

Djibouti

2017 External Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for the Improvement of Fire Fighting and Rescue Equipment of Djibouti City”

External Evaluator: Shima Hayase, IC Net Limited

0. Summary

This project aims to protect citizens and their lives, safety and assets from disasters such as fires and to contribute to community security by improving fire fighting capabilities in Djibouti City through replacing and strengthening the fire fighting and rescue equipment implemented by the ODA grant aid project in 1998.

The project was in line with the national development plans of Djibouti and the development needs which prioritize the protection of its citizens from disasters. Also it was consistent with Japan’s ODA policies at the time of planning. Thus its relevance is high.

A target fire response time to attend another fire site was achieved by improving and upgrading pump and tank trucks.¹ A target time for arrival and fire dousing commencement was achieved by the introduction of small vehicles in areas with narrow streets.² Also other fire fighting and rescue vehicles have demonstrated the expected target function. Due to the improvement of fire fighting capabilities, the response to large-scale fires in dense residential areas, the response to a sequence of fires, and the response to managing hazardous materials was performed more effectively. According to the qualitative survey of residents and shop owners who had experienced fires, the response was that they now had more faith in fire fighting capabilities. Thus its effectiveness and impacts are high.

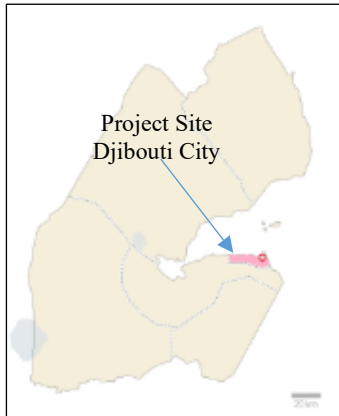
Provision of equipment and an initial operational training at the time of handover were close to target, and both the project cost and the project period were within the plan. Thus the project efficiency is high. No major problems have been observed in the institutional, technical and financial aspects of the executing agency. However, there are some problems in equipment management conditions. Therefore the sustainability of the project is fair.

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

¹ Time for arrival and fire dousing commencement

² Aimed at shortening time required before fire dousing by getting closer to a fire site through the introduction of small vehicles

1. Project Description



Project location



DNPC Headquarters/ Sans-fil Fire Station

1.1 Background

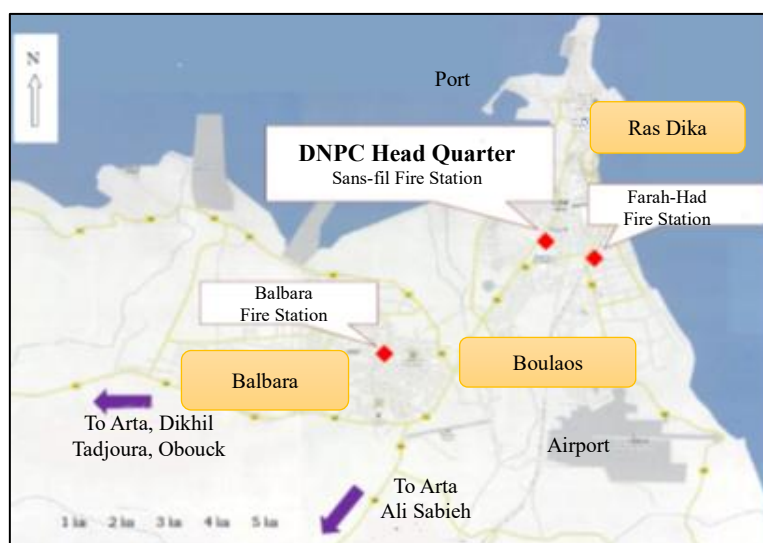
Djibouti is in a tropical dry climate zone. Moreover, especially in summer, its highest temperature exceeds 50 degrees. A hot dry wind called *hamsin* comes with dust storms so that the area faces an increased risk of fire outbreak and engulfment. Also the area faces harsh natural conditions where annual average rainfall is as little as 100 mm to 200 mm.

In Djibouti, due to urbanization, about 70% of the population is concentrated in the capital and is overpopulating the city.³ With economic development, the construction of high-rise buildings and facilities dealing with hazardous materials has been increasing, along with traffic on highways becoming heavier. Therefore a prompt response to diverse problems such as controlling potentially engulfing fires at the time of outbreak and an improved response to traffic accidents had been required.

Fire engines and ambulances in fire stations in Djibouti were those supplied by the ODA grand aid “Fire Fighting and Rescue Equipment Improvement Project” (the exchange of notes was entered in March 1998), and second-hand equipment supplied by the Japan Fire Fighting Association. As the equipment supplied by the ODA were at the end of their serviceable lives, they needed to be replaced. Also second-hand equipment started to develop troubles under the harsh natural Djibouti environment and it became harder to repair them.

Due to a shortage of usable equipment, they could not dispatch fire fighting and rescue vehicles promptly and could not respond to simultaneous multiple fires, so the National Civil Protection Bureau (Directeur National de la Protection Civile, hereafter referred as “DNPC”) made a request to the Government of Japan to implement an ODA grant project to deploy new fire fighting and rescue equipment.

³ In 2012, the population of Djibouti was 503,044, which was 74% of the population in Djibouti. Source: World Bank Development Indicators (<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>)



Source: created with the material provided by JICA

Figure 1: Djibouti City and the location of the fire stations

1.2 Project Outline

The objective of this project is to improve fire fighting capabilities in Djibouti City by replacing and strengthening the fleet of 14 units of fire engines and rescue vehicles implemented by the ODA grant project in 1998, thereby contributing to protect the people's life and their safety and assets from disasters such as fires and to contribute to area's security.

