

The Republic of Tajikistan

FY2017 Ex-Post Evaluation of Japanese ODA Grant Aid Project

“The Project for Improvement of Equipment for Road Maintenance in Khatlon Region and Districts of Republican Subordination”

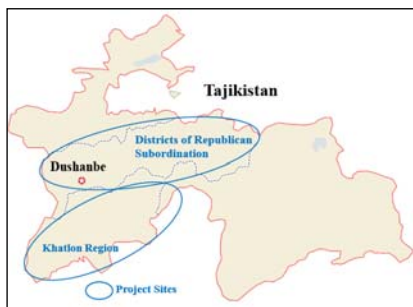
External Evaluator: Hisae Takahashi, Ernst & Young ShinNihon LLC.

0. Summary

This project aims to ensure proper maintenance of trunk roads in the Khatlon region and districts under republican subordination of Tajikistan by supporting the development of road maintenance equipment to State Enterprise of Transport Management (SETMs) managing the target area, thereby contributing efficient freight and passenger transportation. Its purpose is consistent with national development strategy emphasizing road development as a means of economic development, national development needs with roads damaged due to the civil war and progressive aging. Furthermore, it has high coherence with Japanese ODA policy, hence its relevance is high. Although the project cost was within the plan, the project period exceeded the plan due to the extended bidding period in response to changes in the country’s regulations on provision of equipment. Accordingly, the project efficiency is fair. Implementing this project allowed road repairs using hot asphalt having high-strength, helping improve strength and durability for part of the repaired road. It also helped boost efficiency in terms of achieving time, cost and labour savings otherwise required for winter snowfall and repair work. In this section, road development projects were also undertaken with the support of Japan, which helped significantly shorten transportation and travel time, thanks to improved road conditions combined with the contribution of this project. However, because the repaired area was limited due to lack of budget, the effectiveness/impact of this project is fair. Minor problems of Operation and Maintenance (O&M) for the plants and equipment provided in this project were confirmed in the institutional and financial aspects of the executing agency and O&M condition, thus the project sustainability is considered fair.

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

1. Project Description



Project Locations



Asphalt Plant

1.1 Background

Tajikistan is an inland country and most of its domestic freight and passenger transportation relies on roads. Accordingly, domestic trunk roads constitute the key component in the main economic infrastructure; supporting not only national logistics but also trade with surrounding countries. Most of the 30,000 km or so of road network developed in Tajikistan was constructed during the Soviet era and it has since been subject to serious age-related damage and dilapidation as well as the civil war occurring after independence in 1991, which, in turn, pushed up transportation costs even further. In 2011, the Tajikistan Government developed the *National Target Development Strategy for Transport Sector* to solve the abovementioned issue by prioritizing the tasks of constructing, repairing and maintaining trunk roads. In Tajikistan, the Ministry of Transport controls about 14,198km of the international and domestic trunk road network, while the SETMs and State Enterprise on Highway Maintenance (SEHMs) operate and maintain the roads. SETMs manage and supervise SEHMS under their control, while the SEHMs check and repair road pavements, bridges and facilities. However, roads were not properly maintained due to a lack of the necessary equipment and aging, spawning factors that have progressed damage to and degradation of the road.

Under such circumstances, the Tajikistan Government requested assistance from the Government of Japan to procure equipment required to maintain roads in the Khatlon Region and Districts of Republican Subordination, whereupon the current Project was implemented to contribute to proper road maintenance and efficient freight and passenger transportation by developing road operation and maintenance.

1.2 Project Outline

The objective of this project was to achieve an appropriate operation and maintenance of the road by providing the road maintenance equipment¹ to SETMs and SEHMs, those responsible for the trunk roads to connecting Dushanbe suburb, Kurgan-Tyube² and Nizhniy Pyandzh, thereby contributing to the improvement of efficiency of the freight and passenger transportations.

Grant Limit / Actual Grant Amount	1,344 million yen / 1,339 million yen
Exchange of Notes Date/Grant Agreement Date	March 2013 / March 2013
Executing Agency	Ministry of Transport
Project Completion	October 2014
Main Contractor	Katahira & Engineers International

¹ Including asphalt plant and crush plant, 118 facilities and equipment comprising 29 types which are necessary for road maintenance were provided. For details of the equipment, see "Table 1 Planned and actual outputs".

² Kurgan-Tyube was renamed Bokhtar in February 2017. In this report, former name, Kurgan-Tyube, is unified to be used.

