

Federated States of Micronesia

FY2018 Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for Improvement of Domestic Shipping Services”

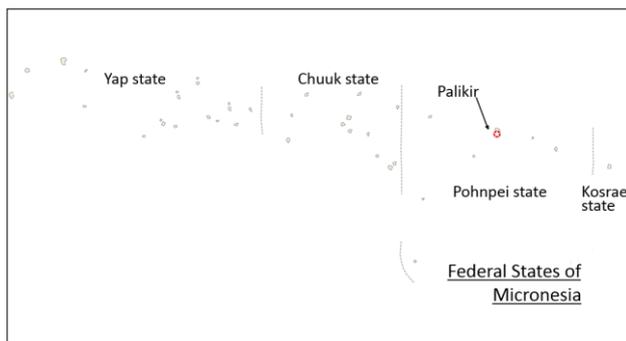
External Evaluator: Hisae Takahashi, Ernst & Young ShinNihon LLC

0. Summary

The project was conducted to improve domestic transport services by building new cargo passenger vessels and procuring equipment for maintenance for maritime transport in the Federated States of Micronesia (FSM), thereby contributing to stabilizing the lifeline of the FSM. The purpose of the project is consistent with the FSM’s development plan, which emphasizes securing access from outer islands to islands with social infrastructure, development needs for procurement of new cargo passenger vessels for safe and efficient operation, and Japan’s ODA policy, which emphasizes support for securing the transportation network. Thus, its relevance is high. Both project cost and the project period were within the plan, therefore the efficiency of the project is also high. Thanks to the building of Micronesia Navigator (M/N), an operation system with two vessels including the existing cargo passenger vessel, Caroline Voyager (C/V), which was the only vessel operating in the country at the time of planning, has been launched. This made it possible to secure days for maintenance of C/V and led to an increase in the number of operating days and port call frequency to remote islands. It has also contributed to generating impacts such as the stabilization of the supply of living goods to outer islands and lifelines, and the improvement of the convenience of traveling between major islands and outer islands. Although the number of breakdown/stoppage days due to the failure per year did not achieve the target value, it can be said that the planned effects were generally achieved when considering the problems which occurred unexpectedly and the appropriateness of the target value set at the time of planning. Hence, the effectiveness and impact of the project are high. Although the organizational system for maintenance is clear and a certain budget is allocated, there is some room for improvement regarding the personnel shortage in the department responsible for maintenance and the awareness of preventive maintenance of the M/N crew. Therefore, the sustainability of the project effects is fair.

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

1. Project Description



Project Location (Whole islands of the FSM)



Constructed Micronesia Navigator

1.1 Background

FSM is a free association state which consists of four states, namely Yap, Chuuk, Pohnpei and Kosrae state. It consists of 607 volcanic islands and atolls scattered about 2,500 km from east to west, and 111,064 people (2010) lived on these scattered islands. About 17% of them live in the outer islands, and maritime transportation is indispensable for transportation of islanders, shipping of daily goods, and provision of health care services as a means of transportation linking the islands. Meanwhile, most of the vessels belonging to the FSM government in 2010 were over 30 years old and were inoperable due to problems such as aging and deterioration. At that time, the only cargo passenger vessel operated continuously was C/V, which was constructed under the Japanese Grant Aid in 1996. Although C/V served as an important lifeline for the residents of the outer islands by transporting passengers and cargo, during the busy season there were many cases in which the number of passengers wishing to board exceeded the licensed passenger capacity, which often risked unsafe operations due to overcapacity. In addition, despite the fact that daily maintenance was being carried out properly, sufficient time could not be secured for maintenance works at a port since there was no alternative vessel. Moreover, when a vessel broke down or dock maintenance¹ was conducted every two years, it was impossible to transport people and supplies to the outer islands other than by a non-registered chartered ship owned and operated privately that did not meet safety standards².

Given this situation, it was recognized that safe and reliable maritime transportation was essential for the FSM, where outer lands are dispersed. With the aim of strengthening cargo and passenger transport, Grant Aid was implemented to procure a new cargo passenger vessel and provision of maintenance equipment to C/V.

¹ To carry out maintenance by lifting vessels in the shipyard.

² Source: Preparatory survey report

1.2 Project Outline

The objective of this project is to improve domestic transportation service by building a new cargo passenger vessel as well as procuring the equipment for maintenance for maritime transport in the FSM, and thereby contribute to stabilizing the lifeline of the FSM.

Grant Limit / Actual Grant Amount	1,100 million yen / 846 million yen
Exchange of Notes Date /Grant Agreement Date	August 2013 / August 2013
Executing Agency	Department of Transportation, Communication and Infrastructure
Project Completion	April 2015
Target Area	Whole islands of the FSM
Main Contractor	Kegoya Dock Co., Ltd
Main Consultant	Fisheries Engineering Co., Ltd
Preparatory Survey	February – August 2013
Related Projects	<p>【Grant Aid】</p> <ul style="list-style-type: none"> • The Project for Construction of the Inter-Island Vessel for Outer Island Fisheries Development (1996) <p>【Government of China】</p> <ul style="list-style-type: none"> • Provision of Passenger cargo vessel : Chuuk state (2004), Yap (2007)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young ShinNihon LLC