E/N Grant Limit or G/A Grant Limit / Actual Grant Amount	736 million Yen / 635 million Yen
Exchange of Notes Date (/Grant Agreement Date)	March, 2013 /April, 2013
Executing Agency	National Civil Protection Bureau
Project Completion	September, 2014
Main Consultant	General Incorporated Foundation Fire Equipment and Safety Center of Japan
Procurement Agency	ITOCHU Corporation
Outline Design	November, 2012
Detailed Design	April, 2013
Related Projects	Grant Aid Project: Fire Fighting and Rescue Equipment Improvement Project (1998) Grant of second hand Fire Engines and Ambulances: Japan Fire Fighters Association (2001, 2007, 2008), India (2010), Qatar (2011), Saudi Arabia (2015)

	Technical Training in Japan: Thematic Training (Fire Fighting)(2011-2013)
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2. Outline of the Evaluation Study

2.1 External Evaluator

Shima HAYASE, IC Net Limited

2.2 Duration of Evaluation Study

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

Duration of the Study: August, 2017- November, 2018

Duration of the Field Survey: December 7 - December 25, 2017, April 14 - May 2, 2018

3. Results of the Evaluation (Overall Rating: A)⁴

3.1 Relevance (Rating: ③)⁵

3.1.1 Consistency with the Development Plan of Djibouti

(1) Consistency with the Development Plan at the Time of Planning

The Government of Djibouti developed *National Initiative for Social Development* (Initiative Nationale pour le Développement Social 2008-2012: INDS) which aimed at protecting the nation throughout from natural disasters, and to devise an effective disaster prevention scheme.

DNPC, under the umbrella of the Ministry of the Interior, supervises the fire fighting administrative body. It developed *DNPC Five-year Plan (2009-2014)* and it aimed to establish a new fire fighting system by opening new fire stations, and renewing and strengthening the fleet of fire fighting and rescue vehicles. The priority areas in the five-year plan were as below.

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|--|
| <ul style="list-style-type: none"> (a) Examination and standardization of fire fighting techniques to protect its citizens; (b) Implementation of a citizen disaster prevention scheme for large-scale disasters; (c) Responding to all types of disasters; (d) Life-saving and asset-protection in natural disasters; (e) Inspection and confirmation of fire prevention equipment in public and private buildings; (f) Public fire safety awareness and guidance; (g) Education and guidance for public and private ambulance attendants; and |
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⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ③ high, ② fair, ① low

(h) Review of fire safety in public buildings.

(2) Consistency with the Development Plan at the Time of the Ex-post Evaluation

The Government of Djibouti developed *the Vision Djibouti 2035*, a long-term national development plan to 2035 (issued in March 2014). In May in the following year, it adopted the *Strategy of Accelerated Growth and Promotion of Employment 2015-2019* (here after referred as “SCAPE”) as its own first five-year national development plan.

SCAPE consists of four pillars. The improvement of the fire fighting system falls under the Improvement of Citizens Protection, a pillar of the Public Governance and Improvement of Capabilities. Specifically, the following implements are included:

- (a) The introduction of fire fighting forces with fire engines in all regional cities and the deployment of a task force in the corridor;
- (b) The deployment of equipment to a new force of DNPC;
- (c) Training for fire fighters and the construction of a facility for improving their physical fitness; and
- (d) The construction of a modern fire and emergency service call center.

Thus from at the time of planning to the ex-post evaluation the development of the fire fighting system has been an important focus. So it is highly relevant to this project.

3.1.2 Consistency with the Development Needs of Djibouti

(1) Urban Development and Population Change

At the time of planning (2012), due to the urbanization of Djibouti City, high-rise construction grew along with an increase in the number of gas stations. Due to an increased volume of logistics from Djibouti Port to Ethiopia, traffic accidents involving large transport trucks on highways had increased. A prompt rescue response to fires in high-rise buildings, vehicle fires and automobile accidents had been required.

At the time of planning (2012), the population of Djibouti city was 500,000. 74% of the nation’s population was concentrated in this city.⁶ Moreover, in addition to urban development, the influx of nomads and refugees has overpopulated Djibouti city.

At the time of the ex-post evaluation study (2018), the population of Djibouti had reached approximately 540,000.⁷ The nation’s population is concentrated in this city and this situation has not changed. *The Vision Djibouti 2035* predicts in 2020 the population of Djibouti City will increase to 640,000.

⁶ World Bank Development Indicators consulted on July 24, 2018:

(<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>)

⁷ The most recent data available at the time of the ex-post evaluation study in 2018; World Bank Development Indicators consulted on July 24, 2018: (<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>)

Table 1: Population of Djibouti City and Share of the Nation's Population Living in Djibouti City(Actual Population)

	2012	2013	2014	2015	2016	2017
Population of Djibouti City	503,044	512,356	521,840	528,627	535,469	542,413
Share of the Nation's Population Living in Djibouti City	74%	74%	74%	74%	73%	73%

(unit: person)

Source : World Bank Development Indicators

In *the Vision Djibouti 2035*, setting the goal of turning Djibouti into a business and tourism hub in Africa, Djibouti has embarked on large-scale infrastructure projects such as port facilities and railways. Also advancing seaside resorts and archeological tourism, it has aimed at increasing visitors to 500,000 annually by 2030.

With the development of transport infrastructure and tourism, improving the capabilities of fire fighting, fire safety and rescue are needed in order to respond to fires in these facilities.



Houses made of zinc surging in densely populated areas

While development is carried out, there has been a surge in houses made of zinc in densely populated areas, and this situation has not changed. This creates a potential fire hazard whereby

neighboring houses can be engulfed at the time of an outbreak. An improved response to challenging fire fighting activities in areas with narrow streets has been continuously required.

