Kyrgyz Republic

FY2018 Ex-Post Evaluation of Japanese Grant Aid Project
"The Project for Improvement of the Equipment for Road Maintenance
in Osh, Jalal-Abad, and Talas Oblasts"
External Evaluator: Mimi Sheikh, International Development Center of Japan

0. Summary

The objective of the project is to improve the maintenance of the roads, including the Bishkek-Osh road, managed by four road maintenance bureaus under the jurisdiction of the Ministry of Transport and Roads in three oblasts: Osh, Jalal-Abad, and Talas. This will be accomplished by modernizing road maintenance equipment, thereby contributing to the enhancement of transfer and transportation efficiency.

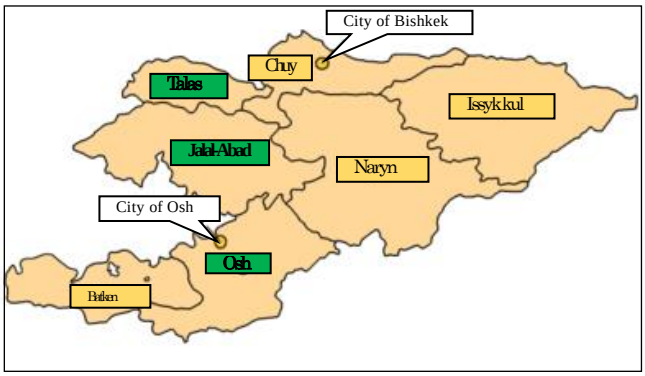
The implementation of this project is highly relevant because it is highly consistent with Kyrgyzstan's transportation policy—with the development needs seeking to improve the maintenance of damaged and deteriorated roads—and with Japan's ODA policy—which focuses on supporting the development of transportation infrastructure. Furthermore, the efficiency of the project is high: not only was all road maintenance equipment procured and installed as planned, but both project cost and period remained within the planned range.

In terms of effectiveness, all the installed equipment was generally utilized effectively, including at the ex-post evaluation. Furthermore, among the effectiveness indicators that were set at the ex-ante evaluation, "the total area of repaired potholes" was below the target but "overlay installation distance" almost achieved the target. Moreover, other effects were also confirmed, including improved construction quality through the use of newly built asphalt and aggregate plants, enhanced application efficiency of snow-removing and snow–melting anti-slip materials, enhanced road restoration efficiency after disasters, and more. In terms of impact, it is confirmed that the transportation of people and goods has been increasing, based on the trends in both number of passengers carried by vehicles as well as volume of cargo transported by vehicles. Therefore, the effectiveness and impact of the project are evaluated as fair.

Regarding sustainability, no issues were found with the institutional, technical, or financial aspects of operation and maintenance; however, it is necessary to take measures to maintain the current status of operation and maintenance, due to a delay in replacing parts for some pieces of road maintenance equipment. The information on how to obtain parts has not been well disseminated to the staff at the project sites. Therefore, the sustainability of the project's effects is fair.

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

1. Project Description



Project locations

An asphalt cutter (left) and a vibration compactor (right): the most installed equipment

1.1 Background

Kyrgyz Republic (hereinafter referred to as "Kyrgyzstan") is a landlocked country at the foot of the northern side of the Tien Shan Mountains in the south of Central Asia; it is surrounded by the countries of Kazakhstan, Uzbekistan, Tajikistan, and China. It has a population of 6.39 million people (National Statistics Committee of Kyrgyz Republic, 2019) and a land area of 198,500 km^2 (about half of Japan's land area).

Roads subject to "The Project for Improving the Equipment for Road Maintenance in the Osh, Jalal-Abad, and Talas Oblasts" are found at an altitude of 750–3,000 meters. The lowest temperature observed in the high-altitude areas is -30°C (in January), and the highest temperature is observed in the Jalal-Abad and Osh Oblasts, located in the southern part of the country, at approximately 35°C (in July). The amount of snowfall is approximately 400mm per year. The major industries in Kyrgyzstan are agriculture, stock farming, food processing (in which agricultural and livestock products are processed), and mining, particularly gold. The country is lacking in energy resources but is rich in water resources.