Main Consultant	ITOCHU Corporation
Basic Design	July 2012 - February 2013
Related Projects	<p>Technical Cooperation</p> <ul style="list-style-type: none"> • The Project for Improvement of Road Maintenance (2013~2016) • Country Specific Trainings (2016, 2017) "Training for Road Maintenance Equipment" <p>Grant aid</p> <ul style="list-style-type: none"> • The Project for the Improvement of Dusty-Nizhniy Pyandzh Road (Phase 1 : 2006) (Phase2 : 2009) • The Project for Rehabilitation of Kurgan Tyube - Dusti Road (Phase 1: 2008) (Phase II: 2011) • The Project for Improvement of Equipment for Road Maintenance in Sughd Region and the Eastern Part of Khatlon Region (2016) <p>Asian Development Bank</p> <ul style="list-style-type: none"> • Dushanbe-Uzbekistan Border Improvement Project (2011~2014) • Dushanbe-Kirgizstan Border Road Rehabilitation Project (2007~2009) • Dushanbe – Kurgan-Tyube – Danghara – Kulyaba Road Improvement Project (2001~2005) <p>Chinese Government</p> <ul style="list-style-type: none"> • Dushanbe – Danghara Road Improvement Project (2009~2012) • Dushanbe – Chanak (Border with Uzbekistan) Road Improvement Project (2006~2011)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young ShinNihon LLC

2.2 Duration of Evaluation Study

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

Duration of the Study: October, 2017 – December, 2018

Duration of the Field Study: December 10th, 2017 – December 22nd, 2017,

April 4th, 2018 – April 10th, 2018

3. Results of the Evaluation (Overall Rating: C³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Consistency with the Development Plan of Tajikistan

At the time of project planning, the *National Development Strategy (NDS)*, prepared in 2007, defined the long-term target for socioeconomic development, priority level and directions to improve the level of citizen's living. This strategy underlined prioritized issues for infrastructure, telecommunication, energy and industrial development and showed the importance of improving the international trunk road from a sustainable economic development perspective⁵. In the transportation sector program, *the National Target Development Strategy for Transport Sector of the Republic of Tajikistan to the Year 2025*, announced in 2011, which aimed to establish a transportation network infrastructure, meeting citizens' needs, has identified the following short-, mid- and long-term objectives to be attained⁶:

Short-term objectives (2010-2014): 712 km rehabilitation, 5,291 km maintenance

Mid-term objectives (2015-2019): 1,312km rehabilitation, 5,291km maintenance

Long-term objectives (2020-2025): 2,141km rehabilitation, 5,291km maintenance

In *NDS 2016 to 2030* (2016) at the time of ex-post evaluation, the draft of the *Mid-Term Development Plan 2016 to 2020*, targeted for the first five years, was formulated and expected results, "Improvement of transportation which encourages active economic circulation, reduced transportation cost and improved safety" are included⁷. The sector plan as of the project planning, *Tajikistan National Republic of National Transport Development Special Program until 2025*, is also effective at the time of ex-post evaluation. The program continues to emphasize the need to develop transportation infrastructure as a cornerstone of economic growth, such as aged roads that were developed during the former Soviet era and roads that were ruined and destroyed in the civil war.

As mentioned above, Tajikistan's development strategy has underlined the importance of improving people's lives and developing infrastructure to boost economic development, particularly trunk roads and improving traffic transportation until the time of ex-post evaluation since planning. The transportation sector plan has also stressed the needs for road operation and maintenance. This project procured the required equipment to SETMs operating and maintaining important trunk roads in the country and is thus consistent with Tajikistan's development strategy.

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

⁴ ③: High, ②: Fair, ①: Low

⁵ Source: document provided by JICA, ODA data book 2008.

⁶ Source : *Preparatory Survey Report on the Project for improvement of equipment for road maintenance in Khalton region and districts of republican subordination in the Republic of Tajikistan (2013)* (JICA) in Japanese version, p19. provided by JICA

⁷ *National Development Strategy of the Republic of Tajikistan for the Period up to 2030*, p.8, pp.22-23, p.76

3.1.2 Consistency with the Development Needs of Tajikistan

In Tajikistan, a landlocked country, a road network of approximately 30,000 km has been established, on which domestic logistics and passenger transportation are heavily dependent. Conversely, at the time of planning, most roads were damaged due to the civil war after independence and aging, while progressive deterioration, increased transportation time due to transportation bottlenecks and insufficient maintenance have hindered economic development. SETMs are handled by the Ministry of Transport, which is responsible for maintaining and managing roads, including supervisory guidance of the SEHMs, which undertake inspection and repair of road pavements, bridges and facilities. However, at the time of planning, road maintenance and management was insufficient due to shortage and aging of the required equipment, which resulted in progressive breakage and aging of the road⁸. At the time, the above *Special Program on National Transportation Development in the Republic of Tajikistan until 2025* cited the “capital city of Dushanbe - Kurgan-Tyube - Nizhniy Pyandzh” as important road section. This section was managed by the SETMs where the project procured the equipment, whereupon its maintenance and management needs were also emphasized.