(2) Number of DNPC Call-Outs

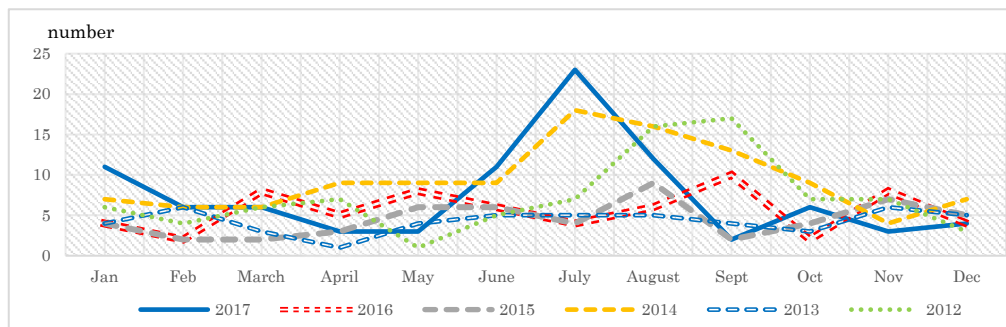
The number of DNPC call-outs is as below in Table 2. At the time of planning, DNPC was the only institution to provide emergency transport services in Djibouti. However, since 2013, hospitals in the city have gradually started to own their ambulances, and they are taking over the function to transport the patients of sudden illness and childbirth to the hospitals. At the time of the ex-post evaluation, DNPC mainly assumed the role of undertaking emergency responses to incidents such as fires and traffic accidents at the scene. Therefore since minor traffic accidents, sudden illness and childbirth, which do not require DNPC's rescuing services, the number of call-outs has been reduced.

Table 2: Number of DNPC Call-Outs (unit: number)

	Fires	Traffic Accidents	Sudden Illness	Childbirth
2012	86	985	483	36
2013	51	1030	325	16
2014	113	562	373	2
2015	54	117	215	0
2016	67	135	120	1
2017	90	90	111	3

Source : material provided by the executing agency

The number of call-outs in response to fires depends on fire occurrence conditions each year. Fires in Djibouti City frequently break out between July and September. This is because a dry hot wind called *hamsin* with dust storms causes fires that spread. The annual number of call-outs for fire fighting services is influenced by a mandatory factor along with natural conditions.



Source: material provided by the executive agency

Figure 2: Number of Call-outs in Response to Fires (by month)

(3) DNPC's Equipment

At the time of planning (2012), DNPC owned 17 vehicle units. However, seven of them were unusable due to leaking and corrosion of tanks. Also the performance of usable vehicles was degraded due to aging deterioration, and they often developed problems. Moreover, although 25 second-hand fire engines and six ambulances were supplied by the Japan Fire Fighting Association in 2001, 2007 and 2008. These were not usable because when they were supplied they had passed their serviceable lives of Japan, or parts such as hoses did not meet the Djibouti's standards. An absolute scarcity of vehicles became an obstacle to a quick response to fire fighting and rescue activities.

At the time of ex-post evaluation (2018), 26 vehicles deployed by this project and ambulances provided by Saudi Arabia in 2015 were mainly used. Among the vehicles supplied before the implementation of this project, 13 serviceable units were still kept in use.

DNPC has developed a plan to construct fire stations in all regional cities, and to deploy a

rescue force in the corridor between Djibouti and Ethiopia. Additional deployment of the fleet of 14 fire fighting vehicles and 20 ambulances is examined.⁸

Therefore the need to develop improved fire fighting capabilities has been continuously high from the planning stage to the time of the ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

This project falls under “The Living Environment Development Program”, a development agenda for “Social Infrastructure for Sustainable Development.” This agenda is a key area of *The Djibouti Development Plan* (implemented in July, 2011). This program aimed to prevent living infrastructure decline due to rapid population inflow in urban areas, and also the decline due to natural disasters such as drought whilst promoting healthy economic growth.

In addition, this project aimed to ensure the safety of Djibouti citizens by reducing the loss of housing to the poor as a result of fire. The project was expected to contribute to solutions targeted by the policy, “Human Security and the Reduction of Poverty,” a pillar of “The Sixth Tokyo International Conference on African Development.”

This project aimed to contribute to the area's safety by protecting the citizens of Djibouti City, and their safety and assets from disasters such as fires. This was done by strengthening the fire fighting equipment. This prevented a decline in living infrastructure in Djibouti where there were many poor people, and aimed at sustainable development. Japan's ODA policy's objectives are to ensure the safety of the population and reduce poverty. Thus the project is highly relevant to Japan's ODA policy.

Therefore this project is highly applicable to Djibouti's development plan and the development needs along with Japan's ODA policy. Thus the project's relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

(1) Fire Fighting and Rescue Equipment

As shown in Table 3 below, the equipment was procured as planned.

⁸ An interview with the director of DNPC on April 24, 2018

Table 3: Plan and the Actual of Equipment Procurement

Plan		Actual
Type of Vehicle	Amount	Implementation
10,000L Fire Tank Truck	4	As planned
3,500L Fire Pump Truck	4	
1,300L Pump Truck	3	
Large Chemical Truck	1	
Medium Chemical Truck	2	
25 m class Ladder Truck with Folding Boom	2	
Rescue Truck with Crane and Flood Light	2	
4WD Bonnet Ambulance	4	
Fire Equipment Carry Truck	4	
Total	26	

Source: material provided by JICA

For rescue purpose, the ambulances supplied by Saudi Arabia in 2015 were mainly used. While the average mileage of the ambulances was 210,000 km, the average mileage of the four ambulances supplied by this project was 2,300 km,⁹ approximately 1% of those from Saudi Arabia's. According to fire fighting and rescue crews, the reason was that the interiors of the ambulances supplied for this project were too small for rescue activities.¹⁰ These were the same car type as fire fighting equipment delivery vehicles. A vehicle which was more suited for use as an ambulance should have been chosen.



Inside of an ambulance supplied by this project



Inside of an ambulance supplied by Saudi Arabia

(2) Soft Component

An initial operational guidance at the time of the handover of equipment was given to approximately 75 people. As the planned numbers of attendees was unknown, a comparison

⁹ The mileages of four 4WD ambulances at the time of a field study in December, 2017 were as follows: 1,798 km; 2,489 km; 2,562 km; 2,213 km

¹⁰ The ambulances supplied by this project are tall in height and have good suspension. Thus they are used for rescue activities on bad roads. However, the interiors of these vehicles are narrow, and are filled with necessary equipment for rescue activities. Thus they have a problem with carrying out rescue activities inside the vehicles. On the other hand the vehicles from Saudi Arabia can carry equipment such as an oxygen inhaler, a fridge for storing blood for infusion and AED, and also can accommodate space for rescue activities (source: field study)

between the planned and the actual numbers cannot be made. However, as it was targeted at leaders and leader candidates, technical transfer to other personnel was expected. According to a staff member who is in charge of training, driving lessons are included in orientations for new employees, and technical operation is transferred within DNPC.

