

Republic of Mozambique

FY2018 Ex-Post Evaluation of Japanese ODA Grant Aid Project

“The Project for Urgent Rehabilitation of Nacala Port”

External Evaluator: Haruo Ito, ICONS Inc.

0. Summary

“The Project for Urgent Rehabilitation of Nacala Port” (hereinafter referred to as “the Project”) was implemented in the Nacala Port, which is one of the main ports in Mozambique. Among various issues in the Nacala Port, the Project aims to reinforce container storage capacities by improving the yard pavement, procuring Rubber Tired Gantry Crane (hereinafter referred to as “RTG”) and reach stackers, and improving the safety and operating rate by repairing the apron pavement and procuring fenders, a firefighting system, and loading arms. Thus, the Project contributes to the comprehensive development of Nacala Port.

The Project is relevant to Mozambique’s development plan, development needs, and Japan’s assistance policy for Mozambique. The importance of the Nacala Port in the Nacala Corridor areas is emphasized. Therefore, the relevance of the Project is high. Although the Project cost was within the plan, the Project period exceeded the plan owing to delays in the customs clearance procedure for materials and equipment on the Mozambique side, delays in the procurement of materials and equipment with torrential rain and flooding, and the repair of a pump shaft distortion in the firefighting system. Therefore, the efficiency of the Project is fair. The annual handling volume of the containers has not attained its initial target owing to external conditions such as economic stagnation, reduction of the investment owing to debt scandals, delay of the Japanese ODA loan projects “Nacala Port Development Projects I and II,” and operational problems at the port. However, the annual handling volume of liquid bulk has been improved, and other indicators such as the safe handling of liquid bulk have achieved their targets. In addition, the promotion of the smooth operation of the port until the completion of the loan projects was confirmed as an impact of the Project. Since contributions to the comprehensive development of the Nacala Port such as alignment with international safety standards were also identified, the effectiveness and impact of the Project is fair. There are no problems with the institutional/organizational, technical, or financial aspects of the operation and maintenance. In addition, the operation and maintenance status at the time of the ex-post evaluation was favorable for both facilities and cargo handling equipment. Thus, the sustainability of the effects produced by the Project is high.

From the above, it can be said that the evaluation of this Project is high.

1. Project Description



Project location: Nacala Port



North Wharf (target area of the Project)

1.1 Background

The Project was implemented in line with the *Short-Term Development Plan* (targeted for the year 2020) compiled in the “Preparatory Survey on Nacala Port Development Project” (Feasibility Study) (hereinafter referred to as “F/S”) (2011)¹ implemented by JICA. At the same time of this grant aid project, the Japanese ODA loan projects “Nacala Port Development Project Phase I” (planned start of service: July 2017) and “Nacala Port Development Project Phase II” (planned start of service: January 2018) were planned. This project was implemented to contribute to the improvement of quay facilities and the cargo handling capacity in order to respond to the port cargo demands during a required period in order to complete the above Japanese ODA loan projects. Therefore, as shown in Figure 1, some functions in the Nacala Port have been improved, including part of the quayside repair on the North Wharf² and its apron pavement, pavement of the container yard, cargo handling equipment (RTG), reach stackers, liquid bulk cargo handling equipment (loading arms), and a firefighting system.

¹ The Government of Mozambique approved the following as a policy for future development of Nacala Port: a development plan for the 2030 target year and a short-term maintenance plan for the 2020 target year, formulated by the “Preparatory Survey on Nacala Port Development Project” implemented by JICA.

² The North Wharf is divided into four sections (Quay No. 1 to 4) according to structure and water depth. The rehabilitated part by the project was in a section of Quay No. 4 with a -10m inland water depth.



Source: JICA

Figure 1 Project components

1.2 Project Outline

Among various issues in the Nacala Port, the Project aims to reinforce the container storage capacity by improving the yard pavement and procuring RTG and reach stackers. In addition, safety and the operating rate of liquid bulk, container, and general cargo will be improved by repairing the apron pavement and procuring fenders, a firefighting system, and loading arms. Thus, the Project will contribute to the comprehensive development of the Nacala Port.

Grant Limit / Actual Grant Amount	3,200 million yen/2,628 million yen ³
Exchange of Notes Date /Grant Agreement Date	December 2012 (modification in October 2013)/December 2012 (modification in October 2013, second modification in November 2015)
Executing Agencies	Ministério dos Transportes e Comunicações (hereinafter referred to as “MTC”) Portos e Caminhos de Ferro de Moçambique (hereinafter referred to as “CFM”)
Project Completion	October 2015
Target Area	Nacala Port in Nampula Province
Main Contractor	Penta-Ocean Construction Co., Ltd.
Main Consultants	Echo Corporation Oriental Consultants Co., Ltd.
Preparatory Survey	April 2012–May 2012 (Outline Design: October 2012)
Related Project	<p>【Technical Cooperation Project】 The Project for Improvement of Nacala Port (2012–2015)</p> <p>【Dispatch Expert】 Support for Improvement of Nacala Port (2015–2017)</p> <p>【Japanese ODA Loan Project】 Nacala Port Development Project Phase I (Loan Agreement: signed March 2013) Nacala Port Development Project Phase II (Loan Agreement signed June 2015)</p>

³ The project was confirmed by the Cabinet in December 2012 (2,666 million yen). However, it became difficult to implement the project with the initial estimation owing to large exchange-rate fluctuations. Therefore, implementation of an additional grant was granted by the Cabinet in October 2013, and the final Grant Limit became 3,200 million yen.

2. Outline of Evaluation Study

2.1 External Evaluator

Haruo Ito, ICONS Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: September 2018–October 2019

Duration of the Field Study: November 11–December 15, 2018

2.3 Constraints during Evaluation Study

With regard to the indicators of effectiveness and impact, collecting indicators that showed the exclusive effects of the Project was difficult, although the areas of rehabilitation by the Project were limited to part of the Nacala Port (see Figure 1). Therefore, for indicators such as “The annual handling volume of the containers,” which was affected by ongoing Japanese ODA loan projects, we applied supplementary indicators to identify the most accurate effects of the Project to avoid under- and overestimating the effects of the Project alone.

The Nacala Port is operated by a private company, Corridor de Desenvolvimento do Norte (hereinafter referred to as “CDN”), under a concession agreement with public organizations such as MTC and CFM. CDN, a private company, maintains data regarding its financial situation, and these data show the sustainability of the Nacala Port. It was difficult to obtain the financial data owing to its confidentiality with regard to corporate management.