Even at the time of ex-post evaluation, 65% of domestic cargo transport and 99% of passenger transport depended on road traffic⁹, while domestic arterial roads were considered key transportation infrastructure within the country’s economy and society. Meanwhile, most national roads were still built during the former Soviet era and are ever-more prone to damage and aging. The section where Kurgan-Tyube and Hissar SETMs provided equipment and oversaw maintenance and management includes the most important international highway connecting the capital Dushanbe and a border town of Afghanistan. In particular, the Khatlon region borders with Afghanistan and as well as being affected by the volatile situation in Afghanistan, is also considered to be the area worse affected by the domestic civil war. Around nearly half of the population are living below poverty line and there is an urgent need to address the socioeconomic stability of the region. One solution is thought to be improving the road network connecting the state and Dushanbe, the capital¹⁰.

Accordingly, in countries, where both cargo and passengers mostly depend on road traffic, maintenance and management of roads subject to progressive deterioration and aging can be considered high, even at the time of ex-post evaluation since the planning. Furthermore, this project targeted the region containing the international route leading to Afghanistan, where the poverty ratio was high, a decision to target this region can be justified by the fact that the project could boost the economic development of such a region.

3.1.3 Consistency with Japan’s ODA/Policy

⁸ Source: document provided by JICA

⁹ Source: document provided by Ministry of Transport

¹⁰ Source: interviews with Ministry of Transportation and documents provided by JICA.

The *Country Assistance Program* (2009) of Japan for Tajikistan at the time of planning designated transportation (road improvement and maintenance) as priority areas and the *Country Assistance Policy* (December 2012) also defined regional and economic infrastructure development as priority fields, where the economic infrastructure development also included developing the transport sector¹¹. In addition, the action plan (2006) of the “Central Asia + Japan” dialogue¹² also mentioned that it would support efforts to improve the transport route between South and North regions in Tajikistan¹³. Therefore implementing this project, which aimed to ensure proper operation and maintenance by providing road maintenance equipment, is fully consistent with Tajikistan’s development policy, development needs, Japan’s ODA Policy and its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

[Japanese portion]

Table 1 shows the planned and actual outputs of this project. During this project, road maintenance equipment, including the installation of Asphalt Plants (hereinafter referred to as “A/P”) and Crushing Plants (hereinafter referred to as “C/P”), was developed in the Kurgan-Tyube (Khatlon) region and the Hissar (Republican subordination) SETMs and 22 SEHMs, which oversee the main road between the capital Dushanbe and the Kurgan-Tyube - Nizhniy Pyandzh.

All equipment was procured as planned. According to the consulting company involved in this project and the Ministry of Transportation, the installation site for A/P and C/P have been changed (details are as follows), with the site situation and plant operation efficiency in mind. There is no influence on generating the effect and the change could be concluded as reasonable.

Table 1 Planned and actual outputs

Equipment	Planned			Actual
	Kurgan-Tyube	Hissar	Total	
Asphalt Cutter	6	4	10	As planned Except, the relocation of A/P and C/P location.
Vibration Compactor	6	4	10	
Hand Breaker	6	4	10	
Air Compressor	3	2	5	
Asphalt Sprayer	3	2	5	

¹¹ Source: ODA Data Book (2012), p. 218

¹² It indicates the second Foreign Minister Meeting of “Central Asia + Japan” dialogue held at Tokyo in June 5th of 2006, attended by ministers of Foreign Affairs from Japan, Kirgizstan, Tajikistan and Uzbekistan as well as an envoy from the Kazakhstan government. During this meeting, the progress of cooperation under the new framework, which was launched during the first Foreign Minister Meeting as of August 2004, was reviewed and efforts to promote future cooperation, particularly within the region, were discussed.

¹³Source: documents provided by JICA

Hand Guide Roller	3	2	5
Asphalt Distributer	1	1	2
Asphalt Finisher	1	1	2
Road Roller	1	1	2
Tire Roller	1	1	2
Water Tank Truck	1	1	2
Motor Grader	6	4	10
Crawler Excavator	3	3	6
Wheel Loader	2	1	3
Bulldozer	1	1	2
Dump Truck	8	6	14
A/P	1	1	2
C/P	1	1	2
Multi-purpose Vehicle	1	1	2
Snow Plough	1	1	2
Rotary Blower	1	1	2
Salt Spreader	1	1	2
Truck with Crane	1	1	2
Truck trailer	1	1	2
Pickup Truck	2	2	4
Line Marker	0	1	1
Mobile Workshop	1	1	2
Maintenance Equipment	2	2	4
Axis Load and Overall Weight Meter	1	0	1

Source: documents provided by IJCA and response of questionnaire to Ministry of Transport

Changes of output: A/P and C/P re-location

① Khatlon Region

The site was relocated, mainly because the government of Khatlon intended to reuse the airport site in future, part of which overlapped the A/P location, thus the Ministry of Transport requested the change¹⁴. In addition, the plan to utilize the plant site used in past projects (“Dusty - Nizhniy Pyandzh Road Improvement Plan”) was also suggested, but the long distance of the stone quarry was a concern. Considering the need to carry stones from a distance and amid concerns over cost and efficiency, it was decided to relocate to a more efficient place near the stone quarry¹⁵.

