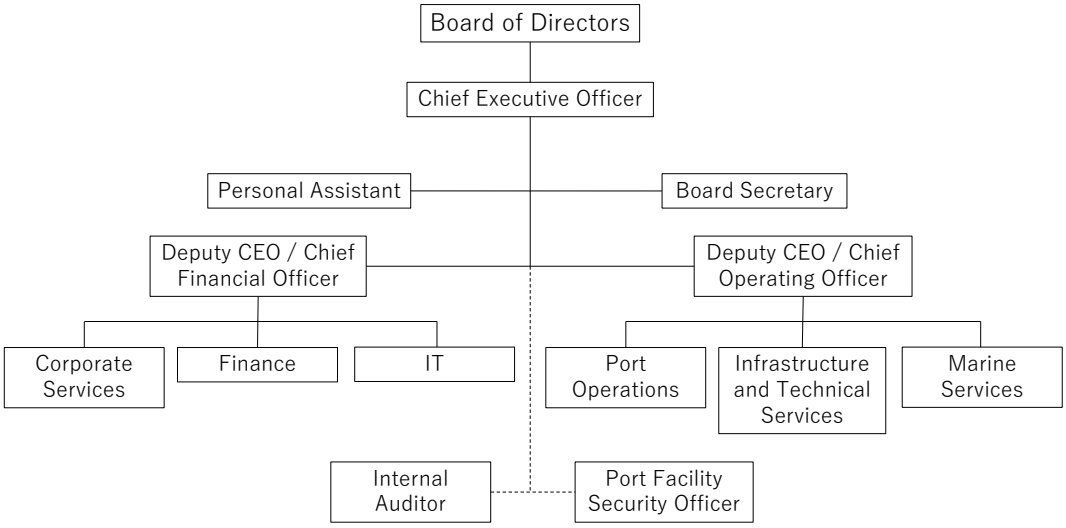
As verified in the "Relevance" section, the *Tonga Strategic Development Framework* (2015-2025) and the *National Infrastructure Investment Plan* (2013-2023) remain valid planning documents at the time of the ex-post evaluation and are highly consistent with the project. In addition, other MOI and PAT management plans remain valid. In terms of port administration, operation and maintenance, there is no change in the system whereby the MOI is responsible for the administration of shipping infrastructure, while the daily operation and maintenance of Nuku'alofa Port is managed by the PAT.

Based on the above, it can be said that the policy and systems sustainability of this project is high.

3.4.2 Institutional/Organizational Aspect

Although the MOI was the executing agency for the project, PAT is responsible for the operation and maintenance of the developed facilities. PAT was established under the Ports

Authority Act of 1998 as a commercial company style entity; as of June 2022, it has 144 full-time employees and two temporary employees[11].



Source: Prepared from PAT 3-Year Business Plan

Figure 1: PAT Organization Chart

Nuku'alofa's ports are managed in an integrated manner by PAT, with no distinction made between international and domestic ports. As shown in Figure 1, the operation and maintenance of the port is mainly carried out by a total of 75 personnel in three divisions: port operations, infrastructure and technical services, and marine services. The number of employees required for smooth operation and maintenance of the port is generally sufficient. As for the electromechanical maintenance, PAT has not been able to secure staff with sufficient knowledge and skills within the organization to adequately diagnose the situations, but the actual maintenance work is outsourced to Tonga Power Limited, Tonga Communications Corporation, and private companies as needed, and the necessary measures are being taken.

Based on the above, it can be said that PAT is responsible for the operation and maintenance of the domestic wharf developed under this project, and that it operates under the adequate organizational structure and number of staff. However, it is necessary to fill the vacant posts with appropriate personnel in due course.

3.4.3 Technical Aspect

No major breakdowns or malfunctions have occurred in the facilities developed by the project, and no technical problems were found in conducting routine inspections and repairs.

[11] There were additional 24 posts which were vacant at the time of ex-post evaluation.

The technical capabilities of the divisions in charge of operation and maintenance are considered sufficient. It was also confirmed that PAT provides training for its staff at its own expense by inviting outside lecturers every year in the fields of mechanical engineering, information and communication, plumbing, and electricity.

Therefore, the sustainability of the outcomes in terms of the technical aspect is judged to be high.

3.4.4 Financial Aspect

PAT's income and expenditure for FY 2016/17 through FY 2020/21 were as shown in Table 4.