3. Results of Evaluation (Overall Rating: B⁴)

3.1 Relevance (Rating: ③⁵)

3.1.1 Consistency with Development Plan of Mozambique

In the planning stage, the Project was consistent with the *Second Phase of Action Plan for the Reduction of Absolute Poverty 2005–2009 (PARPA II)*, which focused on economic development as a development issue. To achieve this goal, active support for the “development of economic infrastructures” for “industry vitalization” was sought. Furthermore, in the *Strategy for Integrated Development of the Transportation System (2009–2023)*, the Government of Mozambique prioritized the expansion and modernization of the Nacala Port, which is able to receive large ships in particularly deep water, and there is a significant space for port expansion. The port is located along the Nacala Corridor and has high potential for a future increase in cargo handling among the three main ports in

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially Satisfactory, D: Unsatisfactory

⁵ ③: High, ②: Fair, ①: Low

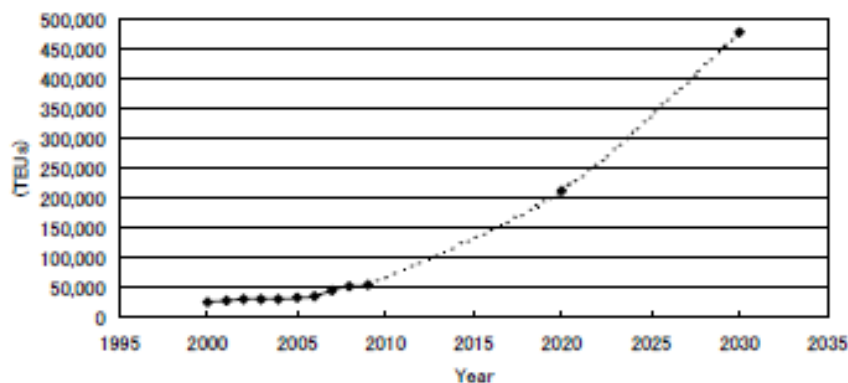
Maputo, Beira, and Nacala.

At the time of this ex-post evaluation, development based on the *Strategy for Integrated Development of Transportation System (2009–2023)* is ongoing. The importance of developing the transportation and transport system in the Nacala Corridor including the Nacala Port was therefore maintained. Furthermore, “expansion and modernization of fishery facility, port, airport, communication, and transport facility” is one of the strategic goals in “economic and social infrastructure development,” which is one of the five priorities of the *National Five-Year Plan (2015–2019)*. Rehabilitation of the Nacala Port along with the Pemba Port and Macuse Port is recommended as a concrete activity. In addition, the *Nacala Corridor Economic Development Strategy* formulated with the support of JICA and approved by the Cabinet in 2016 clearly states the importance of the Nacala Port as a base for the economic development of the Nacala Corridor. As above, both the national policies of Mozambique and the purpose of the Project are consistent at the time of the planning and the ex-post evaluation.

3.1.2 Consistency with Development Needs of Mozambique

The major commercial ports in the country are the three ports of Maputo, Beira, and Nacala. A significant increase in cargo volume was predicted because of the extensive promotion of agriculture and industry in the Nacala Corridor by the government and the development of natural resources in Malawi and Zambia. The future cargo volume of the Nacala Port was calculated in F/S based on the GDP, industrial trends of Nacala Corridor, and the population and port development plan until 2008. The plan states that the container volume at the Nacala Port was expected to increase by 11% annually, and it was estimated that the container volume was expected to increase by about 10 times in 2030 from the baseline (2008) (see Figure 2). In fact, the container cargo volume at the Nacala Port in 2011 was 89,000 TEU⁶, an increase of 17% over the previous year, which exceeded the 11% estimated by F/S. As a result, the necessity of renewing the aging port facilities was identified to make the best use of the yard areas within the limited facility size of the Nacala Port, and to improve the efficiency of loading and unloading containers in the yard. Facilities for liquid bulk cargo and firefighting for tankers was inadequate, and thus these facilities were also urgently needed. From this background, it was confirmed at the time of the planning that the Project deal with the necessity and urgency to improve the port capacity to cope with the increased cargo volume and to secure safety standards as an international port.

⁶ Twenty-foot Equivalent Unit (TEU) is an approximate unit of cargo capacity used to indicate the loading capacity of container ships, the number of cargo handled by container terminals, etc. Of the standardized containers, a 20-foot container is designated as “1 TEU.”



Source: JICA

Figure 2 Container handling volume forecast (F/S report 2011)

Table 1 lists the tendencies of the cargo handling volume (both containers and bulk) in three major ports in Mozambique (Maputo, Beira, and Nacala) as of the ex-post evaluation. The cargo volume at the Nacala Port peaked in 2014, but the volume decreased along with other major ports inside of the country owing to economic growth stagnation by debt problems revealed in 2015 and the slowing of investments. Under such economic conditions, the estimated container cargo volume in the Nacala Port by F/S at the time of planning stagnated, and this affected the achievement of the project indicators. On the other hand, the status of the three major ports in Mozambique has not changed, and the cargo volume of the ports has been recovering since 2017 with the overall economic recovery.

According to CDN, container cargo increased by 8% and general cargo by 24% as of October 2018 compared with the same period in the previous year. According to interviews with the carriers, the cargo volume has been rising since 2018, and it was pointed out that an increase of the export of graphite from the Balama Mine in Cabo Delgado Province⁷ and the improvement of port management are the factors responsible for this increase in volume at the Nacala Port.

In addition, the Nacala Coal Terminal located on the other side of the Nacala Port, which has been in operation since 2016, is steadily expanding its trading volume with coal from Tete Province transported by rail, and contributes to the economic development in the Nacala Corridor.

⁷ In 2018, Syrah Resources Limited in Australia announced that it had begun producing graphite at the Balama Mine in Cabo Delgado, Mozambique, one of the largest graphite deposits in the world. Graphite is provided to many Chinese, Japanese, and Korean companies that manufacture and sell graphite anodes for electronics, solar energy, and lithium-ion batteries.

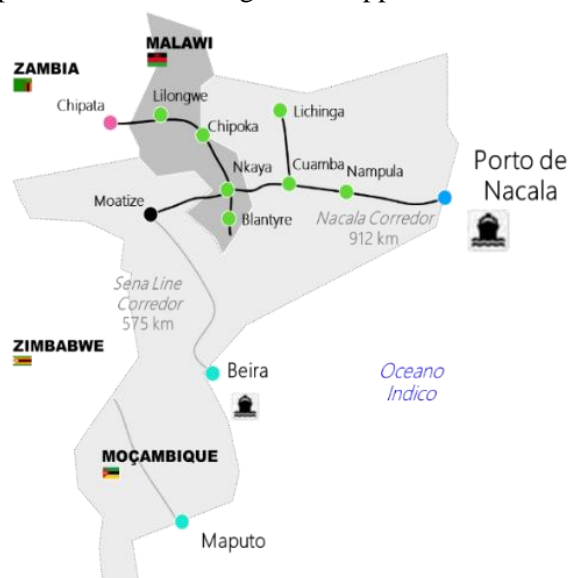
Table 1 Annual Cargo Volume of Main Ports in Mozambique (Container and Bulk)

(Unit: Thousand Tons)

Port	Handling capacity	2013	2014	2015	2016	2017
Maputo	25,000	16,831	19,203	16,767	15,070	18,214
Beira	13,000	10,859	11,899	12,789	9,959	11,196
Nacala	3,000	2,250	2,615	2,117	2,146	2,237
Nacala Coal Terminal	22,000	-	-	-	6,545	10,717

Source: CFM

Furthermore, with regard to the development of the Nacala Corridor, at the time of planning, the Government of Mozambique established Special Economic Zones (hereinafter referred to as “SEZ”) to promote investment in the north part of the country. This includes Nampula Province, where the Nacala Port is located. The SEZ is located in Nacala City, and the number of companies moving into the SEZ has been increasing.⁸ The Nacala Port is an important gateway for import and export for companies entering the SEZ. Starting from the Nacala Port, the Nacala Corridor includes Malawi and Zambia in its economic zone, in addition to the Northern provinces via the road and railway networks. Since the zone has a total population of 36 million, total area of 1.2 million km², and GNI of 18.4 billion USD (2007 Census), a high development potential was confirmed. An increase in exported cargo (agricultural products) via the Nacala Port was assumed with the launch of the “Project for Establishment of Development Model at Communities’ Level under Nacala Corridor Agricultural Development (Japan-Brazil-Mozambique): ProSAVANA-JBM.” This project aimed to increase food production in the region as support for the Nacala Corridor in Japan.