2.2 Duration of Evaluation Study

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

Duration of the Study: October 2018 – October, 2019

Duration of the Field Study: January 13– January 31, 2019

3. Results of the Evaluation (Overall Rating: A³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Consistency with the Development Plan of the FSM

At the time of planning this project, the FSM's development policy, *Strategic Development Plan (SDP) (2004-2023)*, set improving education and health conditions through strengthening basic services as one of the main issues. Therefore, it was also necessary to develop the social

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ②: Fair, ①: Low

infrastructure not only in the main island but also in the outer islands. However, since it is impossible to develop all the infrastructure in all outer islands with small population, emphasis has been placed on securing access from outer islands to the areas with social infrastructure as a practical measure. In the *Infrastructure Development Plan (IDP) (2004-2023)* formulated by the Department of Transportation, Communication and Infrastructure based on the SDP, "promoting the procurement of modern, safe and efficient interstate and interisland cargo passenger vessels" was raised as the development objective for the maritime field⁵.

As SDP is a long-term development plan from 2004 to 2023, there is no change at the time of ex-post evaluation, and securing access to outer islands continues to be a priority in the FSM. Although the *IDP (2016-2025)*, which is a sector plan, has been revised, the content of its predecessor *IDP (2004-2023)* has been basically inherited, and the importance of interstate and interisland cargo passenger vessels is still clearly stated.

As mentioned above, FSM's development policy has focused on securing access from outer islands from the time of planning to the time of ex-post evaluation. This project was to build a cargo passenger vessel, which is the only means to connect the outer islands and the capitals of each state, therefore, the consistency with the development policy is confirmed.

3.1.2 Consistency with the Development Needs of the FSM

In the FSM, an island nation with 608 islands and atolls, interisland liaison vessels support the lifeline of outer islanders, who account for 17.4% of the total population (2010). In the country, the Federal Government, Pohnpei, Chuuk and Yap states operated a total of five vessels, and C/V was procured with a grant in 1998, thus a total of six vessels were in operation. However, these became inoperable one after another after 2002 due to deterioration and submersion, and all five vessels other than C/V became non-operational in 2005. As a result, the operation of only one vessel meant there was no choice but to transport passengers far exceeding the capacity, especially before and after the school's long vacation. In addition, since it was necessary to operate a route previously carried by six interisland vessels with only one vessel, the proper operation and maintenance at the home port required during the voyage was hindered, thus there were concerns that serious failures may occur⁶. Therefore, in order to support the life and medical care of outer islanders and secure learning opportunities, the safe and stable voyage of vessels linking outer islands was necessary, and the enhancement through new vessels in addition to C/V, the existing interisland vessel, and strengthening interisland freighter transportation in the FSM were considered urgent issues.

Information on the population of the main island and outer islands has not been updated since 2010; however, according to the *IDP (2016-2025)*, there have been no significant

⁵ Source: Preparatory survey report

⁶ Source: Preparatory survey report

changes in the population and its distribution (proportion of outer islanders in the total population)⁷. In addition, the lifeline of outer islanders continues to be supported by cargo passenger vessels, thus, in addition to C/V, the only vessel operating at the time of planning, M/N built in this project has begun operation, and those two vessels are operating as interisland shipping vessels. Although the situation has improved since M/N started operation, the number of vessels that are the means of travelling for people and transport of the materials needed for the livelihood of many remote islands scattered in each state has never been sufficient. Accordingly, the two vessels are almost in full operation.

As mentioned above, the importance of domestic marine transportation as a lifeline for outer islanders who have depended on cargo vessel passengers for access to food, living goods and hospitals necessary for life is judged to be very high from the time of planning to the time of ex-post evaluation. In spite of this, even at the time of the ex-post evaluation, C/V and M/N are the only cargo passenger vessels that regularly operate between islands in the country. The two vessels have continued to be in full operation, meaning that a large need for freighters in the country can be confirmed.

3.1.3 Consistency with Japan's ODA Policy

The *Country Assistance Policy for the FSM (2012)* clearly stated that the development of important economic infrastructure and improvement of basic social services would be supported. The *JICA Country Specific Analysis Paper (March 2012)* for the Oceania region also found that transport infrastructure is an essential lifeline not only for import and export but also for the transport of goods and travel to outer islands for Pacific island countries. One of the five pillars of the "Okinawa Kizuna Declaration" adopted at the "6th Pacific-Island Summit" held in 2012 (May 2012), "Sustainable development and human security," also stated that it would continue to develop high-quality infrastructure to secure a reliable transportation network⁸. Therefore, as mentioned above, the project, which aims to contribute to the domestic maritime transport of the country through the provision of cargo passenger vessel, is consistent with Japan's assistance policy to the FSM and the Pacific region.