② District of Republican Subordination

The major reason was the fact that the Ministry of Transport requested that the installation site be changed to reduce the A/P and C/P¹⁶ operating and maintenance costs. Initially, it was expected to install at the existing Chinese plant site but they did not move out as scheduled, hence the need to consider plant relocation. Consequently, the decision was made to relocate the plant to the geographical center of the region with efficiency usage in mind¹⁷.

¹⁴ Source : document provided by JICA and Kurgan-Tyube SETMs

¹⁵ Source: interview survey with the staff of Kurgan-Tyube SETMs and the consulting company

¹⁶ Source: document provided by JICA

¹⁷ Source : interview survey with the staff of Hissar SETMs and the consulting company

[Tajikistan portion]

The following eleven items were implemented as Tajikistan's portions as planned:

- 1) Implementing EIA or equivalent procedures for the installation of C/P and A/P and acquiring installation permission.
- 2) Securing location for A/P and C/P, removing existing structures and levelling grounds.
- 3) Providing electric wiring, water supply, drainage for A/P and C/P operation.
- 4) Securing location for axis load and gross weight meter, electricity wiring for Axis load and gross weight meter and building facilities for workers
- 5) Issuing B/A and Authorization to Pay
- 6) Following B/A, commission payment to Japanese bank
- 7) Tajikistan side should clear immigration and site visiting procedures and make appointment with governmental organisations for Japanese experts dispatched for this project
- 8) Japanese experts and companies were from taxes, duties or other obligations within the country
- 9) Preparation of documents required for customs duties of procured equipment and tax exemptions related to this project
- 10) Dispatching required number of personnel for start-up operation guidance and covering their daily needs.
- 11) All other expenses, that are not covered by Japanese Grant Fund related to this project



Crushing Plant (C/P)



Donor Roller

Donor Grader

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was 1,342 million yen against the planned 1,346 million yen, hence remained within the planned budget at 99.7%. The project cost to be borne by Japan was planned as 1,334 million yen (E/N limit), while the actual project cost, namely 1,339 million yen, exceeded the planned amount. The amount borne by the Tajikistan side, namely 2.9 million yen, exceeded the planned amount by about 2 million yen. Due to mainly foreign

exchange fluctuations, Tajikistan's burden borne exceeded the planned share¹⁸.

3.2.2.2 Project Period

Although the planned project period¹⁹ was 19 months, 20 months were actually required from March 2013 to October 2014 to complete the activities, which slightly exceeded the plan (107% to the planned period). The one-month delay was attributable to an extension of the bidding period. Specifically, it occurred in response to regulatory changes for local exhaust gas. However, such regulatory changes were not planned during the initial project planning stage, but suddenly determined at the bidding stage. In response to the change in the exhaust gas regulation value, the need arose to prepare and adapt documents in accordance with the specifications, so the bidder requested that the bidding period be extended and the project responded to this request²⁰. This is a necessary response to arrange equipment conforming to national regulations and shortening the period was difficult.

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

3.3 Effectiveness and Impacts²¹ (Rating: ②)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators):

Annual area of pothole repairs and overlay repair length by hot asphalt mix

Before this project, Kurgan-Tyube and Hissar SETMs did not own their plants, so they were normally repaired using cold asphalt²². Such repairs meant insufficient strength and durability and could only be considered provisional. Under circumstances where high-strength hot asphalt is required, purchase of the same from a private contractor was inevitable.

After the project, despite fluidity within the Kurgan-Tyube SETM, the repaired pothole works using hot asphalt manufactured in the installed plant were implemented and exceeded the target value. In Hissar, it remained at about 50% of the target. The failure of actual results to meet the planned values in the Hissar region was mainly attributed to budget shortfalls. According to Hissar SETM officials, hot asphalt was about twice as expensive²³ as cold

¹⁸ 1 Tajikistan Somoni was equal to 17.037 yen at the time of appraisal (2012) and had fluctuated to 21.46 yen by the time of ex-post evaluation. Meanwhile, when calculating the actual cost, the IFS of the IMF rate (average between 2011 and 2014, 1 Tajikistan Somoni = 19.02 yen) was used to convert Somoni into yen.

¹⁹ The project period is defined as from G/A month to the month of handing over of equipment (including both month of beginning and ending).

²⁰ Documents provided by JICA and interview surveys with Consulting company

²¹ Sub-rating for Effectiveness is to be put with consideration of Impacts.

²² At that time, when preparing the cold asphalt, it was manufactured as crude oil with high asphalt content was mixed with gravel or sand with equipment such as motor grader with yard at the time of high temperature in summer, it was manufactured.

²³ For example, cold asphalt will cost approximately 220 to 240 Tajikistan Sonomi per ton while hot asphalt costs

asphalt, hence the explained need to limit usage. The overlay construction distance using hot asphalt failed to meet the target in both areas managed by Kurgan-Tyube and Hissar SETM and the main factor limiting the overlay distance was a budget shortfall.