(3) Inputs Made by Djibouti

Inputs by Djibouti at the time of planning was as below. All were conducted as planned and equipment was deployed smoothly to each of the fire stations.¹¹

- (a) Transport (from the DNPC Headquarters to each fire station)
- (b) Adjustment and test driving of the deployed equipment, supplying necessary fuel for the initial operational guidance and water for fire fighting
- (c) Vehicle registration procedure for fire engines
- (d) Bank transfer fee incurred to process the authority for payment

3.2.2 Project Inputs

3.2.2.1 Project Cost

While the target project cost was 734,000,000 yen,¹² the actual cost was 635,000,000 yen. Thus it was within the plan (87% to the planned). The quantity and specification of the outputs were as planned. Because bidding took place, it was possible to procure equipment at a lower cost than planned.

3.2.2.2 Project Period

While the target period was 25 months from April, 2013 to April, 2015,¹³ the actual period was 18 months from April, 2013 to September, 2014. Thus it was within the plan. The shorter period was due to the following factors: bidding for equipment took place four months earlier; and procuring equipment took place smoothly.

Both the project cost and the project period were within the plan. Thus the project's effectiveness is high.

3.3 Effectiveness and Impacts¹⁴ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effect

¹¹ An interview with the director of DNPC on April 24, 2018

¹² Although information on the actual amount of the funds supplied by Djibouti was not given, the injection was made as planned. Thus the total project cost was calculated on the condition that all the projected funds were used

¹³ A comparison was made between the duration of the planned period and the actual period from the signing of a grant agreement to the day that the client endorses the completion certificate

¹⁴ In order to judge effectiveness, impacts were also taken into consideration for rating

(1) An Improved Response Time¹⁵ Required to Attend another Fire Site by Improving and Upgrading Fire Pumps and Fire Tank Trucks¹⁶

Baseline, target and actual response times are as below in Table 4. While the target time was 3-6 minutes, the actual time was 2-4 minutes. Thus the response time was significantly shortened. At the time of the planning, DNPC owned 17 vehicle units. However, due to leaking and corrosion of tanks by salt damage and problems, the number of usable vehicles were limited to 10 units. In the case when the second fire broke out, the force that had already at the first fire had to deploy from the site to another. Due to implementing this project, the number of fire pumps and fire tank trucks available to be dispatched increased. Even if a fire fighting force is already deployed, other forces now can be dispatched to other fire sites.

Table 4: Response Time Required to Attend another Fire Site

	Baseline (2012)	Target (3 rd year after the completion of the project)		Actual (2015-2018)	
Situations	Dispatch from another fire site where force attended	Dispatch from a fire station	Possible prompt dispatch	Dispatch from a fire station	Now it is possible to dispatch promptly
Time	6 to 10 minutes	3 to 6 minutes	Shortening 3 to 4 minutes	2 to 4 minutes	Shortening 4 to 6 minutes

Sources : baseline and target provided by JICA's material, and actual by the executing agency in the questionnaire

(2) Response Time for Arrival and Fire Dousing Commencement after the Introduction of Small Vehicles in Areas with Narrow Streets

Baseline, target and actual response times are as below in Table 5. The introduction of small vehicles has made it possible to get closer to a fire site (80-120 m). Also the number of extended hoses has been reduced. While a response time between arrival and fire dousing commencement used to be 5 to 7 minutes, when two fire fighters extend the hoses, it has now been reduced to between 1.5 and 3 minutes. When one fire fighter extends hoses, it was reduced to 3 to 6 minutes from 7 to 12 minutes. The target time, reducing 3 to 4 minutes, has been achieved.

DNPC has continued to give fire fighting training. Mastering accurate hose extension has also contributed to shortening the response time. Moreover, increases in the number of vehicles and crews has made it possible to douse fires from various sides at large-scale fires.

¹⁵ Time from dispatch to fire dousing commencement after arriving at a fire site

¹⁶ In Djibouti City, there are about 150 hydrants, but they can't be used as the reliable fire fighting water source, because most of them are broken, and frequent cut-off the water in the city. Therefore, Fire Pumps are needing to deploy with Fire Tank Trucks for fire fighting.

Table 5: Response Time for Arrival to Fire Dousing

	Baseline (2012)	Target (3 rd year after the completion of the project in 2018)		Actual (2015-2018)	
Estimated Situation	Arriving at a location 200-300m away from a fire site by a medium-sized vehicle	Arriving at a location 80-120m away from a fire site by a small vehicle	As close to a fire site as possible	Now possible to arrive at a location 80-120m away from a fire site by small vehicles	Now possible to arrive closer to a fire site
Number of Extended Hoses	10-15 hoses	4-6 hoses	Reducing 6-9 hoses	80m : 6 hoses (4 big / 2 small) 100-120m :7 hoses (6 big / 1 small)	Reducing 4-8 hoses
Time Required	5-7 minutes with two fire fighters (7-12 minutes with one firefighter)	2-3 minutes	Shortening 3-4 minutes	80 m:3-5 minutes 120m:5-6 minutes	1.5 to 3 minutes with two fire fighters. 3-6 minutes with one fire fighter

Sources: baseline and target provided by JICA. Actual from an interview at the executing agency.

Notes1: Target at the time of planning was calculated based on an assumption that the length of a small vehicle's hose was 40% of the length of a medium-sized vehicle's hose

Notes2: At the time of planning it took one minute to extend one hose. Thus it was estimated that there would be a reduction of five hoses if a small vehicle could get a 100m closer to a fire site compared with a middle-sized vehicle. It was also estimated that a 2.5 minute shortened duration would be achieved with two crew members operating extended hoses.