In Kyrgyzstan, a road network with approximately 34,000 km has been built. As Kyrgyzstan is a landlocked country, approximately 95% of the transportation of people and goods depends on roads, which means that roads have an important function in the lives of the Kyrgyz people. In addition, some parts of Kyrgyzstan contribute significantly to international logistics, as international roads leading to neighbouring countries play an important role in intraregional transportation that connects the entire Central Asian region and eventually Southwest Asia region. However, most of the road network in Kyrgyzstan was built during the Soviet era and has increasingly deteriorated and become damaged; it has not been sufficiently repaired and maintained since independence in 1991, due to an economic recession. In addition, as there are many mountain roads, road closures due to natural disasters (landslides, avalanches, etc.) occur frequently. Appropriate maintenance of the road network is required, because insufficient

improvement of the road network together with road closures causes an increase in travel and transportation costs. However, the equipment required for such maintenance is insufficient and deteriorated. In order to improve this situation, the Kyrgyzstan government requested the Japanese government to provide road maintenance equipment.

1.2 Project Outline

The objective of the project is to improve the maintenance of the roads, including the Bishkek-Osh road, managed by four road maintenance bureaus under the jurisdiction of the Ministry of Transport and Roads in three oblasts: Osh, Jalal-Abad, and Talas. This will be accomplished by modernizing road maintenance equipment, thereby contributing to the enhancement of transfer and transportation efficiency.

<Grant Aid Project>

Grant Limit / Actual Grant Amount	2,491 million yen / 2,459 million yen
Exchange of Notes Date /Grant Agreement Date	July 2014 / July 2014
Executing Agency	Ministry of Transport and Communications: MOTC[1]
Project Completion	November 2015
Target Area	Osh, Jalal-Abad, and Talas Oblasts
Main Consultant	Katahira and Engineers International
Procurement Agency	ITOCHU Corporation
Preparatory Survey	May 2013 – February 2014
Related Projects	*ODA Loan* ・Bishkek-Osh Road Rehabilitation Projects (I) (II) (1997 and 1998) *Technical cooperation* ・The Project for the Capacity Building of Road Maintenance (2008-2011) *Grant Aid* ・The Project for the Improvement of the

[1] The name of the executing agency was the Ministry of Transport and Communications (MOTC) at the time of project planning. However, the transportation department became independent, and as a result the MOTC became the Ministry of Transportation and Roads (MOTR). The executing agency is described as MOTR in "2. Outline of the Evaluation Study" and in all the following sections.

	Equipment for Road Maintenance in Naryn (2006) ・The Project for the Improvement of the Equipment for Road Maintenance in Issyk kul and Chuy (2010) ・Reconstruction of Kok-Art River Bridge on Bishkek-Osh Road (2013) ・Road Maintenance Equipment Management (2017) ・Avalanche Protection on Bishkek-Osh Road (2017) *Other Donors* ・Turkish government, Road Construction Machinery Procurement plan (2013) ・Islamic Development Bank, Bishkek-Naryn-Torugart Road Renovation Project (2012-2016)

2. Outline of the Evaluation Study

2.1 External Evaluator

Mimi Sheikh, International Development Center of Japan Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2018–November 2019

Duration of the Field Study: November 11, 2018–December 9, 2018

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

3.1 Relevance (Rating: ③[3])

3.1.1 Consistency with the Development Plan of Kyrgyzstan

In the planning phase, the government of Kyrgyzstan designated the transportation and road sector as a high-priority area in the *Medium-Term Development Plan (2012–2014)* and regarded the renovation of the international main road network as a matter of high priority, as it is required in order to secure connectivity with the regional markets. At the time of the ex-post evaluation, transportation and communication were designated as priority areas for economic

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③: High, ②: Fair, ①: Low

development in the *Sustainable National Development Strategy (2013–2017)* and its successor strategy, *the National Development Strategy for 2018–2040*. Since roads are the major means of transportation in Kyrgyzstan, it is regarded as vitally important to develop the transportation of passengers and cargo and to improve, repair, and develop road networks in a way that matches the citizens' needs.