Table 2 Annual area of pothole repairs and overlay repair length by hot asphalt mix

	Baseline	Target	Actual			
	2012	2017	2014	2015	2016	2017
		2 Years After Completion	Completion Year	1 Year After Completion	2 Years After Completion	3 Years After Completion
Annual repair area of pot hole using hot asphalt (m ²)						
Kurgan-Tyube SETM	0	13,000	1,927	10,920	7,500	28,000
Hissar SETM	0	6,000	826	2,067	3,000	2,757
Overlay annual construction distance (Km)						
Kurgan-Tyube SETM	0	10.0	0.3	1.5	1.5	0.5
Hissar SETM	0	10.0	2.3	10.6	9.3	4.2

Source: documents provided by JICA, Kurgan-Tyube SETM and Hissar SETM

As explained above, the lack of budget meant the repair area using hot asphalt and the overlay construction distance did not reach their targets. However, given the inability to manufacture hot asphalt before the project, it could be concluded that this project has elicited certain effects.

3.3.1.2 Qualitative Effects (Other Effects)

At the time of planning this project, equipment shortages were highlighted as the main problem when maintaining and managing the targeted SETMs and SEHMs²⁴. In this project, as well as installing A/P and C/P, maintenance equipment crucial for road repair work and equipment necessary for snow removal work in winter were all procured. The operation and maintenance work was confirmed as having improved, thanks to the allocation of equipment to each of the offices as follows:

(1) Stronger and more durable repair spots

The installation of the plants, SETMs and SEHMs in the target area means repairs of the road using hot asphalt are underway. Although budget shortfalls limited the scope of repair, after the project was implemented, it boosted strength and durability at repair spots using hot asphalt. Despite the expense compared to cold asphalt, in durability terms, it may have almost

around double, 460 – 480 Tajikistan somoni.

²⁴ Source: Preparatory Survey Report URL: http://open_jicareport.jica.go.jp/614/614/614_156_12113452.html (Access as of June 14, 2018)

20 years additional life expectancy²⁵. Accordingly, hot asphalt is used in the sections where the traffic volume is high.

(2) Increasing efficiency of snow clearing, melting and spreading non-slip agents works

According to the Ministry of Transport, SETMs and other stakeholders, implementing this project also helped streamline work, including mechanization of work to clear snow, melting and spreading non-slip agents works during the winter season. Although it was difficult to identify a specific period because the shortening of the work period depends on snowfall, it boosted the efficiency of the activities. For instance, before the project, traffic was cut off for 5 to 6 hours pending snow removal work after heavy snowfall and at the time of ex-post evaluation, the use of bulldozers and multipurpose vehicles procured in the project enabled 1 to 2 hours of operation. As another example of boosting work efficiency (labor force) before snowfall, about 20 workers carried out work which involved spraying non-slip sand (40 tons) by hand before the project, by switching to mechanization work using equipment provided in this project. At the time of ex-post evaluation, there was scope to handle this using only the driver and several supporting staff.

(3) Boosted repair work efficiency (in time and cost terms)

Prior to this project, when the repair of roads, removal of snow in winter and spraying of non-slip agents (sand etc.) was required, the necessary equipment was rented from private companies as well as outsourcing asphalt production, whereupon the work was carried out. Providing the equipment and establishing the plants in this project eliminated the need to pay the rental fee to the private companies. It also freed up time which would have been taken on administrative work for equipment rental and asphalt purchase as well as waiting time, all of which accelerated the repair work period.

For example, the cost of the hot asphalt used to repair roads was reduced from 750 Tajikistan somoni (about 9,400 yen) per ton, as ordered by the private sector to 400 somoni (about 5,000 yen) when produced in the own plant. More than 10 days was required for overlay work to repair the road over a stretch of about 200 meters, but it could be handled in about two days at the time of ex-post evaluation²⁶.

²⁵ Source: interview survey with the staffs of each SETM

²⁶ Source: interview survey with the staffs of each SETM

3.3.2 Impacts²⁷

3.3.2.1 Intended Impacts

(1) Contributed to streamline passenger and freight transport

Passenger and freight transportation time has been shortened by improved trunk road condition thanks to improved road development and maintenance. According to the private transport company interviewed, the fuel cost is saved as the required time is shortened (see Table 3 below).

Table 3 Time shortening of passenger and freight transportation

Section	Before project	After project
Yavan—Nizhniy Pyandzh	one round trip in two days	one round trip in a day
Kurgan-Tyube—Nizhniy Pyandzh	one round trip in a day	two round trips in a day

Source: interview surveys with transport companies

However, it is considered that the transport company that responded and others did not distinguish the changes between periods before and after the implementation of the grant aid road development project and this project. During the site visit, some sections where road conditions such as irregularities on the road surface and potholes were deteriorating frequently emerged in trunk roads other than those which were developed in the grant project. Respondents who answered the interview surveys also reported the same issue and feedback suggesting some scope to improve maintenance was partially evidenced.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

As this project included A/P and C/P, environmental impact assessment prescribed by the law of the country was implemented when installing these plants. In accordance with the assessed plan, noise, air quality and etc. during the plant installation work were monitored. There is no negative impact on the environment and society caused by this project implementation.