3.3.1.2 Qualitative Effects

At the time of planning, due to the implementation of this project, qualitative outcomes such as improved resident safety and security was expected. As qualitative outcomes fall under this project's impact level, they are intergraded into Section 3.3.2.

The expected outcomes according to vehicle type, and performance achievements are shown below.¹⁷ All vehicles have achieved the expected outcomes.

¹⁷ The baseline for qualitative effects was not set in the ex-ante evaluation study. However, it was added to the ex-post evaluation study in order to assess how the project has contributed to strengthening the overall fire fighting capabilities of DNPC

Table 6: The Expected Outcomes and Performance Achieved of Each Vehicle

Expected outcomes (2012)	Performance achievements as at ex-post evaluation (2015-2018)
Small Fire Pump Truck	
<ul style="list-style-type: none"> • As it can get into narrow streets, it will become possible to douse fire at a point closer to a fire site • As the number of extended hoses to be used is reduced, it will become possible to douse fire earlier 	<ul style="list-style-type: none"> ○ Achieved: it has become possible to douse fire at a point closer to a fire site, and the number of extended hoses to be used has been reduced. An increase in the number of vehicles has made it possible to douse fire more effectively from various sides
Fire Tank Truck	
<ul style="list-style-type: none"> • Vehicles' water carrying capacity is increased so that it becomes possible to respond to controlling engulfing fires • The efficiency of fire fighting pump equipment (2,000L/min.) will double in comparison to existing levels. This will make it possible to connect four hoses, and to carry out a wide range of fire fighting activities 	<ul style="list-style-type: none"> ○ Achieved: <ul style="list-style-type: none"> • Now it has become possible to respond to controlling fires from various sides • Now it has become possible to use four hoses.
Ladder Truck	
<ul style="list-style-type: none"> • Can directly carry out rescue and fire fighting activities from streets for incidents in medium density and high-rise buildings • To own two ladder trucks and to be able to dispatch them in the case of simultaneous outbreaks in medium density and high-rise buildings • Can douse fire in a large-scale outbreaks affecting blocks in dense residential areas at high vantage points from surrounding buildings • At an outdoor tank fire, can spray fire extinguishing foam at high levels to access fire inside the tank 	<ul style="list-style-type: none"> ○ Achieved: <ul style="list-style-type: none"> • Now it has become possible to use two ladder trucks • These vehicles were never used in fires in medium density and high-rise buildings or in a tank fire. However, training for these incidents is being conducted • Can be used as a water fire pump truck if fire extinguishing chemical foam is not used
Rescue Truck with Crane and Flood Light	
<ul style="list-style-type: none"> • To improve survival rate by early response rescues • To be able to dispatch to multiple rescue sites by the deployment of two ambulances • To be able to carry out rescue activities at night with flood lights 	<ul style="list-style-type: none"> ○ Achieved: <ul style="list-style-type: none"> • Now used at incidents sites at night • The availability of data on survival rate is unknown. However, flood lights have been used in night rescues
Ambulances	
<ul style="list-style-type: none"> • To be able to provide quick response first aid for sudden illness and injuries, and to be able to assist quick response for hospitalization 	<ul style="list-style-type: none"> ○ Partially Achieved: Other donor's ambulances are mainly used however the ambulances by the project are especially serviceable for bad roads
Fire Equipment Carry Truck	
<ul style="list-style-type: none"> • To be able to supply manpower and materials at large-scale incidents and to strengthen the efficiency of fire fighting forces • Carry chemical equipment so that it can respond safely to a chemical fire 	<ul style="list-style-type: none"> ○ Achieved: <ul style="list-style-type: none"> • Used as the leading vehicle at a fire site • Chemical equipment was dispatched to a fire at a supermarket in the summer of 2016 due to proximity of the fire to a gasoline station.

Sources: The expected effects by JICA, the performance achievements from an interview with the executing agency.

3.3.1.3 Contribution and Obstacle Factors

Securing water for fire fighting activities has greatly contributed to the improved project effect. At the time of planning, a water point near the Djibouti International Airport was the only water source. Thus a round-trip became a loss of time. At the time of the ex-post evaluation water tanks were installed in each of the fire stations along with eight other locations in the city. Now a ready water supply has become possible. Water tanks were installed in 2013 on the suggestion of the newly appointed DNPC director. He visited Kobe for training in Japan where learned the important role of water tanks,¹⁸ and so he implemented the introduction of water tanks. The Agriculture Ministry prioritizes water supply to these tanks as fire fighting activities are regarded as vital.



A water tank in the Sans-fil Fire Station

Due to increased traffic volumes in the city center, arrival times at outbreaks has been affected. This has become an obstacle in the project's efficacy. Also when fire breaks out in residential areas, crowds gather so that measures such as traffic control and access restrictions are needed. Liaison with the police is essential.

As mentioned above, the project has achieved both targeted operational and outcome indicators. Thus effectiveness of the project is high.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The expected impacts of this project were “to contribute to ensuring area's safety” and “to protect Djibouti citizens and their safety and assets from disasters such as fires.” There are no baseline quantitative indicators for these. The impacts are assessed by analyzing the causes of disasters¹⁹ and the project's contribution to the improved responses of DNPC to disasters along with a qualitative survey regarding area's safety.²⁰

¹⁸ The Fire Fighting Seminar for Senior Managers II took place in 2005

¹⁹ Since the beginning of the implementation of the project, there have been no big natural disasters. Representative disasters were fires and traffic accidents

²⁰ The subjects for the qualitative survey were 13 fire fighters from 3 fire stations, who are the direct recipients of the project, and 9 residents and 4 shop owners who received fire fighting services. The subject fire sites for the survey of the residents and shop owners were selected upon consultation with the executing agency as follows; ① a residential area in the Balbala district where 26 houses were partially or completely destroyed in December, 2017; ② a residential area in the Boulaos district where 100 houses were completely or partially destroyed in July, 2017; and ③ a supermarket which was completely destroyed in July, 2016, caused by a faulty electrical appliance

3.3.2.2 The Causes of Disasters and the Contribution of the Project

(1) Fires in Djibouti City

In interviews with fire fighters, almost all answered that the major causes for fires were electric wires and appliances (12 people: 92%). Especially, in densely populated areas, major causes of fires were electric wires which are used extensively to steal electricity and poor-quality electric appliances from overseas. The next biggest cause was *hamsin*, a dry wind with dust storms, in summer (11 people: 85%). Even small fires in the kitchen or with matches will combust and expand rapidly due to the strong dry winds of *hamsin*. Thus on the radio and TV, attention is drawn to fire safety during the summer time.