Source: CDN

Figure 3 Positioning of the Nacala Port in Nacala Corridor

⁸ In Mozambique, the law for the special economic zone was enacted in 2009. In the same year, the first Mozambique SEZ was established in Nacala City and Nacala-A-Velha. Between 2009 and 2012, 62 investment projects in Nacala SEZ were approved by the Office for Economic Accelerated Development Zones (GAZEDA) (currently called the Agency for Investment and Export Promotion).

Even at the time of this ex-post evaluation, as of 2017, there were 18 million people, which accounted for approximately 63% of the national population (approximately 29 million) in the five provinces (Cabo Delgado, Nampula, Niasa, Tete, and Zambezia) in the northern Mozambique area of the Nacala Corridor. According to the United States Agency for International Development (USAID), agriculture accounts for 24.8% of Mozambique’s GDP and 28.1% of Malawi’s GDP. Since 80% to 85% (2016) of the adult population in the above five provinces of the Nacala Corridor engages in agriculture, agriculture is the key industry in these regions. The main export products from the Nacala Port are agricultural products from Mozambique and Malawi. Moreover, there are many import products related to agriculture such as fertilizer. Development of the Nacala Port contributes to the country’s economic activities by promoting agriculture, which is the key industry.

3.1.3 Consistency with Japan’s ODA Policy

The Project is positioned as the “Nacala Corridor Development and Upgrading Program” in the category “activate regional economy including corridor development.” This is a priority area in the *Japanese Country Assistance Policy for Mozambique (March 2013)* in the planning stage. Furthermore, the Project is also positioned to “improve the foundation for growth” in a “solid and sustainable economy.” This was one of the priority development strategies at the 5th Tokyo International Conference on African Development (TICAD V) in 2013. Thus the Project is in line with Japan’s cooperation policy.

3.1.4 Appropriateness of Project Plan and Approach

The Project aims to improve the quay facilities and cargo handling capacity for responding to the port cargo demand during the repair of the Nacala Port by Japanese ODA loan projects. The necessity and urgency of the target facilities and equipment are high, and thus the contents of the Project are relevant. On the other hand, implementation of the Japanese ODA loan projects is far behind the schedule,⁹ and therefore the validity of the approach through verification of the complementary and synergistic effects with the Japanese ODA loan projects is expected to be seen after completion of the loan projects in 2021.

From the above, this project is highly relevant to the country’s development plan and development needs, as well as Japan’s ODA policy. Therefore, its relevance is high.

⁹ The plans for the ODA loan projects are “Nacala Port Development Project Phase I” (March 2013–July 2017) and “Nacala Port Development Project Phase II” (March 2013–January 2018). Although the project has been implemented in November 2015, the payment of Value Added Tax (VAT) by the Government of Mozambique was not agreed upon, and actual construction was initiated in July 2018. The Project completion will be significantly delayed to July 2021.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The contents (quantity and specifications) of both port facilities and cargo handling equipment were secured as planned. The contents of the planned and actual port facilities and cargo handling equipment are listed in Table 2.

Table 2 Port Facilities and Handling Equipment Procured by the Project (Plans and Actual)

Item	Contents
Port facility	
1.Repair of North Wharf (Quay No 4) Liquid bulk berth	Extension: L=120 m <ul style="list-style-type: none"> • Cap concrete: Gravity type (L=120 m) • Countermeasure for settlement: Steel sheet piles (L=110 m) • Apron pavement: Interlocking concrete block (A=2,714 m²) • Attachment work: Fender (13), bollards (4), loading arm foundation, foam monitor (firefighting system) basics
Container berth	Extension: L=190m <ul style="list-style-type: none"> • Cap concrete: Gravity type (L=190 m) • Countermeasure for settlement: Steel sheet piles (L=203 m) • Apron pavement: Interlocking concrete block (=4,365 m²) • Attachment work: Fenders (16), anchorage columns (6)
2. Container Yard Pavement	<ul style="list-style-type: none"> • RTG driving foundation: RC structure (22 wards×6 rows×2 lanes) • Container storage foundation: RC structure (46 units) • Yard pavement: Interlocking block pavement (A=10,806 m²) • Drainage work: Open channel (L=290 m), Culvert (L=110 m)
3.Firefighting system Intake pipe system	<ul style="list-style-type: none"> • Culvert (RC) (L=14 m) • Vertical shaft (RC) (L=7 m) • Protective work (rubbing type) (V=2,043 m³)
Equipment of pumps and tanks	<ul style="list-style-type: none"> • Pump hut Total floor area (A=81.96 m²) Foundation, roof, pillar (RC structure) Wall (block stacking) • Fire-extinguishing equipment (fire-extinguishing pump, mixing device, foam monitor, outdoor fire hydrant)
Cargo handling equipment	
1 Reach stackers	2 units (5 stacks, 45-t suspension)
2 RTG	2 units (6 rows, 5 steps, 40.5-t suspension)
3 Loading arms	3 units (Gasoline, Light oil, Jet fuel)

Source: JICA

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was within the plan, as the planned cost was 3,200 million yen (grant limit), whereas the actual project cost was 2,628 million yen (82% that of the plan).

The project cost was reduced because in the bid for facilities and equipment in January

2014, the lowest-bid price was 2,480 million yen against a sealing price of 3,051 million yen, which was 81% of the sealing price. The rationality of the tender price was also confirmed because it was estimated with minimum indirect costs in order to resolve the competition.

Table 3 Project Cost (Planned and Actual)

(Unit: million yen)

	Plan	Actual	Ratio
Facility	2,236	1,899	85%
Equipment cost	815	580	71%
Construction Supervision	148	148	100%
Total	3,199 ¹⁰	2,627	82%

Source: JICA

All items borne by the Government of Mozambique were implemented by the end of the Project except for the redemption of VAT and removal of substations in the yard. As part of the VAT was not redeemed to Japanese contractors owing to the government's financial crisis. Then, it was confirmed that all remaining VAT was reimbursed by April 2019. In addition, removal of the substation is planned to be implemented together with the implementation of the Japanese ODA loan projects. CFM indicated that there are no negative impacts on port operations at the time of the ex-post evaluation.

3.2.2.2 Project Period

The project period was assumed to be from February 2013 to January 2015 (25 months) at the stage of planning; however, the planned project period was recalculated as 31 months including an extension period of 6 months for the procedure for the additional grant owing to the acute fluctuation of the exchange rate. The actual results, on the other hand, exceeded the plan by 2 months (106% of the plan) from February 2013 to October 2015¹¹ (33 months). The breakdown of the project period is as shown in Table 4 below.

Table 4 Project Cost (Planned and Actual)

	Plan	Actual	Ratio
Detailed Design	7 months (extension period for additional grant+6 months) = 13 months	February 2013–February 2014 (13 months)	100%
Construction and Procurement	18 months	March 2014–October 2015 (20 months)	111%
Total	31 months	33 months	106%

Source: JICA

¹⁰ The total amount of planned project costs was 3,199 million yen; however, the maximum amount of the grant was adjusted by raising the amount by 1 million yen.