3.1.4 Appropriateness of the Project Plan and Approach

Through interviews with the executing agency in this ex-post evaluation, it was reported that the executing agency is considering replacing M/N engine. It was explained that due to lack of engine power capacity, the speed in bad weather is slow, raising safety concerns⁹. With

⁷ Compared with the population in 2010, there is almost no increase in population by 2030, and the population increase in 2050 is estimated to be less than 10%. It is also assumed that there is no significant change in domestic distribution. (Source: *Infrastructure Development Plan FY2016-2025*)

⁸ Source: Ex-ante evaluation report

⁹ However, at the time of the ex-post evaluation, funding has not been secured, and the specific timing for the change has not been fixed yet.

regard to the engine power procured at the time of planning, the needs of the executing agency, the understanding of safety, insufficiency of the engine capacity, and the appropriateness were confirmed with the consultant. Their answers were as follows:

- The engine output of M/N (maximum speed 10.5 knots¹⁰) is the general capacity of cargo and passenger vessels operating in the Oceania region. The same specs were used for C/V and Micro-Glory, which had been operated in the past in Chuuk state.
- The executing agency mentioned that there is a safety issue since M/N cannot pass over the certain wave height during the bad weather given that her horsepower does not provide enough speed increase to sufficient level. . On the other hand, when safety is taken into consideration, general practice is to postpone operation or reroute based on conditions such as wave height in bad weather. Therefore, it is difficult to consider this as a safety problem that the speed does not increase during bad weather.
- At the request of the FSM, the specifications were also agreed upon with the Permanent Secretary of the previous administration (with the minutes signed by both parties), and the vessel was procured.

Given the above explanation, the problem when considering safety is not necessarily the one caused by the engine capacity, and since both the FSM and the Japanese side agreed upon the specifications at the time of planning, it can be said that there is no particular problem with the relevance of the project plan.

In the light of the above, this project has been highly relevant to the FSM's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

【Japanese side】

This project consists of building of cargo passenger vessel, procuring of equipment, and consulting services. Table 1 shows the planned and actual outputs of this project. Spare parts for maintenance of C/V and M/N and the number of invited crew on board M/N from Japan were added, but the output was almost as planned except for these.

¹⁰Knot is a unit of speed, which is the speed to travel one nautical mile (1.852 km) per hour.

Table 1 Planned and actual outputs ^{note 1}

Items	Plan	Actual
Cargo passenger vessel Types of the vessel Length overall Breadth, molded Depth, molded Service draft Gross tonnage Main engine Loaded speed Number of passenger Cargo hold PMP spare parts	One vessel Cargo passenger vessel (Domestic water of the FSM) 59.0 m 10.8 m 4.6 m 3.5 m 920 tons 6EY17W (2) , 374kW x1,350 rpm ^{note2} 10.5 knots 425 persons 700m ³ 1 set	As planned ^{note 3}
Equipment Workboat PMP spare parts for C/V	1 boat Outboard motor (3) (including 1 spare motor)	As planned
Equipment (spare parts) additionally procured for : C/V's main engine C/V's generator engine Equipment for C/V M/N's main engine M/N's generator engine	—	RATO flexible coupling (2) Cooling water temperature control valve (2) Cooling water temperature control valve(2) Work boat (2) Zinc anode (250) Anti-corrosive (30) Fuel oil filter element (20) Lube oil filter element (20) Zinc anode (50) Anti-corrosive (30) Fuel oil filter element (20) Lube oil filter element (20)
Consulting Services	Prepare the tender documents, Assistance in the tender bidding and contractual phases, Supervision of the vessel construction.	As planned

Source: Preparatory survey report, documents provided by JICA, responses to a questionnaire to the executing agency and interview with the consultant

Note 1: Number in parentheses indicates quantity.

Note 2: 6EY17W is model, 374kW is output, and 1,350 rpm is rotation speed.

Note 3: Strictly speaking, the actual cargo storage capacity was 732 m³ and the draft was 3.6 m, exceeding the plan. However, according to the consultant, when showing the figures in the planning stage were rounded off, thus the volume and draft of the cargo storage can be said to have been output as planned.

The reasons for the change are as follows regarding the additional spare parts and the increase in number of invited crew members at the time of the transport sailing from Japan. It can be concluded that both were necessary and appropriate increases for the stable operation of the vessels expected at the time of planning. Also, there has been no impact on

the project cost and project period due to those changes.

【Changes in the output】

(1) Change: Additional procurement of the spare parts

(Reason) When the consultant attended the periodic inspection of C/V and examined the disassembled main and generator engine, defects not found in the visual inspection in the site survey were found. Specifically, the flexible coupling of the engine and the propeller shaft was worn out and needed to be replaced soon. A determination was made to procure spare parts because it takes about six months to purchase the flexible coupling and the vessel may not operate if the part is broken. In addition to the flexible coupling, spare parts (water temperature control valves, anti-corrosive, filter elements, etc.) for which recognized of the decline in functionality were additionally procured¹¹.

(2) Change: Increase in the number of the FSM crew joining the transport sailing from Japan to the FSM from three to six

(Reason) The interpretation of the STCW International Convention¹² was clarified by the Ministry of Land, Infrastructure, Transport and Tourism, and the requirements previously not applicable to commercial vessels became applicable to M/N. It became apparent that it was not possible to meet the requirements of the voyage with only the crew originally planned. Therefore, in order to meet the requirements for the return vessel from Japan to the FSM, it was decided to increase the number of invited crew members of the FSM from three to six¹³.

【The FSM side】

The following five items were implemented by the FSM as planned¹⁴.

- 1) Conclusion of Banking Arrangement with an authorized foreign exchange bank in Japan, issuance of a authorization to pay, and bearing necessary commissions to the bank, for the contracts verified by JICA in relation with this Project
- 2) Acquisition of all licenses and certificates of the Government of FSM, necessary for the Project, e.g. Provisional Certificate of Nationality, Radio Station License etc.
- 3) Exemption of the new vessel and equipment from customs duties, internal taxes and fiscal levies, and prompt customs clearance.