Fire debris clean-up of 26 houses in a densely populated area

Table 7: The Cause of Fires

Major causes for fires in the Djibouti City (multiple answers possible)	Answers	Ratio
Electric wires and appliances	12	92%
<i>Hamsin</i>	11	85%
Children playing with fire	5	38%
Using fire carelessly	4	31%
Burning rubbish	3	23%
Smoking <i>hookah</i> carelessly	1	8%

Source: Interviews with fire fighters

(2) DNPC's Response to Fires

A series of three fires, including a large-scale fire which took place on the same day were used as examples of disasters that occurred after implementing the project.

On July 18, 2017, it was a very hot day with temperature exceeding 50 degrees in the morning and *hamsin* took place. At 6 a.m. a large-scale fire took place, engulfing a part of the Balbala District. A strong wind blew. As the wind blew in various directions, the direction of engulfment could not be predicted. DNPC dispatched all vehicles, except a special one, and the fire fighters carried out activities by surrounding the areas under threat of the fire. The first fire was large-scale so that it took six hours to extinguish. However, they succeeded in preventing engulfment. The second fire, which occurred immediately after the first one, was extinguished in one hour. The third one was extinguished in one and a half hours.

Beside these fires described above, recent large-scale fires are shown in Table 8 below.

The vehicles supplied by this project are being used effectively in responding to large-scale

fires such as in the example above, to a sequence of fires, and also in the management of hazardous goods.

Table 8: Large-Scare Fires and DNPC's Responses

Time	Fire Sites, Causes, Damages	DNPC's Responses
July 2016	The Boulaos District, a densely populated area. Carelessly handing a fire. Engulfed by <i>hamsin</i> . 100 houses completely or partially destroyed. No casualties.	Fire pumps and fire tank trucks were dispatched
July 2016	A supermarket in the Boulaos District. Ignited by a faulty electrical appliance. Completely destroyed. Engulfing surroundings. No casualties.	Fire pumps were dispatched along with a chemical fire truck because there was a potential to engulf a gasoline station.
Dec. 2017	The Balbala District, a densely populated area. A child played with fire. 26 houses completely destroyed. The child was hospitalized.	Four fire pump trucks and four fire tank trucks. Dousing the fire on two fronts. An ambulance transported the injured child.

Source : interviews with the executing agency

3.3.2.3. The Improvement of Citizens' Living Environment

According to a qualitative research of residents and shop owners, the response was that 12 people (92%) had now much stronger faith in fire fighting activities, and one person (8%) had now faith to some extent. Regarding the fire fighting services of DNPC (Table 10), everyone rated it as good.

Appreciation for fire fighting capabilities manifested in the positive responses. However, the arrival time of fire engines was considered to be late. So they rated it as good rather than very good.

Table 9: Change in Faith in Fire Fighting Capabilities

Do you think your faith in fire fighting capabilities has changed through experiencing fires	Residents (Number)	Shop owners (Number)	Ratio
Faith has become stronger	8	4	92%
Faith has become stronger to some extent	1	0	8%
No change	0	0	0%
Faith has become weaker	0	0	0%
Faith has become greatly weaker	0	0	0%
No response	0	0	0%

Source: A qualitative survey of residents and shop owners

Table 10: Fire Fighting Service Rating

Rating of DNPC's fire fighting services	Residents (Number)	Shop owners (Number)	Ratio
Very good	0	0	0%
Good	9	4	100%
Fair	0	0	0%
Bad	0	0	0%
Very bad	0	0	0%
Don't expect anything	0	0	0%

Source: A qualitative survey of residents and shop owners

In an interview about their response at the time of fire outbreak (Table 11,) the largest answer was: “reported a fire station” (46%.) At the time of planning, even a fire broke out, residents and shop owners did not report fires to a fire station as they did not have faith that a fire engine would be dispatched. This was a problem at the time. However, more than half of the subjects now reported to a fire station so the belief in the new fire fighting capacity and faith in them has improved.



An emergency call center in the DNPC

Table 11: Response at the Time of Fire Outbreak

How did you respond to a fire when you noticed it? (Multiple answers possible)	Residents (Number)	Shop owners (Number)	Ratio
Reported to a fire station	4	2	46%
Escaped from the building	5	0	38%
Told neighbors and people in the buildings about fire outbreak	2	1	23%
Waited to be extinguished inside the buildings	3	0	23%
Tried to extinguish the fire	2	0	15%
Went to see the fire	0	1	8%
Did not do anything	0	0	0%
No response	1	0	8%

Source: A qualitative survey of residents and shop owners

3.3.2.4 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

At the time of planning, the project was considered to have little or no negative impacts on the natural environment. According to the documents provided by JICA and the confirmation with DNPC,²¹ no critical impacts on the natural environment are noted.

(2) Resettlement and Land Acquisition

This project was aimed at strengthening the equipment. Thus the resettlement of residents and land acquisition did not take place.

(3) Unintended Positive/Negative Impacts

According to an interview with fire fighting crews, the equipment supplied by Japan was well maintained and able to be used for a long period of time. They were far better than fire fighting and rescue equipment owned by other African countries and are the pride of the fire fighting crews.