(2) Resettlement and Land Acquisition

The plant was installed on the land owned by the country and the equipment was procured to each SETMs and SEHMs and no resettlement of residents or land acquisition due to the implementation of this project has occurred.

²⁷ It can be said that improved freight and passenger transportation was the overall effect; generated not only from this project but also from a grant aid project conducted prior to this project and technical cooperation “The project for improvement of road maintenance” conducted after this project. Given the difficulty in confirming the contribution of each respective project, the impact of the project will be treated as an indirect effect generated from support for road development, procurement of road maintenance equipment and capacity improvement of operation and maintenance.

(3) Other Impacts

- Increase in cargo volume and number of passengers

According to the Ministry of Transport (Cargo/Passenger Transportation Department), the cargo volume and passenger numbers increased with shorter transportation and travel time. Table 4 shows the traffic volume in the Dushanbe - Nizhniy Pyandzh section. This was attributable to the increased number of round trips per day such as buses and trucks, which helped reduce the time required. In the above area, many areas mainly involved the agricultural industry and despite the absence of any formal data, transportation of agricultural products in particular increased. Conversely, feedback also suggested that transport companies dealing with construction materials did not cause the cargo volume to increase as much due to the deterioration of security in Afghanistan.

Table 4 Cargo volume and number of passengers of Dushanbe - Nizhniy Pyandzh

	2012	2013	2014	2015	2016	2017
Cargo volume (ton)	56,870	66,120	15,000	179,450	211,970	242,100
Number of passengers (person)	741,959	837,300	1,628,200	2,947,640	3,506,710	4,128,200

Source: documents provided by Ministry of Transport

- Decreased number of traffic accidents and declining victims

Table 5 shows the number of traffic accidents having occurred at Kurgan-Tyube. The Ministry of Transport considered that improving road conditions also helped reduce the number of traffic accidents and victims. The surface was also more even, i.e. with fewer potholes, which explained more stable travel for drivers. There is, however, the possibility of other factors such as traffic rules explaining some of the improvement and this project is thought to contribute indirectly.

Table 5 Number of traffic accidents in Kurgan-Tyube

	2012	2013	2014	2015	2016
Number of traffic accidents	142	92	93	79	69
Number of traffic victims	84	91	100	72	56

Source: document provided by Ministry of Transport

By providing the plants and equipment required for road maintenance in this project, repair work using hot asphalt became possible. Moreover, it is far stronger and more durable compared with repairing spots with cold asphalt, as was done conventionally. However, budget shortfalls meant the actual repair area did not reach the planned target and remained within a certain range. In addition, each SETM and SEHM is now able to mechanize the spraying work of non-slip sand in winter and use their own equipment/asphalt necessary for repair work previously purchased and rented from the private companies, helping save on office working hours and purchase cost. Through a series of Japanese assistance (grant: road improvement,

grant: equipment provided under this project, technical cooperation: improved maintenance capacity), the main road conditions improved in the target area. Although some sections still require repair, positive impacts, such as shortening the passenger and freight transportation time from the capital Dushanbe to the area connected to the neighboring town of Afghanistan, an increased transportation volume and a decreased number of accidents were also confirmed.

Based on the above, this project implementation has achieved its objectives to some extent. Therefore effectiveness and impacts of the project are fair.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

Six SETMs²⁸ under the Ministry of Transport have maintained the national trunk roads. Kurgan-Tyube and Hissar SETMs oversee the operation and maintenance (O&M) of the plants and equipment provided in this project. There are 13 SEHMs and nine SEHMs respectively under the jurisdiction of each of the SETMs, while the SEHMs oversee small- and medium-scale repairs supervised by SETMs. Large-scale repairs (over 10,000 Somoni) and spare parts required for a fixed amount (2,000 Somoni) or more have been requested to the Ministry of Transport to respond²⁹. Although the necessary communication systems are laid between each of the SEHMs, SETMs and the Ministry of Transport, it was confirmed that basic information was not shared, for example, disparities in the methods used by each party and a lack of uniformity concerning the amount and costs incurred for obtaining spare parts among them.

SETMs basically secured the number of O&M personnel for plants and equipment that was assumed at the time of this project plan (see Table 6). However, the interview survey revealed an insufficient number of personnel required for both SETMs and imposed a burden on each person. The reasons were basically a budget shortfall and similar trends were also observed in Tajikistan.