¹¹ Source: document provided by JICA, interviews with executing agency and the consultant

¹² Abbreviation of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers. Seafarers engaged in ship operation are required to hold qualifications corresponding to the captain, chief engineer, etc. under the international treaty, and the international standards for qualification are defined in the STCW treaty.

¹³ Source: document provided by JICA, interviews with the executing agency and the consultant

¹⁴ Source: document provided by JICA, responses to questionnaire by the executing agency

- 4) Exemption of Japanese nationals from customs duties, internal taxes and fiscal levies for their services in FSM.
- 5) Maintenance of storage for large spare parts pertaining to preventive maintenance management system.



(photo) Space for passengers



(photo) Control room

3.2.2 Project Inputs

3.2.2.1 Project Cost

The Japanese side's share of the project was 846 million yen compared to the exchange note (E/N) limit of 1,100 million yen; thus, costs on the Japanese side were within the plan (77% of the plan). The reason is the difference between the bidding price (contract amount) and the planned amount. The input from the FSM side was 0 at the time of planning, and the result was in line with the plan. In addition, a revision in the contract amount due to the addition of spare parts and a balance from the increase of invited FSM crews occurred, the breakdown of which was as follows.

Table 2 Breakdown of Japanese side's share

(unit: million yen)	
Item	Amount
Contract amount with the consultant	49.4
Contract amount with the contractor	776.8
Revised contract amount (portion of added spare parts)	17.3
Requested residual amount (portion of increased invited FSM crews)	2.1
Total	845.6

Source: document provided by JICA

3.2.2.2 Project Period

The project period¹⁵ was planned to be 23 months, however, it was actually the 21 months from August 2013 to April 2015, which was within the plan (91% of the plan). According to the executing agency and the consultant, the project largely progressed as planned, with no events leading to delays. The contract term for the vessel building has been advanced by two

¹⁵ The project period is defined as the duration from the month in which the G/A was signed until delivery of the vessel.

months since the G/A signature. This is because the time of change of the administration was approaching, and the internal procedures of the FSM side were advanced earlier than usual because the related stakeholders wanted to proceed with the project as much as possible while they remained in office.

As mentioned above, both the project cost and project period were within the plan. Therefore, efficiency of the project is high.

3.3 Effectiveness and Impacts¹⁶ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

(1) Operation days and number of port calls

Thanks to the procurement of M/N, the one vessel operation system using only C/V has changed to operation with two vessels (C/V and M/N), which resulted in an increase of the number of operation days to access to outer islands after securing the days for maintenance and management of C/V, and achieved the target (126%). As with the increase in the number of operation days, the frequency of port calls has also increased and achieved the target value (137%). The reason why both data in 2017/18 were lower than the one in 2016/17 was explained that C/V stopped operation for about one month in 2017/18 due to being placed in dock¹⁷ for periodic maintenance.

Table 3 Operation days and number of ports of calls

	Baseline ^{note1}	Target ^{note2}	Actual ^{note2}		
	2011	2019	2016/17	2017/18	2018/19
		4 Year After Completion	2 Year After Completion	3 Year After Completion	4 Year After Completion ^{note3}
Operation days (days/year)	232	311	475	322	391
Number of ports of calls (ports/year)	275	358	409	375	491

Source: document provided by JICA and the executing agency

Note 1: Baseline is the number for C/V.

Note 2: Target and actual values are the sum for C/V and M/N.

Note 3: Each year covers October to September. The figures for 2018/19 are based on actual values from October 2018 to January 2019 and the value estimated based on the planned operation schedule from February to September 2019.

(2) Annual breakdown/stoppage days

The stoppage days for C/V and M/N due to breakdown etc. were maintained at 0 days until 2016/17, however, they rose to 30 days due to the damage of the main engine of M/N and lack of spare parts in 2017/18 (see table 4). Specifically, it was explained that although

¹⁶ Sub-rating for Effectiveness is to be put with consideration of Impacts.

¹⁷ A generic term for facilities and facilities built for ship construction, repair, mooring, cargo handling, etc.

problems occurred with the main engine, making it necessary to replace the corroded journal bearing (main bearing), the manufacturer had none in stock, and engineers for the inspection and response could not be arranged. According to the results of analysis by the manufacturer, corrosion arising from the lubricating oil mixing with water and long-term use in the over speed range of the main engine are considered to be the causes of the problem. Since M/N is equipped with a lubricating oil cleaner, it can be used to remove the water contained in the lubricating oil and operate within the service limits of the main engine. According to the consultant, they always used the purifier immediately after the ship going into service, but it was also reported that it had been operating only for several dozens of hours in a year¹⁸ when manufacturer's engineer confirmed the utilization of purifier later on. In addition, this problem is very rare, with only two cases reported by the manufacturer among several thousand units produced. It can hence be said to be an unexpected problem.

Table 4 Breakdown/stoppage days

	Baseline	Target	Actual		
	2011	2019	2016/17	2017/18	2018/19
		4 Year After Completion	2 Year After Completion	3 Year After Completion	4 Year After Completion
Annual breakdown/stoppage days (days/per year)	About 7	Less than 1	0	30	N.A.