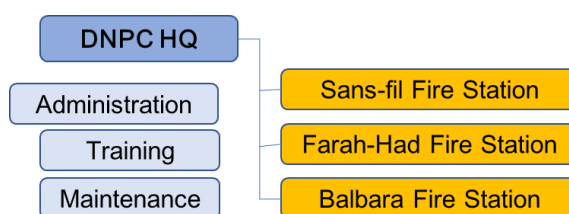
²¹ The JICA Environment and Social Consideration Guideline (April, 2010)

Thus this project has achieved its objectives as planned. Therefore the effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

DNPC is under the umbrella of the Ministry of Interior, and is the administrative body which supervises fire fighting and rescue services. This has not changed since the time of planning. At Headquarters there are Administration, Training, and Maintenance Sections. All fire stations are under Headquarters. At the time of planning (2012,) there were only two fire stations in Farah-Had and Balbala. However, at the end of 2012, a new fire station in Sans-fil has opened. The contents of the day-to-day workload, roles in fire fighting, ambulance services and reporting line are delineated.



Source: based on the interview with the executive agency, the external evaluator drew

Figure 3: Organizational Structure of DNPC

At the time of planning (2012) there were 181 staff members in DNPC. At the time of the initial scheduled project completion (2015), Headquarters and the three fire stations, capacity of two operating shifts with a planned increased to approximately 300 people, were to function the equipment supplied by this project. At the time of the ex-post evaluation (February, 2018), the system was run by 367 staff members; a figure above the projected estimate. Also the Headquarters system has now been established.

At the time of planning, according to a staff in charge of training at DNPC, fire fighters were over 40 years of age. Due to the introduction of a retirement system in 2013 and recruiting new staff (aged between 18 and 25),²² the ratio of young staff members has increased. Recruiting new staff has made it possible to increase the number of crews with a positive attitude to training, high morale and good physical strength. This has helped strengthen the efficiency of the fire fighting system.

²² Retirement is for those over 60 or for those who have been employed for over 25 years

Table 12: Number of DNPC Staff

(unit: person)

	Fire Station				DNPC HQ			Total
	Sans-fil	Farah-Had	Balbara	Sub-total	Admin.	Maintenance	Training	
Project Planning: 2012	—	85	64	149	11	11	10	181
Project Completion: 2015	90	90	75	255	27	12	3	297
Ex-Post Evaluation: 2018	115	98	95	308	31	22	6	367

Source: material provided by JICA and executing agency

According to the director of DNPC, there are the following plans:

- The construction of fire stations in all five states in Djibouti;
- The deployment of a rescue force to respond to accidents in the corridor between Djibouti and Ethiopia. For these plans, an additional 500 members are expected to be hired; and
- Furthermore, the establishment of a fire fighting school has been planned.

DNPC has been in collaboration with the following related institutions below in order to respond to fire fighting and rescue activities in Djibouti, and in order to ensure area's safety. Staff have proposed a further collaboration with the city to review the safety standard of buildings.

Table 13: DNPC Collaboration with its Related Institutions

Names of Institutions	Contents
Police	Traffic control at fire or accident sites, restricted access, emergency reporting
Djibouti Electric Company	Shut down power around fire sites in order to prevent electric shock to the population or crews during fire fighting operations
Ministry of Agriculture in Djibouti	Prioritize water supply for fire fighting operations even in time of drought or water shortages
Foreign troops	Cooperation in the case of large-scale fires and response to special incidents such as airport fires or in oil complexes
Djibouti City	On National Foundation Day parade, conducting fire fighting drills in the city
Hospitals	Accommodating patients with emergency transport and treatment

Source: Based on interviews with the executing agency, the external evaluator compiled

Thus the executing agency's system has been established. Also a sufficient work force has been secured. In addition, collaborations with institutions related to fire fighting and rescue activities in Djibouti City are established. Therefore there are no problem found with operational and maintenance systems.

3.4.2 Technical Aspect of Operation and Maintenance

3.4.2.1 Fire Fighting Skill

DNPC's recruits must undergo the following training: (a) first aid; (b) emergency care

following first aid procedures including how to use emergency equipment; and (c) Fire fighting education and practical training. After employment all crew members undertake training to maintain or upgrade their skills four times a year (every three months.)

As part of daily operations, daily drill is carried out at commencement of work. Also unannounced dispatch drills are carried out randomly in order to respond to effectively to various issues such as fires.

Besides these, fire fighting skills upgrades are conducted as being out sourced.²³ Proactively, young leaders have been sent to train overseas in order to educate the next generation of leaders. This also has contributed to upgrading fire fighting tactics to respond to various types of fires according to training plans. Sometimes DNPC crews have been sent to work in disaster relief and peacekeeping work to the neighboring countries. Skills and training acquired in these roles have also been utilized.

3.4.2.2 Technical Aspects of Operating and Maintaining Equipment

A daily check-up of equipment is carried out at the time of a shift change. Cleaning the vehicles, and choking gasoline, water, oil and tires, then crews in charge of driving each vehicle then report to the maintenance section manager. In the cases when faults are found in vehicles, the staff report to the manager immediately, and the maintenance section handles them. Therefore there is no log for each vehicle, but no issues. After returning from fire fighting activities, the vehicles are washed, and water is refilled.

A regular check-up is carried out every 5,000 km, and the oil and filter are changed. The under body of the vehicles is checked every 2 to 3 months. Inspection and maintenance are recorded in a log book, which is kept in each vehicle. Each fire station is equipped with a pit and crane. The skills for basic maintenance of the vehicles is sufficient now, however the director of DNPC presented a vision for training technicians to service the electrical systems and computer controls of vehicles. The operational manuals in French are kept by the officer who is in charge of documents and fire crews can borrow it if needed. The spare parts supplied by the grant aid are kept in a storage,²⁴ and inventory has been controlled by computer. Every December, inventory control has taken place.

Therefore there are no problem observed with the technical aspects of fire fighting skills and operation and maintenance of vehicles.

²³ In 2016 DNPC dispatched 21 firefighters for fire-fighting skill training in Saudi Arabia, and commander-class firefighters to various rescue tactics training including mountain sites in West Africa. In 2017 for fire-fighting skill trainings, two firefighters were sent to Burkina Faso, and two to France. In 2018, trainers of French Fire Agency were invited to Djibouti, and conducted fire-fighting skill trainings for firefighters and commanders.