²⁸ Six SETMs, including Hissar, Kulob, Rashut, Kurgan-Tyube, Sughd and Pamir

²⁹ Source: interview surveys with each SETMs

Table 6 Plans and achievements of O&M staff number of plant and equipment

No. of O&M	Baseline		Actual	
	Kurgan-Tyube	Hissar	Kurgan-Tyube	Hissar
Small construction machine operator	18	12	18	11
Construction machinery operator	17	14	17	14
Plant operator	6	6	2	6
Vehicle operator (driver)	14	13	12	13
Mechanic	4	4	2	4
Shaft weight / load meter operator	9	-	*	-
Total	68	49	51	48

Source: document provided by JICA and each SETMs

Note: An axle weight / load meter is installed along the trunk road near the border with Afghanistan. Employees allocated in the area need special permission to work in and out, between Tajikistan and Afghanistan. Accordingly, officials of the Ministry of Transport, rather than staff of SETMs, have been assigned and the number is indicated as “-”. Since there were no plans to place the equipment along the border at the time of planning, it was planned to allocate personnel from the SETMs (nine people). Actually staff from Ministry of Transport have been assigned and no concerns of O&M has arose.

3.4.2 Technical Aspect of Operation and Maintenance

Each SETM and SEHM has required employed degree and certificate holders in each field, each with the basic technical skills necessary for O&M. Regarding the newly provided equipment, basic trainings for the initial operations and operators were provided, whereupon staff overseeing O&M in SETMs and SEHMs have acquired the necessary knowledge and experiences. In addition, on completion of this project, technical cooperation in the form of the “road maintenance management improvement project” – a means of technical assistance - was conducted; aiming to help enhance the management capacity within an area including Kurgan-Tyube and Hissar and training was provided, including SEHMs. In this project, each of the staff utilized the provided plants and equipment in actual repair work on the roads at each site. Training was conducted involving most of the SEHMs staff by areas, helping obtain the necessary knowledge and experience and successfully boosting their self-esteem.

On completion of the project, the staff having acquired the O&M method for plants and equipment in this project and technical cooperation project became leaders and oversaw asphalt quality tests in the laboratory, O&M of A/P, C/P and various equipment, while maintenance and management of actual roads continued on a daily basis. It was confirmed that distributed manuals and guidelines were utilized on sites during the site surveys of each SETMs. As mentioned above, from the technical aspect, it can be confirmed that there are no serious concerns that impede O&M.

3.4.3 Financial Aspect of Operation and Maintenance

At the time of planning, the annual cost required for O&M of procured equipment was estimated at 4,740 thousand somoni (about 80.28 million yen). This amount is equivalent to about 10% of the road maintenance and management budget in the Ministry of Transport in

FY2012. Considering the past budget growth rate (15% in 2011, 20% in 2012), it was judged that the necessary budget could be secured. The Ministry of Transport budget at the time of ex-post evaluation and the trends and breakdown of the SETMs are as shown in Tables 7 and 8. Although it was considered difficult to determine the amount for only the provided equipment, the O&M budget of the Ministry of Transport has been almost the flat since planning. Also, at the time of ex-post evaluation, the O&M budget comprised only 4 to 6% or so of the budget of the Ministry of Transport, which was slightly below the plan.

Table 7 Budget of Ministry of Transport and it's road maintenance/repair cost
(Unit: thousands Somoni)

	2015	2016	2017
Budget of Ministry of Transport	964,200	864,400	1,399,600
Road O&M cost	59,600	57,000	60,200

Source: documents provided by Ministry of Transport

Table 8 Breakdown of the each SETM's budget
(Unit: thousands Somoni)

Kurgan-Tyube	2013	2014	2015	2016	2017
Road maintenance cost	5,191	4,460	4,976	4,339	4,931
Contingency	433	589	433	438	341
Personnel cost	2,470	2,866	2,832	3,117	3,002
TOTAL	8,094	7,915	8,241	7,893	8,274

Hissar	2013	2014	2015	2016	2017
Road maintenance cost	2,999	3,362	3,697	3,318	3,311
Contingency	498	537	592	563	563
Personnel cost	3,583	4,010	4,010	4,542	4,769
TOTAL	7,080	7,909	8,299	8,423	8,643

Source: Kurgan-Tyube and Hissar SETMs

When each SETM and SEHMs was interviewed, it was reported that the necessary budget to implement O&M on the road and operate and maintain the equipment was not sufficiently secured. Despite scope to gain income irregularly by selling part of the asphalt manufactured at the plants, unlike a budget where a certain amount is distributed periodically, it is difficult to incorporate it into the plan, thus securing a budget for consumables, spare parts and others is the challenge of each office.

3.4.4 Status of Operation and Maintenance

It was confirmed at the site visit that the provided plants and equipment were fully utilized and the maintenance situation was also generally positive. Conversely, nearly all SETMs and SEHMs pointed the procurement of spare parts as a serious problem. For instance, the lack of any agency dealing with genuine spare parts in Tajikistan means they are not distributed to the local market. Even if available, they are expensive and difficult to purchase on the budget side.