Table 4: PAT Operating Income and Expenditure

(Unit: thousand pa'anga)

Fiscal year	2016/17	2017/18	2018/19	2019/20	2020/21
Income	13,390	12,273	13,425	12,099	12,135
International cargo	11,093	10,278	10,995	9,462	10,005
Domestic vessel	385	371	306	366	317
Other	1,912	1,624	2,124	2,181	1,813
Expenditure	8,560	7,997	9,015	9,195	9,054
Depreciation and amortization	1,972	2,071	2,044	2,301	2,583
Administrative expenses	3,661	3,051	2,974	2,922	3,005
Of which, repair and maintenance	*411*	*262*	*719*	*371*	*596*
Personnel expenses	2,927	2,875	3,997	3,972	3,467
Operating balance	4,830	4,277	4,409	2,905	3,081
Financial expenses and taxes	1,278	1,088	1,098	850	891
Net profit	3,552	3,189	3,311	2,055	2,190

Source: PAT annual reports for each fiscal year (July to June of the following year)

PAT posted a positive financial result in FY 2020/21 (July 2020-June 2021), and has consistently been in a good financial position since FY 2016/17. The percentage of revenues from vessels on domestic routes is very small, with the majority coming from berthing fees and wharfage fees from international cargo vessels. The negative impact of COVID-19 was not significant, and the impact of the massive volcanic eruption was limited, therefore PAT is expected to continue to be profitable in FY 2021/22 and beyond.

The maintenance budget is shown in italics in Table 4. The fact that maintenance has been properly carried out, as described below, shows that the necessary amount of money has been invested, and there are no budgetary obstacles. No major repairs or replacements have been made to the facilities and equipment developed by the project, and no major repair costs have

been incurred. It is expected that relatively large-scale maintenance work will be required periodically in the future, and PAT will be able to provide the necessary budget for such work.

Based on the above, the financial sustainability of the project's outcomes is high.

3.4.5 Environmental and Social Aspect

In “3.3.2.2 Other Positive and Negative Impacts,” it was mentioned that coral growth monitoring was conducted once after the project was completed. However, periodic environmental monitoring is not planned or implemented.

3.4.6 Preventative Measures to Risks

As mentioned above, different agencies had different views on the depth of the basin, which also affected the effectiveness of this project, but since mid-2021, MV Otuanga'ofa has continued to use the wharf without any problems. PAT has a plan to measure the depth of the domestic wharf every three years and dredge as necessary, and similar risks are expected to be avoided in the future.

The damage to the wharf caused by the massive eruption in January 2022 was limited, but the tsunami caused some minor damages to the wharf as a result of the collision of anchored vessels with the wharf. Although there is no immediate operational impact, it is important to repair the damage as soon as possible.

3.4.7 Status of Operation and Maintenance

All of the facilities developed under the project, including breakwaters, dredged basin, wharf, ancillary facilities to the wharf, yard aprons, ramps, and navigation aids, were in good condition and use, except that some of the wharf was damaged by the massive eruption and the terminal building walls were partially stained. It was also confirmed that PAT installed additional navigation signs after the completion of the project to further enhance safety, given that the entrance of the new wharf has a coral shoal that is difficult to navigate.

Regarding the use of the new wharf, dredging was conducted once in 2020, and the full use by MV Otuanga’ofa began in mid-2021. It was also confirmed that all other vessels were using the new wharf. Although the usability of the wharf is generally good, some of the shipping companies expressed that there are problems in securing water and electricity, and they would like to see underground burial work so that they can be used by their vessels at the wharf.

Although the facilities developed under the project did not require advanced repair techniques, maintenance was carried out in the form of quarterly inspections based on the Assessment Forms, and repairs were made as necessary. However, repairs were not always carried out in a timely manner, and there were delays in taking measures to prevent corrosion

of the structural frame due to salt damage, especially in the terminal building located along the sea.

In this project, the stone materials for the installed breakwaters were to be those that can be secured in Tonga, and the yard lighting was also to be LED lights to reduce maintenance costs, and these were performing as expected. According to PAT, there were no problems in procuring parts and materials necessary for repairs. In the future, PAT as a whole plans to formulate an asset management plan that compiles the assets of the entire international and domestic wharves, and to develop a maintenance plan.

From the above, it can be said that all of the facilities and equipment developed in this project are in good operating condition, and as a whole, the operation and maintenance status is good.