²⁴ Sufficient amount of spare parts for 5 years after project completion were provided, and the list of dealers for each vehicle was provided, however, as mentioned in “Status of Operation and Maintenance” in the Sustainability section, DNPC was having problems to find some spare parts, and the faults of vehicles were not fixed.

3.4.3 Financial Aspect of Operation and Maintenance

The budget of DNPC, a part of the Ministry of Interior, is controlled by the Ministry of Finance. Due to the matter with confidentiality, its budget is not disclosed. Thus data on its budget and expenditure are not provided.

According to the director of DNPC, a sufficient budget for fire fighting and rescue activities is secured and the renovation of fire stations advanced. Based on a national mid-term plan, the budget for the following development of fire fighting system was requested to cover:

- the construction of fire stations; and
- the hiring additional crews.

According to interviews with staffs, fire stations have a sufficient number of staff and fuel, and operations and maintenance are carried out properly.

Therefore there are no problem with the financial sustainability of its operation and maintenance aspects.

3.4.4 The Status of Operation and Maintenance

The status of operation and maintenance of the vehicles supplied by the project was confirmed based on interviews with crews along with a field study.

At the time of the ex-post evaluation, fire stations in Farah-Had and Balbala were under renovation. Thus all the vehicles by the project were kept in the Sans-fil Fire Station. The fire station was paved and there were roofed garages. After the completion of the renovation at the two fire stations, vehicles were expected to return to each fire station.

The status of operations and maintenance of the vehicles was good. Every morning check-ups and cleaning were carried out and all vehicles readied for dispatch. However, the faults listed below have not yet been repaired. DNPC learned that the dealers in Djibouti could neither procure nor repair the vehicle parts. As the vehicles were still serviceable, they were used as they were, and DNPC could not find an overseas dealer or an alternative repair method.

Table 14: Faults of the Equipment and DNPC's Responses

Vehicles	Faults of the Equipment and DNPC's Response
3,500L fire tank trucks (2 units)	One unit: Two hose connection areas of four were corroded. The other unit: one corroded area. When fires were doused, water leaked. The connection parts should be replaced. There is no dealer in the country that can procure the parts and repair, and DNPC has not enquired of overseas dealers. The truck are used as they are.
Rescue truck with crane and flood lights (1 unit)	There is a problem with a truck's electrical system. The flood lights cannot be stored by the remote controller. After use they store the flood lights manually. As there is no technician who can fix this in DNPC or Djibouti. Nothing further has been done.

Source: A field study and interviews with the executing agency



Corroded areas in hose connection parts



The rescue truck could not store flood lights

All the vehicles supplied by the project are maintained in a condition ready for dispatch. However, some faults are not repaired. There are some problems with the status of operations and maintenance.

Therefore there are no problem found with the institutional, technical and financial aspects of operations and maintenance. However, there are some problems with the status of operations and maintenance. Thus the sustainability of the project is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to protect citizens and their lives, safety and assets from disasters such as fires and to contribute to community security by improving fire fighting capabilities in Djibouti City through replacing and strengthening the fire fighting and rescue equipment implemented by the ODA grant aid project in 1998.

The project was in line with the national development plans of Djibouti and the development needs which prioritize the protection of its citizens from disasters. Also it was consistent with Japan's ODA policies at the time of planning. Thus its relevance is high.

A target fire response time to attend another fire site was achieved by improving and upgrading pump and tank trucks. A target time for arrival and fire dousing commencement was achieved by the introduction of small vehicles in areas with narrow streets. Also other fire fighting and rescue vehicles have demonstrated the expected target function. Due to the improvement of fire fighting capabilities, the response to large-scale fires in dense residential areas, the response to a sequence of fires, and the response to managing hazardous materials was performed more effectively. According to the qualitative survey of residents and shop owners who had experienced fires, the response was that they now had more faith in fire fighting capabilities. Thus its effectiveness and impacts are high.

Provision of equipment and an initial operational training at the time of handover were close to target, and both the project cost and the project period were within the plan. Thus the project efficiency is high. No major problems have been observed in the institutional, technical and financial aspects of the executing agency. However, there are some problems in equipment management conditions. Therefore the sustainability of the project is fair.

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

4.2 Recommendations

4.2.1. Recommendations to the Executing Agency

All vehicles be maintained ready for dispatch. However, 3,500 liter pump trucks has developed a water leak. Its hose connection areas have become corroded and water is leaking when fires are doused. The connection parts have not been replaced. And the flood lights of a rescue truck have an electrical system failure which has not been addressed. However, the vehicles are still used as they are. The maintenance section of DNPC, the executing agency, expected to find a dealer which can procure the connection parts or needs to procure substitutable parts, and an engineer who can fix the rescue truck's flood light electrical system.

4.2.2. Recommendations to JICA

None

4.3 Lessons Learned

(1) Selecting Purpose Suited Vehicles

The average mileage of the ambulances supplied by this project in 2014 is just about 1% of the mileage done by ambulances supplied that of Saudi Arabia. The reason was that this type of vehicle is for fire fighting equipment delivery so that the interiors are too small for rescue activities. On the other hand, they are tall in height and have good suspension. Thus they are used for rescue activities on bad roads. Among all, they should have chosen some larger vehicles or larger and could handle bad roads. When it comes to selecting vehicles, specific ones suited to purpose should have been chosen.

(2) Necessity of Collaboration with Related Institutions

DNPC has developed collaborative relationships with the police, military and hospitals where the injured will be transported along with the following institutions:

- The Ministry of Agriculture, which prioritizes supplying water for fire fighting;
- The Djibouti Electric Company, which shuts down power distribution in order to prevent electric shock to the population or fire fighters during the operations;
- Djibouti City, which practices an awareness campaign for fire prevention in summer when many fires break out, and which organizes rescue drills in hotels using ladder trucks.

Also fire fighters have proposed a review of building standards for fire prevention. Establishing collaborative relationships with these institutions are essential in order to realize the protection of its citizens and ensure community safety in a comprehensive way.