Source: documents provided by JICA and the executing agency

Moreover, the target of one day or less set at the time of planning made it impossible to avoid exceeding the target significantly when a sudden problem like this occurs. Given the current situation where not all spare parts can be stocked abundantly and rare and unexpected events occur, the target may be considered unrealistic when events that are difficult to predict are taken into account. Therefore, considering the actual number of days until 2016/17, the fact that the trouble that occurred was a rare and unexpected incidence, and that the number of stoppage days was maintained at 0 days thereafter, it can be judged that the planned effect has largely been generated.

3.3.1.2 Qualitative Effects (Other Effects)

The following effects were expected through the procurement of the vessels at the time of planning: “the operation of the two vessels will satisfy the demand for domestic maritime transportation and ensure safe operation,” “enough space for boarding and showers, etc. will be secured and safety of passenger is secured and comfort is expected to be improved.” Through interviews with the executing agency and passengers of M/N, effects such as those

¹⁸ The manufacturer has already contacted the executing agency to keep it regularly running.

with regard to the following were confirmed¹⁹: “addressing demand for domestic maritime transportation,” “securing of safe operation,” and “improvement of comfort.”

(1) Addressing the demand for domestic maritime transportation

As explained above, the operation days to outer islands increased thanks to the start of the operation of M/N, and the frequency of port calls is expected to increase approximately 1.8 times. Realistically, it is difficult to completely satisfy demand because it is necessary to set a certain period of operation and maintenance required, in order to secure the port calls to the remote islands and safe operation of two vessels. However, at the time of ex-post evaluation, the only means of connecting the state capital and outer islands is the operation of C/V and M/N. Thus the increase in the frequency of port calls means the transport of goods to outer islands through domestic maritime transportation, the travelling of passengers. In other words, it is directly linked to responding to the demand for domestic maritime transport. Therefore, it can be said that the procurement of M/N and equipment for maintenance and management have greatly contributed to the improvement of the response to demand for domestic maritime transportation by expanding opportunities for cargo and transportation through the increase in the number of port calls.

(2) Securing safe operation

C/V, which was the only vessel in the FSM to carry out maritime transportation before the procurement of M/N, was built as a cargo vessel, and the number of passengers was limited to 150. Meanwhile, at the peak time, more than 500 passengers were accepted, and there was no way to secure a sufficient period for maintenance work, meaning that it had no choice but to operate under dangerous conditions. On the other hand, the passenger capacity of M/N is more than 400, making it possible to board more passengers. According to a private contractor in Pohnpei state in charge of booking tickets, complaints from people who cannot buy tickets have also decreased. Since the acceptable number of passengers and the number of operations have increased since the operation of M/N started, there is no need to accept passengers exceeding the capacity, and the required minimum number of days is secured for maintenance work and safe operations have been maintained.

(3) Improved comfort by securing sufficient passenger space, etc.

C/V, which was built for the purpose of transporting cargo, had the problem that the ship shook strongly during the voyage and there was not enough passenger space. Compared with

¹⁹ For the executing agency, several interviews were conducted with the Permanent Secretary of the Department and person in charge of each branch in the Division of Marine Transportation during the site visit. As for the passengers, interviews were conducted with five families in preparation for onboard on January 19, 2019, according to the timing of M/N leaving Pohnpei port during the field survey.

C/V, M/N allows more passengers on board, secures ample passenger space, and also has a private room for privacy and a room for the sick. Consideration was also given to installing a hammock in the passenger space, and a more comfortable environment was maintained. The installation of a hypotonic device also addresses the improvement of passengers' comfort. According to an interview with several passengers of M/N, there were no passengers who felt problems with the staying space for the passengers, ride comfort, etc., and it was answered that they were generally satisfied, thus it can be said that the comfort has improved.

3.3.2 Impacts

3.3.2.1 Intended Impacts

At the time of planning of this project, “contributing to the stabilization of the lifeline of the FSM,” “transporting goods for daily life continuously” and “improving the convenience of FSM people traveling between urban areas and outer islands” were anticipated as impacts generated by the implementation of the project by regular operation of C/V and M/N. Each generated impact confirmed through interviews with the executing agency, ticket sales contractors for C/V and M/N and passengers were as follows.

(1) Contribution to stable transportation of goods for daily living and the stabilization of lifeline

With the increase in the number of port calls to outer islands after the start of the operation of M/N, the volume of goods for daily living transported also increased at the same time. Although official data could not be obtained, for example, M/N has carried cargoes to outer islands in the last six months until the ex-post evaluation as described in table 5. The main contents of cargo transported to outer islands are foods essential for daily life, such as rice, flour, oil and sugar, as well as other materials necessary for construction of residential infrastructure and social infrastructure for communities such as cement, and gasoline in addition to household products such as soap.

Table 5 Loaded cargo volume and breakdown of M/N
(departed from Pohnpei port)

Period	August 2018 to January 2019 (six months)
Number of operations	6 times
Loaded cargo volume	10,767.5 CU.FT (cubic feet) (approx. 305m ³ , 1 cubit = about 0.028 m ³)
Major cargo	Rice, flower, oil, sugar, instant noodles, coffee, construction material (cement, plywood, pipes, stones), gasoline, furniture (chair, desks, shelf, etc.)