¹¹ The project initiation date is the detailed design (D/D) contract date, and the project completion date is the final completion date of the facility.

The period for detailed design (G/A agreement–Detailed Design–Tender Operation) was 13 months and significantly exceeded the initial plan (7 months) (186% of the plan). However, this period was extended by 6 months for delays owing to the processing of the additional grant. In fact, the Detailed Design was completed as planned (100% of the plan).

The period of construction and procurement (20 months) exceeded that of the plan (18 months) (111% of the plan). The main factors for exceeding the period of construction and procurement were delays in customs clearance procedures for materials and equipment (borne by the government of Mozambique), delays in the procurement of materials such as cement owing to heavy rain and flooding in the northern region during January 2015, and the production of replacement parts and repair work at the site owing to distorted pump shaft in the firefighting system (August 2015). Japanese consultants applied twice to JICA for an extension of the deadline. It was also confirmed that this extension of the project period influenced the start of the Japanese ODA loan projects “Nacala Port Development Project Phase I and Phase II,” implemented by the same executing agencies.

As mentioned above, although the project cost was within that of the plan, the project period exceeded that of the plan. Therefore, the efficiency of the Project is fair.

3.3 Effectiveness and Impacts¹² (Rating: ②)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The effect expected by implementation of the Project was “improvement of the safety and operation rate of cargo handling at the Nacala Port.” As shown in Table 5, (1) “Annual handling volume of the containers” and (2) “Achievement of safe handling of liquid bulk” were set as quantitative indicators. In particular, (1) “Annual handling volume of the containers” measures the handling volume of containers in the entire Nacala Port. This means that this indicator cannot represent the independent project effect because the project targeted only some parts of facilities and cargo handling equipment at the whole Nacala Port. Therefore, the direct effect of the liquid bulk facility provided by the Project as (3) “Annual liquid bulk volume” was set as a complementary indicator. Since this supplementary indicator was set for the ex-post evaluation, the baseline and target volumes were not predetermined, but the transition of the indicator was taken into account in this evaluation as a reference.

Table 5 lists the quantitative effect indicators of the Project.

¹² Sub rating for Effectiveness is to be put with consideration of Impacts.

Table 5 Quantitative Effect Indicators

	Baseline	Target	Actual		
	2011	2017	2015	2016	2017
		2 Years After Completion	Completion Year	1 Year After Completion	2 Years After Completion
(1) Annual handling volume of the containers (TEU/year)	89,714	161,590	80,102	71,142	70,248
(2) Achievement of safe handling of liquid bulk (%)	0	100	100	100	100
Complementary indicator					
(3) Annual liquid bulk volume (t/year)	-	-	385,670	510,559	580,891

Source: JICA, CFM

(1) Annual Handling Volume of the Containers [Not Achieved]

The actual amount was 70,248 TEU/year in 2017, which did not achieve the target of 161,590 TEU/year in 2017. The reasons for the underachievement of the indicator included external factors such as 1) stagnation of economic growth and investment owing to the debt issue in Mozambique, 2) delays in Japanese ODA loan projects, and 3) issues in port operations.

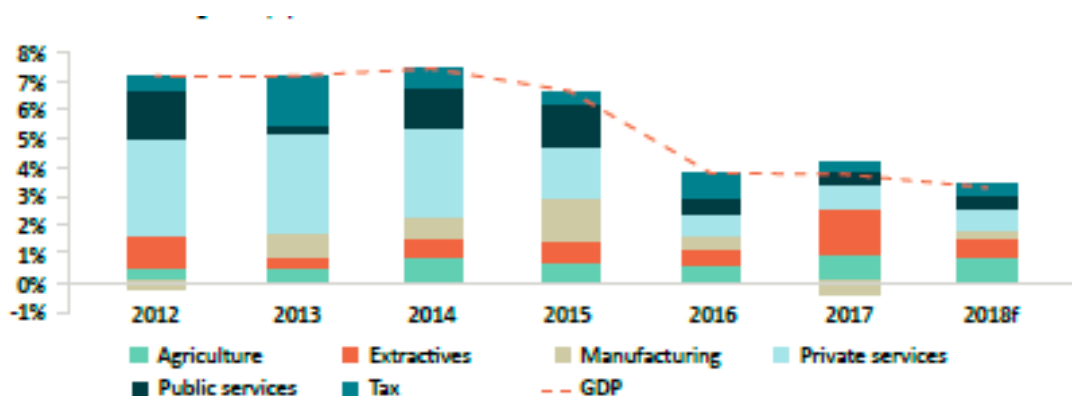
In addition, the value estimated in F/S based on industrial trends, the population in the Nacala Corridor, and port development plans by 2008 was applied to the project indicator “Annual handling volume of containers.” At the F/S, an 11% annual increase in the container volume at the Nacala Port was expected. The handling volume of containers was also estimated to reach 10 times that of the base year (2008) by 2030 (see Figure 2). At the same time, this volume was estimated on the premise of completing the Japanese ODA loan projects in 2015, and officials of the executing agency pointed out that the estimate was too high to measure the effects of the Project alone.

The details of the underachievement factors of the “annual handling volume of the containers” are shown below.

1) Stagnation of economic growth and investment owing to the debt issue in Mozambique

As shown in Table 1 under “Relevance,” the annual cargo handling volume at the Nacala Port declined after peaking in 2014 owing to economic stagnation and the economic impact of the debt problem in Mozambique. This mainly caused the stagnation of the “annual handling volume of containers,” which constitutes part of the annual cargo handling volume. In the F/S in which the “Annual handling volume of containers” was calculated, the increase in exports of agricultural products together with the importation of fertilizers and export of industrial products from Nacala SEZ was assumed. However, as shown in Figure 4, since

the onset of the debt issue in 2015, the country's GDP growth rate has fallen sharply, particularly with regard to major trading products at the Nacala Port, private-sector investment has slowed down since 2015, and agricultural production has also been sluggish. The country's economy then began to recover, and as of October 2018, CDN explained that the container volume increased by 8% and the general cargo handling volume increased 24% compared to the previous year.



Source: World Bank (2018), Mozambique Economic Update: Shift to More Inclusive Growth

Figure 4 Trends in GDP by sector in Mozambique¹³

2) Delay in Japanese ODA loan projects

The Japanese ODA loan projects were delayed from the initial plan as construction was started in July 2018 and completion of the projects is scheduled for 2021. As a result, the bottleneck to increase the handling volume of containers in the entire Nacala Port has not been resolved by the Japanese ODA loan project (Nacala Port Development Project), which was originally planned to be completed in 2018. This project aims to secure cargo space through expansion of the container yards and to improve port access for container vehicles.

3) Operational issues of the Nacala Port

Tangled procedures and cumbersome documentation for cargo inspection, import and export licensing, customs clearance, and lack of cargo handling equipment have increased costs and shipping times¹⁴. Shipping companies using the Nacala Port stated that they tend to use other ports (Beira Port, etc.) that are equipped with enhanced port facilities and have fewer procedural problems.

¹³ The amount for the year 2018 is an estimation.

¹⁴ According to interviews with carrier companies, since gantry cranes have not been procured at Nacala Port (planned by ODA loan projects), and ordinary handling equipment and cranes on the ship's side are used, the speed of cargo handling is slower than at other ports. In addition, the container handling volume per hour at Nacala Port is limited to 6 containers/h, while at Beira Port, which already has large cargo handling equipment such as gantry cranes, the volume is 60 containers/h or more.