At the time of ex-post evaluation, the budgeting and procurement schedules and

stockpiling of spare parts suggested at the planning stage had not been fully realized and a system to purchase them on an as-required basis existed. Regarding spare parts for which genuine products could not be obtained, the measures taken were as follows:

- Filters necessary for various vehicles (for engine oil and fuel):
Purchase made in China products by SEHMs at the local market or those provided by the Ministry of Transport (made in China)³⁰.
- Cone crusher (part of the crash plant):
Utilize substitute Chinese products or those available in other markets. In addition, Kurgan-Tyube SETMs is experimentally using a crusher that was independently improved.
- Belt band-carrying asphalt (part of the asphalt plant facility):
Maintenance staff in charge of O&M has repaired and being in used.

As mentioned above, although not genuine, spare parts were obtained and individual responses were made, so none of the equipment was non-operational due to a lack of spare parts. Meanwhile, the effect on the equipment lifetime by using substitute parts is felt and despite the low cost, such parts have a short service life, requiring frequent replacement, and prompting a concern in O&M.

Therefore, some minor problems have been observed in terms of the institutional aspect, financial aspect and O&M status, the sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to ensure proper maintenance of trunk roads in the Khatlon region and districts under republican subordination of Tajikistan by supporting the development of road maintenance equipment to SETMs managing the target area, thereby contributing efficient freight and passenger transportation. Its purpose is consistent with national development strategy emphasizing road development as a means of economic development, national development needs with roads damaged due to the civil war and progressive aging. Furthermore, it has high coherence with Japanese ODA policy, hence its relevance is high. Although the project cost was within the plan, the project period exceeded the plan due to the extended bidding period in response to changes in the country's regulations on planned providing

³⁰On the procurement system, expensive equipment and spare parts otherwise difficult to obtain were purchased centrally (by the Ministry of Transport). In that case, bidding is necessary and there are many cases involving bidding on Chinese goods in price. This is impossible for local SETMs and SEHMs to handle, hence the need to share information and understanding between the Ministry of Transport and SETMs and SEHMs, including future plans.

equipment. Accordingly, the project efficiency is fair. Implementing this project allowed road repairs using hot asphalt having high-strength, helping improve strength and durability for part of the repaired road. It also helped boost efficiency in terms of achieving time, cost and labour savings otherwise required for winter snowfall and repair work. In this section, road development projects were also undertaken with the support of Japan, which helped significantly shorten transportation and travel time, thanks to improved road conditions combined with the contribution of this project. However, because the repaired area was limited due to lack of budget, the effectiveness/impact of this project is fair. Minor problems of O&M for the plants and equipment provided in this project were confirmed in the institutional and financial aspects of the executing agency and O&M condition, thus the project sustainability is considered fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

On the site using the provided equipment, given the expense of the amount and the inability to purchase it in the local market, obtaining genuine or appropriate spare parts is the key concern with maintenance. There is a need for the Ministry of Transport to urgently inform to all SETMs and SEHMs about how to obtain spare parts and improve its maintenance and system. In doing so, each of the SETMs and SEHMs must prepare a procurement plan for spare parts according to the equipment operation and the Ministry of Transport must understand the necessary budget beforehand, so budget/time concerns for purchasing genuine spare parts can be taken into consideration. Moreover, it is desirable to formulate an efficient procurement plan by clarifying equipment which can use spare parts that are not necessarily genuine but do not impede the proper operation of the equipment and equipment for which genuine spare parts should be used, then share the information among SETMs and SEHMs.

4.2.2 Recommendations to JICA

In the grant aid project underway at the time of ex-post evaluation, “The Project for Improvement of Equipment for Road Maintenance in Sughd Region and the Eastern Part of Khatlon Region”, road maintenance equipment will be provided as in this project. To prevent similar problems occurring in this project with respect to the spare parts obtained after completing the project, it is recommended to support and follow up on means of obtaining spare parts in detail among all stakeholders before the project completion.

4.3 Lessons Learned

Implement comprehensive and strategic support considering project sustainability

On the main international trunk road of the country, Japan developed the road, provided equipment to maintain it and provided technical support for road maintenance by actually utilizing the equipment provided. In the country, which was affected by the civil war (not only in terms of infrastructure damage but also technical human resources drained out of the country), the effect/impact could not have been fully utilized if any support for infrastructure development, procurement of equipment or technical support was lacking. Under the circumstances, there is reason to believe that the project is a good practice that developed comprehensive and strategic support, while taking effect and sustainability fully into consideration. As part of future support, particularly in areas affected by civil war etc., stakeholders involved in the project planning must identify the scope of damage sustained in each area at the time of project planning and provide long-term support for lacking infrastructure, equipment, human resources and others. Accordingly, it can be said that following support programmatically by using multiple target area schemes will help generate effectiveness and boost the sustainability of the project.