(photo) M/N, loading cargo

Source: prepared based on the document provided by private companies in Pohnpei state

For islanders of outer islands, locally available food is limited to bananas, taros, etc., and other foods (including seasonings etc.), as well as general goods, household goods, and construction materials are only brought in by two vessels, C/V and M/N. In the FSM, even the capital and state capitals rely on imports for most of the household goods. In the life on the outer islands, the goods transported by vessels from the state capital are even more indispensable. Therefore, it is thought that the operation of M/N contributes to the stabilization of the lifeline to outer islanders from the viewpoint of securing daily necessities by increasing the frequency of transportation of goods and food products.

(2) Improving the convenience of the people who travel between urban areas and outer islands

Operation using M/N, which can accept many passengers compared with the operation of only C/V, which was built mainly for cargo transportation, eliminates the problem of overcapacity of passengers even at peak times, and has made it possible to move between urban areas and outer islands safely as needed. In particular, the operations for students are added into the regular schedule before and after long vacations in schools, where overcapacity were problems in the past, and these operations have led to improve the convenience for students traveling between outer islands and state capitals. In addition, M/N has also set up boarding space for sick people. It is also used for transferring sick people from outer islands where medical systems are not maintained as needed, thus contributing to the improvement of convenience for the people traveling between urban areas and outer islands.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

According to *the Japan International Cooperation Agency Environmental and Social Consideration Guidelines (2010)*, it was determined that the undesirable impact on the

environment was minimal at the time of planning. Also, the FSM does not apply environmental impact assessment to new vessels. However, in order to avoid the provision of vessels that do not meet international standards, it was necessary for M/N to take various measures for pollution and to use corresponding vessel equipment as follows:

- Measures against pollution by oil: Oil/water separating equipment must be installed on board to prevent oil discharge.
- Measures against pollution by sewage: Sewage tank must be installed not to discharge sewage into restricted sea areas.
- Measure against air pollution: Diesel engines complying with the NOx emission control must be installed.

It was confirmed with the executing agency, captain of M/N, and the consultant that no negative impact on the natural environment occurred during or after the completion of the project. It was also confirmed that all the various measures considered at the time of planning had already been addressed, and that no negative impacts on oil, sewage and the air had occurred.

(2) Resettlement and Land Acquisition

In this project, M/N was built at a Japanese shipyard and then sailing to the FSM. Therefore, there is no land acquisition or resettlement due to the implementation of this project.

After M/N was provided, operation with the two vessels was implemented, which increased "operation days" and "frequency of port calls" connecting the FSM state capital and outer islands. Travelling and transportation to outer islands are mainly carried out by C/V and M/N in the FSM, so an increase in the frequency of port calls by two vessels also directly contributes to the regular transportation of materials necessary for life. In addition to C/V built primarily for the purpose of transporting cargo, the operation of M/N, which allows more passengers, improves passenger's comfort and convenience, and contributed to the improvement of congestion and safety of C/V that had been accepting the exceeded capacity of passengers. Although it was confirmed that the number of stoppage days annually for breakdown exceeded the set target, this was due to unexpected sudden failure that occurred in M/N and the parts shortage of the manufacturer. As the number of stoppage days before and after the failure was maintained on day 0, it can be said that the planned effect was achieved.

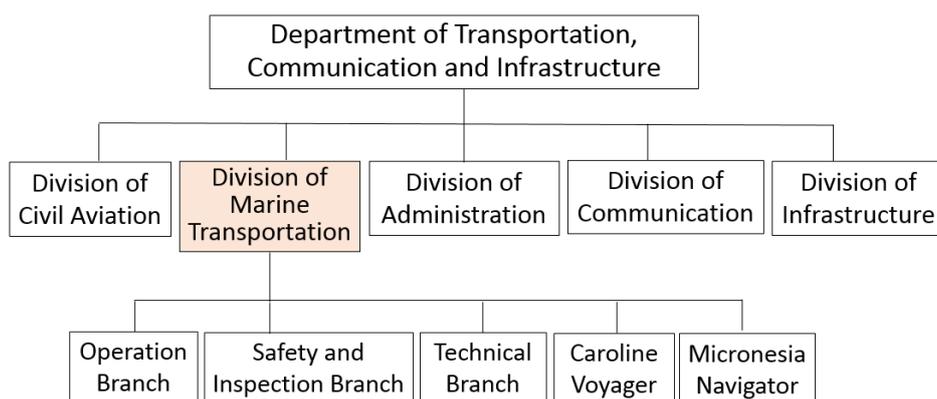
In light of the above, this project has largely achieved its objectives. Therefore effectiveness

and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

The operation of M/N is managed by the Division of Marine Transportation in the Department of Transport and Communication Infrastructure. This division encompasses the Operation Branch, Safety and Inspection Branch, and Technical Branch. C/V, the existing vessel, is positioned along with those departments, and M/N is positioned in the same way (see figure 1). The operation and allocation plans for C/V and M/N are formulated and managed by the Operation Branch, and routine maintenance activities are carried out by the crew of each vessel. In addition, announcement of the schedules and ticket sales to the islanders for the two vessels are outsourced to private companies in each state. There is no problem with the coordination and reporting system within the Division of Marine Transportation or with private companies²⁰.