(2) Achievement of safe handling of liquid bulk **【Achieved】**

This indicator shows the proportion of tankers that handle liquid bulk in a safe manner. This is done using the loading arms procured by the Project (see Table 5). A loading arm ensures the safety of the work and avoids disasters because there's no liquid bulk leaks have been reported since the completion of the Project, and all (100%) tankers secured safe handling operations. Therefore, it is concluded that this quantitative effect indicator has been achieved.

(3) Annual liquid bulk (complementary indicator) **【Significantly increased】**

The annual liquid bulk set as a complementary indicator shows the direct effect of major project components such as the rehabilitation of the liquid bulk berth and installation of loading arms in the North Wharf. As shown in Table 5, the annual volume of liquid bulk has been increasing rapidly since the completion of the Project in 2016 because operational efficiency has significantly improved as a result of the rehabilitation of the liquid bulk berth and the installation of loading arms in the North Wharf by the Project. The loading arm installed in the Project has improved the flow rate of liquid bulk from 500 m³/h before installation to 1,200 m³/h. Moreover, the operation time of 6 to 8h for connecting oil pipes of liquid bulk was shortened to about 30 min after the loading arms were installed. These were pointed out as factors of the increase in the number of liquid bulk carriers (tankers) that were calling. The installation of the loading arm also contributed to stop environmental pollution owing to oil leaks and to the safety of work.



Lording arms at North Wharf

3.3.1.2 Qualitative Effects (Other Effects)

Qualitative effects of the Project were (1) the Aging Nacala Port prolongs its facility life for further utilization and (2) Safe mooring of ships is secured with installation of fenders. Item (1) is evaluated as “achieved,” and (2) as “partially achieved.” The following shows the survey results that led to the evaluation of the qualitative effects.

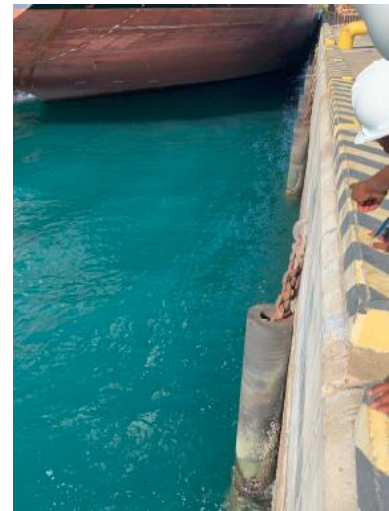
(1) Aging Nacala Port prolongs its facility life for further utilization **【Achieved】**

As a result of the rehabilitation of deteriorated facilities by the Project, parts of the North Wharf (Quay No. 4), container yards, firefighting system, and so on have been continuously usable. In addition, since the quays that are planned to be rehabilitated (Quays No. 1 to 3) will be temporarily unavailable during the construction period of the current implemented

Japanese ODA loan projects, the quay rehabilitated by the Project (Quay No.4) will be fully utilized. As a result, the Nacala Port is able to be used continuously without interruption due to the construction of the Japanese ODA loan projects.

(2) Safe mooring of ships is secured with installation of fenders **【Partially Achieved】**

All vessels moored at the rehabilitated North Wharf (Quay No. 4) use fenders. Damage to the vessels is reduced, and the safety of mooring is conditionally secured. The selection of the installed fenders, on the other hand, considered the sizes of all small and large vessels. However, when mooring large ships, there are cases in which the hull interferes with the quay when appropriate mooring methods such as hull control (taking into consideration the surrounding environment, use of a tugboat, etc.) are not observed, or when berthing during stormy weather. Therefore, appropriate mooring methods were strictly followed, and measures to wait for restoration of the weather during periods of stormy weather were taken. However, appropriate mooring methods were not always observed, and the mooring time increased during periods of stormy weather. As a result, the executing agency is considering whether to replace existing fenders with large-sized fenders that will enable the mooring of large vessels without being affected by vessel operations or weather conditions.



Fenders installed in North Wharf

3.3.2 Impacts

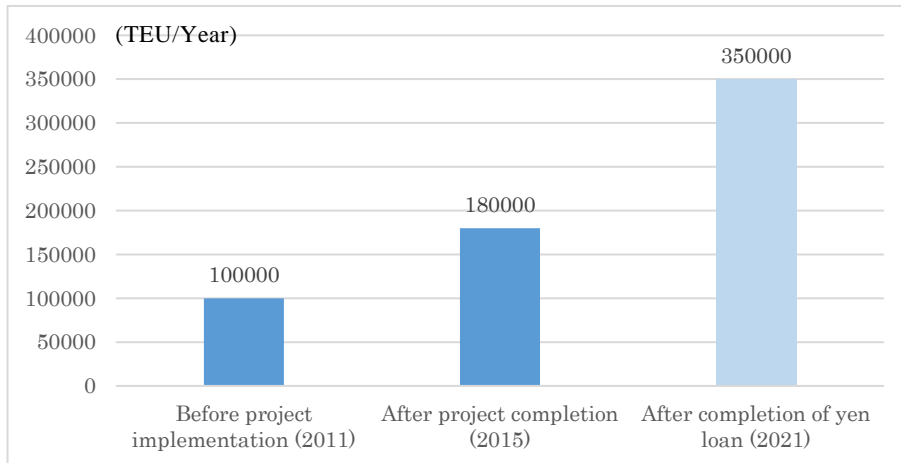
3.3.2.1 Intended Impacts

Although indicators to measure impacts have not been set for the Project, from the Project outline in the initial plan, the future goal of the Project can be written as “to contribute to the comprehensive development of the Nacala Port” by generating synergistic effects with the Japanese ODA loan projects. At the time of the ex-post evaluation, the following impacts on this future goal were identified through the implementation of the Project.

(1) Contribution to comprehensive development of the Nacala Port

The container handling capacity of the Nacala Port was 100,000 TEU/year before the Project but increased to 180,000 TEU/year after the project completion in 2015, as shown in Figure 5. With the initiation of full-scale construction of the Japanese ODA loan projects, the construction work will be implemented in parallel with cargo handling work at the Nacala Port. The expansion of the port capacity and improvement of the efficiency of cargo operations by procured equipment of the Project will prevent a reduction in cargo volume

during the construction period of the Japanese ODA loan projects, and will contribute to the facilitation of the ODA loan project. The container handling capacity is also planned to increase to 350,000 TEU/year after the completion of the Japanese ODA loan projects in 2021. This suggests that the Project contributes to the comprehensive development of the Nacala Port.



Source: CFM

Figure 5 Transition of container capacity in the Nacala Port

(2) Application of project’s implementation structure to Japanese ODA loan projects

The Project Management Unit consisted of members of the executing agency and related companies has been handed over to the Japanese ODA loan projects¹⁵. Therefore, the experience of the unit accumulated during the Project is utilized to contribute to the smooth implementation of Japanese ODA loan projects.

(3) Cargo operations with international safety standard

Before a firefighting system was installed by the Project, firefighting vehicles were on standby from tanker entering to leaving the shore. Thus, no sufficient measures to combat large tanker fires at the liquid berth were taken. The installation of a firefighting system by the Project enables cargo operations to conform to international safety standards of the International Maritime Organization (IMO) and to contribute to establishing the status of the Nacala Port as an international port.