Although there was no system to regularly monitor corals, water quality in the environmental aspect, it was confirmed that the sustainability of the project was high in terms of policy and system aspect, organization and institution aspect, technical aspect, financial aspect, risk response aspect, and operation and maintenance status. Therefore, as a whole, the sustainability of the project effects generated through this project is judged to be high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to improve the efficiency of international and domestic cargo handling operations and ensure the safety of passengers by constructing a new wharf for large domestic transport vessels at the port of Nuku'alofa, Tonga's capital. While there was no specific coordination or synergy expected between this project and other JICA projects or support from other organizations during the planning and implementation period of this project and the effects of inter-project linkages were not observed, the project was consistent with Tonga's development plan and needs at the time of planning and ex-post evaluation, and was also found to be consistent with Japan's ODA policy at the time of planning. Based on the above, its relevance and coherence are high. Regarding the project implementation, the outputs were mostly as planned, and although the project period slightly exceeded in real terms, the project cost was within the plan. Therefore, the efficiency of the project is judged to be high. Regarding the effectiveness of the project, while qualitative effects such as shortening of unberthing/berthing operations, improvement of cargo handling efficiency, improvement of passenger comfort, and assurance of safety were fully realized, the overall generation of quantitative effects was significantly delayed due to the substantial delay in the commencement of use of the new wharf by a large domestic transport vessel. In addition, one of the indicators, “volume of cargo handled,” was substantially lower than

the target, and economic effects and revitalization of cargo and passenger transport were not fully observed. Therefore, although there were some force majeure events associated with the global spread of the new coronavirus from the beginning of 2020 and the huge volcanic eruption in January 2022, the overall effectiveness and impact of the project as a whole were moderately low, as some aspects were not necessarily achieved as originally envisioned. Regarding the sustainability of the effects of the project, although the environmental monitoring system needs to be improved, no issues were found in terms of policy and system, organization and institution, finance, risk response, and operation and maintenance, and thus the sustainability of the effects of the project is considered to be high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Although the effects of the project were delayed by the fact that MV Otuanga'ofa did not begin to use for three years after the completion of the project, it was generally being effectively utilized at the time of ex-post evaluation. However, if further improvements are made in the following areas, it is expected that more stable operation of the facility and improved effectiveness will be observed.

<Human Resource Aspect>

By securing personnel in the electromechanical field within PAT, it will be possible to diagnose the operational status of equipment, etc., and to consider the best method of outsourcing inspections and repairs. In addition, since 14% of the established posts are vacant, it is necessary to make efforts to secure appropriate human resources.

<Environmental Aspect>

Since environmental monitoring after the completion of the project was limited, it is desirable that the monitoring plan be developed by the Department of Environment and PAT, and appropriate monitoring be conducted on a regular basis and necessary actions be taken according to the monitoring results.

<Operation and Maintenance Aspect>

The development of the asset management plan and the steady development and implementation of asset records and their maintenance plans are important for the long-term and proper management of the facilities and equipment. In particular, it is desirable to implement without delay anti-corrosion measures for the terminal building that is vulnerable to salt damage. In addition, since shipping companies using the wharf have expressed inconvenience in using electricity and water supply, it is important for MOI and PAT to consider measures to improve the quality of service to enhance convenience.

4.2.2 Recommendations to JICA

Because of the development of highly resilient facilities under the project, the facilities were not severely damaged during the massive eruption in January 2022, but some of the quay walls were damaged when anchored vessels were lifted up by the tsunami. Since the damage was caused by force majeure and not by deterioration due to PAT maintenance, it is desirable to confirm and discuss with PAT about the repairs to these damages from the viewpoint of long-term facility management.

4.3 Lessons Learned

Importance of consensus building through full consultation with all relevant agencies

In this project, the large vessel MV Otuanga'ofa did not enter the port for domestic transportation for three years after the completion of the project due to the difference in views of the related agencies on the water depth of the basin, which delayed the sufficient realization of the outcomes of using the constructed wharf. Although the project consultants worked closely with MOI, the executing agency, and PAT, the operation and maintenance agency, the project as a whole did not always reach a sufficient consensus on the use of the terminal building and water depth with FISA, the agency in charge of the vessel's operation, which was a particularly important aspect of the project. Although there were no problems from a technical standpoint, the fact that FISA's concerns were not fully dispelled led to the delay in the realization of the project outcomes. Therefore, when planning a similar project, it is important to obtain agreement on the details of the project through in-depth discussions with all the relevant organizations that play a particularly central role in the project, and to ensure that the executing agency continuously follows up on the project during its implementation to avoid any delays in the transfer of vessels from the existing wharf. It is important for the effective utilization of the facilities immediately after the completion of the project.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

This project was designed to create an environment for the smooth and safe use of the large domestic cargo vessel provided by Japan in the past and to separate international and domestic cargo handling operations. JICA provided appropriate project supervision from planning to completion for the development of the domestic maritime transportation hub. The project consultant and contractor also held regular progress report meetings with the executing agency and responded to the need for various changes. In particular, when the major cyclone hit the area towards the end of the project period, necessitating repair work and additional countermeasure

work, those related to JICA maintained appropriate contact with the executing agency and promoted the project.

5.2 Additionality

None.

(End)