Source: document provided by the Division of Marine Transportation of Department of Transportation, Communication and Infrastructure

Figure 1 Organization chart of Department of Transportation, Communication and Infrastructure

The number of staff of the Division of Marine Transportation is very limited, with a total of five members, including the Assistant Secretary, the manager, one from each of the Operation Branch, Safety and Inspection Branch, and Technical Branch, and each person's burden is large. According to the Division of Marine Transportation, requests for recruitment are submitted every year, however it has not been accepted because of limited human resources who have experience in the marine sector and lack of budget. On the other hand, there are 27 crew members on M/N (1 captain, 11 deck crew, 9 engine crew, 6 stewards), and mostly there is no problem in the number of personnel. According to the captain of M/N, although it will be overboard personnel, it is hoped to have additional 5 staff to carry cargo to

²⁰ Interviews with the Division of Marine Transportation and contracted private companies

facilitate smooth loading operation²¹.

As mentioned above, the Division of Marine Transportation and the crews are in charge of the operation and maintenance without any change from the time of planning, and there is no problem in the roles of divisions and the reporting system. On the other hand, the excessive workload on each individual caused by the personnel shortage in the Division of Marine Transportation is causing a concern.

3.4.2 Technical Aspect of Operation and Maintenance

In the FSM, crew members with experience in passing through the atolls of the country and who are familiar with port navigation were working on C/V, thus it was confirmed that the ship handling capabilities were sufficient at the time of project planning. In addition, it is planned that the construction shipyard will be in charge of the initial operation instruction after building of M/N, and the first operation after the on-site delivery. In fact, crew members, invited from the FSM to Japan, took maintenance training at a technical training school sponsored by a manufacturer, and received training on handling equipment at a shipyard. After that, while on the re-routing of M/N to FSM from Japan, FSM crew members received in-service training for operation from the Japanese crew.

It can be said that the crew members of M/N have no problem in vessel handling technology because crew members who have participated in the trainings in Japan and the voyage on C/V and the rounding of M/N are assigned to the crew of M/N. On the other hand, according to the consultant, although the crews are basically able to handle operation and maintenance, some of the crew members do not necessarily have sufficient basic knowledge. For example, they did not fully understand the proportion of each mixture when using preservatives etc., and they thought that maintenance and management activities would be difficult in the event of a failure since they had basic knowledge, applied ability. According to the Division of Marine Transportation, there were no training opportunities for crew members after the completion of the project until the time of ex-post evaluation, thus it is desirable to thoroughly acquire knowledge on maintenance management again in the future.

3.4.3 Financial Aspect of Operation and Maintenance

Table 6 shows the budget of the Division of Marine Transportation. According to the executing agency, though sufficient budget for necessary maintenance and management have not been allocated, both C/V and M/N have been docked every two years. It is also possible to carry out the minimum necessary maintenance and management activities (painting and repair of minor damaged parts). In addition, replacement parts distributed as equipment during the project implementation have been used, and necessary items other than spare parts such as

²¹ Source: Interviews with the executing agency and captain of M/N

consumables (paints) have been obtained from Japan and used²².

Table 6 Budget of Division of Marine Transportation

	(unit: thousand US\$)			
	2017	2018	2019 ^{note 1}	2020 ^{note 1}
Personnel cost	95.2	106.1	106.1	106.1
Travel cost	21.0	28.8	29.3	30.5
Consumable cost ^{note 2}	1,000.0	1,345.8	1,399.7	1,455.7
Contract service cost	1,031.0	1,334.1	1,387.5	1,443.0
Total	2,147.2	2,814.3	2,992.6	3,035.2

Source: document provided by executing agency

Note1: Amount of 2019 and 2020 are estimates.

Note2: Fuel, replacement parts, consumables, painting cost, communication expenses, etc.

On the other hand, the personnel cost is lower than the planned amount. The increase in the number of personnel in the future is not clear, and the preventive maintenance needed to maintain stable operation of two vessels has not been implemented (refer to “3.4.4 Status of Operation and Maintenance” for the detail). This is also due to a lack of budget, which can be said to be a financial concern.

3.4.4 Status of Operation and Maintenance

Since the executing agency does not own the facilities to maintain the cargo passenger vessels, both C/V and M/N are to be docked at Japanese shipyards every two years and carry out periodic inspections. Regular docks are planned and implemented for the two vessels so as not to overlap. C/V’s dock has been implemented in 2018, and M/N dock is planned in 2019. In addition, daily maintenance and management (rust prevention of the hull, oiling to moving parts, etc.) will not be carried out daily if the operation schedule is overcrowded, but the minimum necessary measures are carried out by the crew. Even at the time of site survey of M/N, it was confirmed that daily activities, painting work as anti-corrosion measures, replacement work at damaged parts of plastic boards on the deck, were being carried out.



(photo) Maintenance (painting) work

The FSM does not have a manufacturer agency that handles the parts needed to repair both vessels. Therefore, in the case of failure of important equipment, it is necessary to bring them to repair in Japan or other countries, thus it is an inconvenient environment even for the

²² Source: responses to the questionnaire to executing agency

procurement of parts. Therefore, in addition to the provision of M/N, the project formulated a Preventive Maintenance Policy (PMP) and provided spare parts for PMP implementation. According to the Division of Marine Transportation, although the importance of PMP is recognized by both the executing agency staff and M/N crews, the operation schedule is too tight and has not been implemented due to a lack of budget. Accordingly, it is inevitable that the procurement is made in time with the need for replacement, not in terms of procuring replacement parts and tools required for PMP. Cases of problems with procuring spare parts have been identified when sudden engine troubles occurred, thus it is necessary to prepare plans not to hinder the planned operation of vessels by managing the stock of spare parts. During the site survey of M/N, the following problems and corresponding situations were confirmed.