Firefighting system (Pump facility)

¹⁵ The Project Management Unit was re-structured and changed to the MTC-Unit of Implementation of Project for Rehabilitation of Port Nacala (referred to as “MTC-UIPRPN”) in July 2015.

3.3.2.2 Other Positive and Negative Impacts

(1) Impact on natural environment

MTC prepared an Environmental Impact Assessment (hereinafter referred to as “EIA”) report for the Project in June 2012 by hiring an environmental consultant. The report was approved by the Ministry of Land, Environment and Rural Development (hereinafter referred to as “MITADER”) in October of the same year. During the project period, the Project Management Unit monitored the impact items (accidents, air pollution/noise, water pollution, etc.) based on the EIA’s environmental management plan, and a complaint-handling mechanism for residents and fishermen was established. For environmental management after the project completion, MTC-UIPRPN, in which CDN, the concessionaire of Nacala Port is involved, obtained an environmental license from MITADER and renews it every five years. CDN has also obtained a Certification in Environmental Management (ISO 14001) and conducts periodic environmental monitoring. Actually, no complaints from residents and fishermen were received, and it was confirmed that the standard values for environmental monitoring were fulfilled. In addition, it was confirmed that the installation of a loading arm at the North Wharf by the Project contributes to the prevention of marine pollution caused by oil leakage from the joints. As a result, no negative impact on the natural environment was recognized.

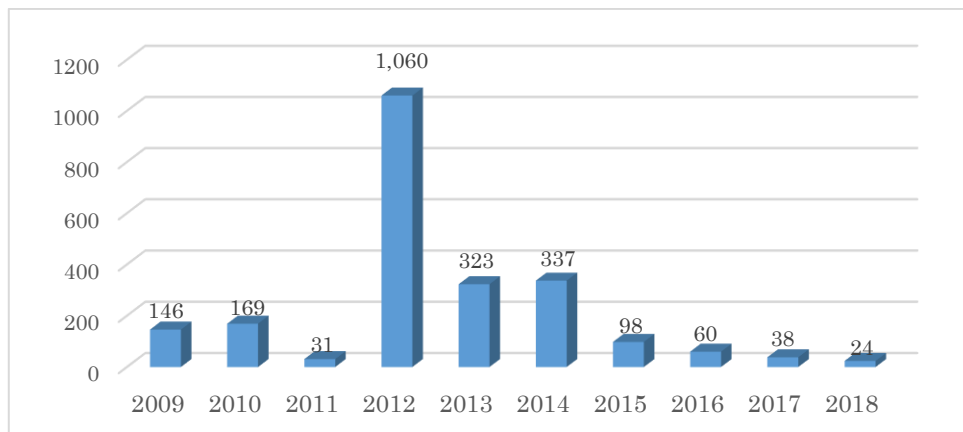
(2) Resettlement and land acquisition

Since the Project involves rehabilitating the existing Nacala Port, no new land was acquired, and the scoping results of the Initial Environmental Examination (IEE) show that no resettlement has occurred.

(3) Other impacts

As another impact, at the planning stage, the benefits on the SEZ which promotes investment in the three Northern provinces including Nampula province where the Nacala Port is located were expected. However, as shown in Figure 6, companies have not advanced into Nacala City SEZ because of the recent economic crisis. Furthermore, as mentioned above, due to delays in Japanese ODA loan projects, the comprehensive development of the Nacala Port by the originally planned ODA loan project, including the expansion of the cargo handling capacity and improvement of access of container vehicles to the port, has not been completed. At the time of the ex-post evaluation, it was too early to note benefits solely by the Project in the SEZ.

(Unit: USD 10 million)



Source: APIEX

Figure 6 Trend of investment in Nacala SEZ

The quantitative effect “Annual handling volume of containers” that shows the effectiveness has not been achieved due to the economic situation, delays in Japanese ODA loan projects, overestimating the target values at the planning stage, and operational issues at the Nacala Port such as bureaucratic processes and documentation for inspections, import and export licenses, and customs clearance. However, the indicator related to “Safe handling of liquid bulk” has been achieved, and an increase in the value of the complementary indicator “Liquid bulk handling volume,” which shows the direct effect of the Project, was confirmed. In addition, the qualitative effect of “Aging Nacala Port prolongs its facility life for further utilization” has been achieved, and “Safe mooring of ships is secured with installation of fenders” has partially been achieved. As impacts, the contributions of the Project to the overall development of the Nacala Port such as “Improvement of container handling capacity,” “Smooth implementation of Japanese ODA loan projects” and “Securing international safety standards” have been identified.

As mentioned above, although some of the quantitative effects have not been achieved, the effectiveness and impact of the Project are fair because some effects of the Project have been realized.

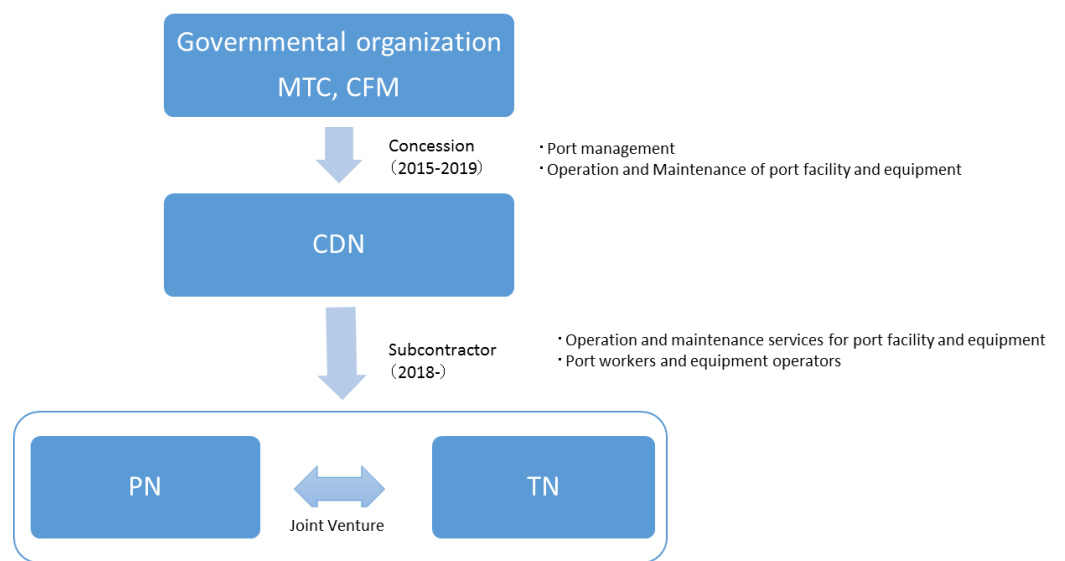
3.4 Sustainability (Rating: ③)

3.4.1 Institutional/Organizational Aspects of Operation and Maintenance

As shown in Figure 7, for the operation and maintenance system of the Nacala Port, MTC¹⁶

¹⁶ Although the reorganization of MTC was carried out by “Cabinet Council vote 20/2018 for public administrative reform” on June 25, 2018, it was confirmed that there was no change in the management of Nacala Port.

is the responsible governmental agency for the port, but as a public organization, CFM, which deals with railway- and port-related services in Mozambique, has substantial responsibility for the indirect management of the port. In addition, CDN is responsible for the operation and maintenance of the Nacala Port, and a 15-year concession agreement between three parties (MTC, CFM, and CDN) has been signed. The concession contract will expire in 2019, but the contract is expected to be continued thereafter. CDN has also signed a subcontracting agreement with a joint venture consisting of Portos do Norte, (hereinafter referred to as “PN”) and Terminas do North (hereinafter referred to as “TN”). PN provides maintenance service for facilities and equipment, and TN supplies port workers and equipment operators.