Furthermore, as a country participating in the Central Asian Regional Economic Cooperation (CAREC) led by the Asian Development Bank (ADB), Kyrgyzstan has listed the renovation of its international highway network as a matter of high priority, with the goal of intensifying the intraregional transportation of passengers and cargo. The *Development Program for 2018–2022: Unity, Trust and Creation* points out that developing both the domestic road network and the international highway network is important for enhancing Kyrgyzstan's transportation capacity. In addition, the *Road Sector Development Policy for 2016–2025* clearly states that repairing and appropriately managing international highways and major national roads, along with introducing a quality control system to achieve these goals, are necessary.

For all these reasons, the government of Kyrgyzstan has placed a high priority on developing the road network in its transportation policy, from the time of the project planning through the time of the ex-post evaluation. Therefore, since this project supports the provision of road maintenance equipment as a way of improving road transportation, it is highly consistent with the government of Kyrgyzstan's development policy.

3.1.2 Consistency with the Development Needs of Kyrgyzstan

At the planning phase, the roads in the project region at the time of planning were significantly damaged and deteriorated and required repair, but it was too difficult to promptly repair these roads because much of the equipment owned by the Local Level Roads Management Unit (hereinafter referred to as "DEU[4]") was inoperative or failed frequently, as it was made in the Soviet era, which was 20-25 years ago. In addition, most of the DEUs purchased asphalt from private plants because of the shortage of asphalt and aggregate plants. However, asphalt made by private plants was expensive and its supply was unstable.

In Kyrgyzstan, approximately 95% of the transportation of people and goods depends on roads, and the number of passengers and cargo transported has been increasing since the project planning. Therefore, road maintenance is increasingly important for the economic development of the country, and the need in this field remains high. Specifically, renewed asphalt cutters, vibrating compactors, and hand breakers became available to many DEUs because of this project, but heavy machines like asphalt finishers, road rollers, and excavators are still lacking. In addition, the supply of asphalt is stabilizing in the regions affected by the plan but not in all regions of the country, and there are still areas where asphalt needs to be purchased from private

[4] DEU is an abbreviation for Russian terms and does not match its English name.

plants. Thus, the need to construct plants also remains high. For these reasons, the road maintenance project is highly consistent with the development needs from the planning through the ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

In the Country Assistance Policy for Kyrgyzstan, established by the Ministry of Foreign Affairs of Japan (February 2012), "the maintenance of transport infrastructure and reduction of regional disparities" is listed as one of the prioritized areas, and the policy clearly stipulates that "assistance centering on the improvement of traffic on main roads shall be provided." In addition, in JICA's Rolling Plan for Kyrgyzstan (2012), "developing transport infrastructure" is taken up as a development issue in "the maintenance of transport infrastructure and reduction of regional disparities", which is a prioritized area and is positioned as a concrete cooperation program called the "program for promoting logistics for boosting export competitiveness."

This project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

<Japanese portion>

In this project, equipment used for road repair, post-disaster reconstruction, snow cleaning/melting, and road maintenance support was installed for the four road maintenance bureaus listed in Table 1 below, based on the needs of the individual bureaus. In addition, one asphalt plant and one aggregate plant were provided for each bureau.