Table 7 Damaged parts and corresponding situations

Damaged parts	Corresponding situations
Clogged toilet (1 place)	Not repaired. It is planned to confirm during the dock in May 2019.
Rain leaks on the part of roof of the passenger space	Temporary repairs
Plastic board damage in the passenger space	Under repair
Corrosion of journal bearing (main bearing) of engine part	Replaced once, but required to be replaced again. Currently, Yammer Co., Ltd (manufacturer) is checking the situation

Source: Based on the confirmed situation at the time of the site survey of M/N (January 2019).

Minor repairs (rain leaks and board replacement) can be handled by the crews. On the other hand, it is difficult in the FSM to carry out measures that require ship structure and technical judgment, thus they need to wait for the manufacturer's inspection and the timing of docking. According to the consultant and the executing agency, the two vessels are the only means to access and transport to outer islands, thus it is conceivable that there is almost no risk of leaving damages that could cause problems in operations due to the large needs.

As mentioned above, the minimum maintenance activities have been implemented, and docks have been conducted as planned. However, since the two vessels have been fully operating, it is a concern that the port's laydays is short and maintenance activities remain minimal. Moreover, it is necessary to carry out maintenance activities incorporating PMP, taking into consideration the operation status of the vessels.

As described above, some minor problems have been observed in terms of the institutional/organizational aspect, technical aspect, financial aspect and current status of operation and maintenance. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was conducted to improve domestic transport services by building new cargo passenger vessels and procuring equipment for maintenance for maritime transport in the FSM, thereby contributing to stabilizing the lifeline of the FSM. The purpose of the project is consistent with the FSM's development plan, which emphasizes securing access from outer islands to islands with social infrastructure, development needs for procurement of new cargo passenger vessels for safe and efficient operation, and Japan's ODA policy, which emphasizes support for securing the transportation network. Thus, its relevance is high. Both project cost and the project period were within the plan, therefore the efficiency of the project is also high. Thanks to the building of M/N, an operation system with two vessels including the existing cargo passenger vessel, C/V, which was the only vessel operating in the country at the time of planning, has been launched. This made it possible to secure days for maintenance of C/V and led to an increase in the number of operating days and port call frequency to remote islands. It has also contributed to generating impacts such as the stabilization of the supply of living goods to outer islands and lifelines, and the improvement of the convenience of traveling between major islands and outer islands. Although the number of breakdown/stoppage days due to the failure per year did not achieve the target value, it can be said that the planned effects were generally achieved when considering the problems which occurred unexpectedly and the appropriateness of the target value set at the time of planning. Hence, the effectiveness and impact of the project are high. Although the organizational system for maintenance is clear and a certain budget is allocated, there is some room for improvement regarding the personnel shortage in the department responsible for maintenance and the awareness of preventive maintenance of M/N crew. Therefore, the sustainability of the project effects is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- Securing personnel for the continuation of safe and stable operation services

The Division of Marine Transportation, which is responsible for the operation and maintenance of cargo passenger vessels in the FSM, has a very limited number of personnel, and the work burden on each member continues to be very large. On the other hand, the need for domestic maritime transportation is still high, and it is expected that it will further respond to the increase in freighters and their operation services in the future. As it is not realistic to consider expanding services by the current number of personnel, the Division of Marine Transportation needs to continue to propose to the Department of Transportation,

Communication and Infrastructure to increase the number of its personnel.

- Examination of preparing the program to ensure the implementation of PMP

Responding to large needs, C/V and M/N have operated at full capacity. As a result, maintenance activities have been carried out only for a limited period of anchorage. Since it is expected that full operation of the two vessels will continue in the future, conducting maintenance activities in line with PMP is critical, so as not to cause the issues due to damage. So far, it has been considered difficult to implement due to the lack of budget and anchorage days, but it is important to work on formulation and implementation of PMPs that can be implemented even within the limited anchorage days and budget. The executing agency is needed to prepare a feasible PMP in line with the current operation schedule as soon as possible and strive for its implementation.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

- Considering training opportunities for appropriate maintenance activities to be continued

The O&M activities of M/N are carried out by its crew. In this project, when M/N voyaged from Japan to the FSM, M/N's senior crew members received training in Japan and also had the opportunity to learn handling and manoeuvring of the vessel on board. On the other hand, the crew members were briefed on the site for simple operation and maintenance, and did not receive training opportunities thereafter. According to the consultant, many of the crew members' basic knowledge has not achieved sufficient level, thus it is difficult to understand the importance of maintenance activities and PMP implementation in a short period of time. Although basic maintenance activities are being implemented at the time of ex-post evaluation, it is assumed that the background where PMP have not been followed is not only lack of budget but also lack of appropriate capacity to implement and understanding of its importance. If the capacity for the implementation of maintenance activities, the basic knowledge and understanding of the person in charge is not sufficient, the stakeholders involved in planning the project need to grasp the situation and establish a sufficient training period. As such, it is desirable to include the training plan for the trainees to make sense of maintenance activities and their importance.