Source: Created by evaluator based on results of interviews with CDN

Figure 7 The Nacala Port operation and maintenance system

(1) MTC and CFM

CFM has an independent financial system, and there is no financial support from the government. However, CFM is the landlord of the Nacala Port. Moreover, CFM is in charge of the operation and management of some terminals in the port such as the terminal for liquid bulk. The operation and maintenance of the liquid bulk facility (loading arm) and the firefighting system provided by the Project are therefore supervised by CFM. A total of 12 engineers (3 mechanical engineers, 2 electrical engineers, 1 automatic control, 1 mechanic, and 5 assistants) are assigned to the maintenance department of CFM.

(2) CDN

The organization of the CDN is composed of departments of port operation, administration and finance, marine services, land services, and maintenance, with the executive branch at

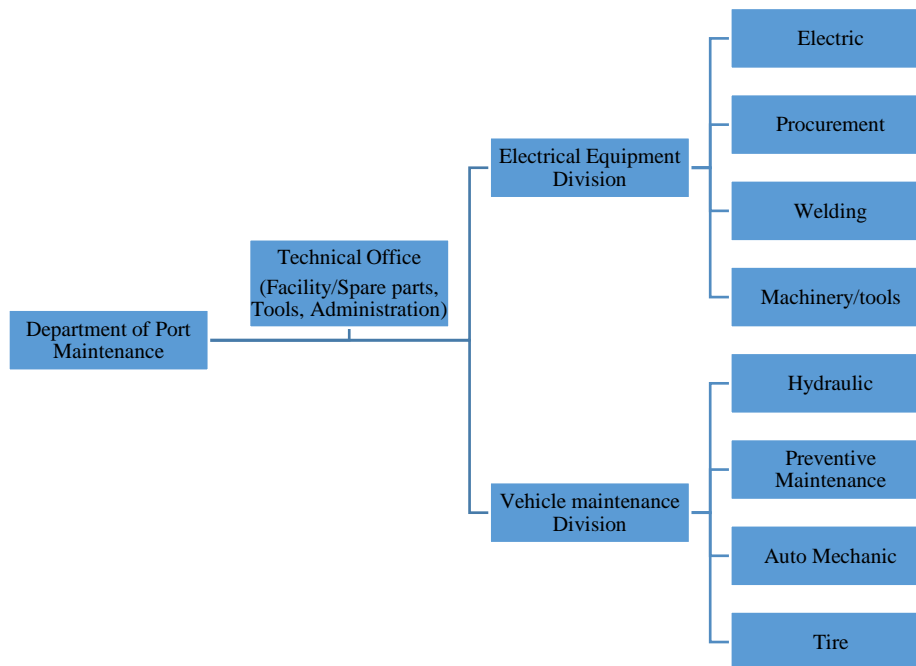
the top. The maintenance of RTG, reach stackers, and the North Wharf provided by the Project is overseen by CDN, but the task of maintenance by CDN mainly involves the procurement of materials and equipment and ordering maintenance services from PN and external maintenance companies.

(3) PN and TN

The organization of PN’s port maintenance department responsible for the operation and management of actual facilities and equipment at the Nacala Port is divided into the Technical Office, which manages equipment, inventory, and tools and provides administration; the Electrical Equipment Division; and the Vehicle Maintenance Division. These divisions are shown in Figure 8. A total of 33 staff members works on a 24-h basis in four shifts. The Electric Maintenance Division is in charge of the maintenance of the North Wharf, and the Vehicle Maintenance Division is in charge of the maintenance and management of the RTGs and reach stackers. There are also covered workshops for vehicle maintenance that are large enough to simultaneously maintain two reach stackers. TN dispatches dock workers and is responsible for the operation of cargo handling equipment such as RTGs and reach stackers, but TN is not involved in the maintenance and management of port facilities.



Maintenance workshop for vehicle



Source: PN

Figure 8 Organization of port maintenance department in PN

3.4.2 Technical Aspects of Operation and Maintenance

The CFM, CDN, and PN staff in charge of substantial operation and maintenance have received training for facility and equipment operation and maintenance at the time of procurement. The staff also received technical transfer to improve the maintenance system for facilities and equipment, including spare parts management and maintenance plan formulation for cargo handling equipment via the technical cooperation project “Project for Improvement of Nacala Port (2012–2015)” and the dispatching experts through “Support for Improvement of Nacala Port (2015–2017).” Interviews with CFM, CDN, and PN at the time of this ex-post evaluation showed that the staff in each organization has sufficient operation and maintenance skills to ensure sustainability. In addition, including the CFM staff in charge of maintenance of the safety equipment and loading arms and the PN staff in charge of reach stackers and the North Wharf, there was almost no replacement or transfer of engineers trained by the Project during its implementation. These engineers are responsible for ongoing maintenance and management. The maintenance experience of the CFM and PN engineers is more than 5 years, and new hires are provided training mainly through on-the-job training (OJT) by these organizations. CFM and CDN also provide regular training to the port staff on occupational safety and health, etc. It was confirmed from the management ledger of the maintenance departments of CFM and PN that the maintenance manuals formulated by the Project at the time of facility and equipment procurement and by the “Project for Improvement of Nacala Port” and “Support for Improvement of Nacala Port” are fully utilized even at the time of the ex-post evaluation, and periodical inspection and maintenance based on the manuals are continuously implemented.

Since RTG cargo handling equipment was introduced at the Nacala Port for the first time, initial training (7 days) after installation was conducted for CFM engineers (electrical and mechanical staff), PN vehicle mechanics, and TN operators. Training was also provided by the manufacturers in Japan, and guidance on operation and maintenance was continuously provided by the manufacturer’s engineering staff during the warranty period (3 months) in Mozambique. However, this training could not promote sufficient understanding owing to the language barrier. Portuguese technicians were hired separately by CDN for retraining on RTG operation and maintenance. Through those self-measures, problems with the operation and maintenance of facilities and equipment including RTG had not occurred at the time of the ex-post evaluation.

3.4.3 Financial Aspect of Operation and Maintenance

Since the development of the Nacala Port is carried out with the current Japanese ODA loan projects and investment budget by CDN, there are no expenses from MTC and the Ministry of Finance for the development and operation of the Nacala Port. The port is

operated by the financially independent CFM with a concession fee from CDN, which has a concession contract with CFM. The concession fee is part of the sales of CDN, such as the port use fee collected from the carrier companies. According to the F/S report, payment of the concession fee from CDN to CFM is at a fixed amount (2 million USD per year from 2015 to 2019) plus a variable amount (15% of revenue). CFM and CDN pay expenses for the operation and management of the port facilities and equipment from these revenues. For the facilities and equipment of the Project, CFM bears the expenses of consumables and periodic inspections of the loading arms and firefighting system. On the other hand, CDN bears expenses for maintenance of the reach stackers, RTG, and the North Wharf. As shown in Table 6, since the expenses for maintenance were being properly allocated even after the completion of the Project, it was confirmed that there were no financial problems.

Table 6 Maintenance Expenses for Facilities and Handling Equipment of Project (Actual)

(Unit: Metical)

	2016	2017	2018
CFM	1,075,500	1,377,375	1,985,574
CDN	n.a.	n.a.	n.a.

Source: CFM

In addition, CDN has changed the contract method with PN since July 2018. For the operation and maintenance budget of the facilities, previously, PN provided the comprehensive maintenance of the facilities and equipment, however after the change of the contract, CDN procures materials and tools for maintenance of facilities and equipment and PN has provided maintenance services. This leads the improvement of the profitability by strengthening the CDN budget management system for the operation and maintenance.

3.4.4 Status of Operation and Maintenance

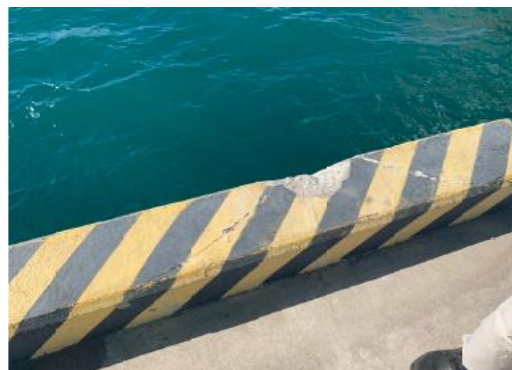
As mentioned above, the facilities are regularly maintained, and the equipment is also regularly inspected and maintained based on the maintenance manual. The maintained equipment is in good condition. For handling equipment, PN has a regular inspection program and provided the pre-inspection/maintenance and inspection/maintenance in accordance with the operating hours.¹⁷ The fire-extinguishing equipment is subjected to a weekly performance check of the pumps and an operation system inspection by water discharge once a year. Furthermore, PN manages and supplies spare parts for the procured equipment. These spare parts are kept in locked storage and are appropriately managed with a ledger. On the other hand, fenders installed at the North Wharf are relatively small in size

¹⁷ For example, inspections and maintenance are implemented after every 500 h of operation time for reach stackers procured under the project.

to accommodate various sizes of ships. Small cracks in some wheel stoppers occurred by the contact of large ships owing to inadequate operation. However, the function of these wheel stoppers was not impaired.



Regular water discharge for inspection of firefighting system



Crack of wheel stoppers by contact of ships

From the above, no major problems were observed in the institutional/organizational, technical, and financial aspects and current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

“The Project was implemented in the Nacala Port, which is one of the main ports in Mozambique. Among various issues in the Nacala Port, the Project aims to reinforce container storage capacities by improving the yard pavement, procuring RTG and reach stackers, and improving the safety and operating rate by repairing the apron pavement and procuring fenders, a firefighting system, and loading arms. Thus, the Project contributes to the comprehensive development of Nacala Port.

The Project is relevant to Mozambique’s development plan, development needs, and Japan’s assistance policy for Mozambique. The importance of the Nacala Port in the Nacala Corridor areas is emphasized. Therefore, the relevance of the Project is high. Although the project cost was within the plan, the project period exceeded the plan owing to delays in the customs clearance procedure for materials and equipment on the Mozambique side, delays in the procurement of materials and equipment with torrential rain and flooding, and the repair of a pump shaft distortion in the firefighting system. Therefore, the efficiency of the Project is fair. The annual handling volume of the containers has not attained its initial target owing to external conditions such as economic stagnation, reduction of the investment owing to debt scandals, delay of the Japanese ODA loan projects “Nacala Port Development Projects I and II,” and operational problems at the port. However, the annual handling volume of liquid bulk has been improved, and other indicators such as the safe handling of

liquid bulk have achieved their targets. In addition, the promotion of the smooth operation of the port until the completion of the loan projects was confirmed as an impact of the Project. Since contributions to the comprehensive development of the Nacala Port such as alignment with international safety standards were also identified, the effectiveness and impact of the Project is fair. There are no problems with the institutional/organizational, technical, or financial aspects of the operation and maintenance. In addition, the operation and maintenance status at the time of the ex-post evaluation was favorable for both facilities and cargo handling equipment. Thus, the sustainability of the effects produced by the Project is high.

From the above, it can be said that the evaluation of this Project is high.

4.2 Recommendations

4.2.1 Recommendations to Executing Agency

Increase of handling volume through the improvement of overall operation of the Nacala Port

With regard to the issues of the Nacala Port, a stagnation of the increase in handling volume was identified owing to infrastructure-related issues such as a lack of stockyards, restricted access to container vehicles, and operational restrictions such as costly and time-consuming customs clearance procedures. While constraints on the infrastructure are expected to be resolved with the completion of the Japanese ODA loan projects, operational improvements for smooth customs procedures and appropriate fee settings are still required.

Replacement of fenders in renovated North Wharf

The size of the fenders installed on the rehabilitated North Wharf wall was selected to be compatible with all small to large vessels, but some damage to the wharf may occur if appropriate operations (hull control considering the surrounding environment, use of tugboats, etc.) are not provided when large vessels are berthed. In addition, although measures have been taken to regulate the landing of large vessels during stormy weather, this will increase the retention period and affect the efficient operation of the wharf. Therefore, it is recommended to replace existing fenders with those of a size that is unaffected by inappropriate vessel operation for berth and weather conditions.

4.2.2 Recommendations to JICA

Support for prompt implementation of Japanese ODA loan projects

This project was implemented to complement Japanese ODA loan projects and contribute to the comprehensive development of the Nacala Port. In order to achieve the expected effects (effectiveness and impact), Japanese ODA loan projects that are behind schedule are

expected to be implemented promptly. To achieve the original purpose at an early stage, the impact of the synergistic effects between the Project and the ODA loan project is expected to be examined. Measures have been taken, such as the dispatch of JICA experts to promote Japanese ODA loan projects, but continuous measures and support are required.

4.3 Lessons Learned

Reinforcement of operation and maintenance system in cooperation with technical cooperation projects

The technical cooperation project titled “Project for Improvement of Nacala Port” (2012–2015) was implemented at the same time as the Project. In particular, the capacity development of CFM, CDN, and PN engineers in charge of operation and maintenance and the establishment of the maintenance system for the continuous implementation of management have contributed to effective utilization of the facilities and procured equipment provided by the Project. It is difficult to establish an operation and maintenance system only by short-term initial training in grant aid projects. Support to establish an operation and maintenance system by using technical cooperation projects while understanding the local situation and long-term technical transfer promote the effective and sustainable use of facilities and equipment of grant aid projects.

Setting indicators with appropriately reflected development effects

As an indicator to measure the quantitative effects of this project, the container volume of the entire Nacala Port was determined. However, the facilities and equipment provided under the Project will remain at a part of the Nacala Port. Therefore, the contribution to this indicator is limited, and at the same time, the delay in the Japanese ODA loan projects which was expected the synergy effects with the Project has been negatively affected to achieve the indicator. Because the indicator is also highly dependent on the national and regional economic situation, it seems that the indicator does not directly reflect the effects of the Project. Thus, it is necessary to confine the effects of the Project to those that can be reliably measured as project effects, such as the volume of liquid bulk prepared by the Project. In particular, for projects which are expected to generate some effects combining with the implementation of other projects such as Japanese ODA loan projects, it is required to set indicators that can measure the specific effects of the target project alone in order to avoid over- and underestimation.

End