Table 1 Targets of the Project

Road Maintenance Bureaus	Sections Managed	DEU
Osh-Sarytash-Irkeshtam Main Roads Management Unit (OSIUAD)	Roads in Osh Oblast	DEU-16 DEU-21 DEU-37 DEU-44 DEU-45 DEU-959 DEU-960
Jalal-Abad Balykchy[5]	Roads in Jalal-Abad Oblast	DEU-12 DEU-17 DEU-27 DEU-31 DEU-50 DEU-51 DEU-52
Oblast Level Roads Management Unit 5 (PLUAD 5)	Roads in Talas Oblast	DEU-6 DEU-19 DEU-36 DEU-47 DEU-48
Bishkek-Osh Main Roads Management Unit (BOUAD)	Bishkek-Osh Roads	DEU-5 DEU-9 DEU-22 DEU-23 DEU-26 DEU-30 DEU-38 DEU-956

[5] Jalal-Abad Balykchy is the unit's name at the time of the ex-post evaluation; in the planning phase, it was called Oblast Level Roads Management Unit 6 (PLUAD 6).

As shown in the planned and actual project outputs in Table 2, all equipment was procured as planned in the project.

Table 2. Planned and Actual Project Outputs

	Name of Equipment	Spec.	OSI-UAD		Jalal-Abad Balykchy		PLUAD 5		BO-UAD		Total	
			Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
1	Asphalt Cutter	150 mm	14	14	14	14	10	10	16	16	54	54
2	Vibration Compactor	60 Kg	14	14	14	14	10	10	16	16	54	54
3	Hand Breaker	7 Kg	14	14	14	14	10	10	16	16	54	54
4	Air Compressor	5 m^3	7	7	7	7	5	5	8	8	27	27
5	Asphalt Sprayer	350 L	7	7	7	7	5	5	8	8	27	27
6	Hand Guide Roller	600 kg	7	7	7	7	5	5	8	8	27	27
7	Asphalt Finisher	4.4 m	1	1	1	1	1	1	1	1	4	4
8	Road Roller	9 t	1	1	1	1	1	1	1	1	4	4
9	Tire Roller	8-12 t	1	1	1	1	1	1	1	1	4	4
10	Water Tank Truck	8,000 L	1	1	1	1	1	1	1	1	4	4
11	Motor Grader	3.7 m	2	2	1	1	1	1	1	1	6	6
12	Excavator	0.8 m^3	1	1	1	1	1	1	1	1	4	4
13	Wheel Loader	2.5m^3	1	1	1	1	1	1	1	1	4	4
14	Dump Truck	14 t	3	3	3	3	3	3	3	3	12	12
15	Asphalt Plant	35t/h	1	1	1	1	1	1	1	1	4	4
16	Aggregate Plant	35t/h	1	1	1	1	1	1	1	1	4	4
17	Multi-Purpose Vehicle	4X4	1	1	1	1	1	1	1	1	4	4
17-1	Snow Plough Attachment	-	1	1	1	1	1	1	1	1	4	4
17-2	Rotary Blower Attachment	-	1	1	1	1	1	1	1	1	4	4
17-3	Salt Spreader	-	1	1	1	1	1	1	1	1	4	4
18	Track with Crane	5 t	7	7	7	7	5	5	8	8	27	27
19	Track Trailer	25 t	1	1	1	1	1	1	1	1	4	4
20	Mobile Workshop Van	4X4	1	1	1	1	1	1	1	1	4	4
21	Maintenance Equipment	Set	2	2	2	2	2	2	2	2	8	8
22	Portable Load Meter	-	-	Installed at Weight Control and Tunnel Service (WCTS)							3	3
Total			91	91	90	90	70	70	101	101	355	355

Source: Documents provided by JICA and the results of field study.

The equipment was categorized into four operation types. Work details by the type of equipment are described in Table 3.

Table 3 Operation Types for the Equipment

Operation type	Work detail
(1) Road repair	Pothole patching, crack sealing, overlaying and replacement of asphalt pavement, and road shoulder and surface shaping

(2) Snow cleaning and melting	Snow and ice removal, and application of snow-melting salt and sand
(3) Post-disaster reconstruction	Removal of fallen rocks and landslides, and restoration of roads struck by avalanches
(4) Support operation	Transportation of equipment, maintenance and repair of equipment at a workshop or in the field, and measurement of the weight of large-sized vehicles (overload control)

Source: Preparatory survey (January 2014).

<Kyrgyzstan Portion>

In this project, acquiring construction sites for the asphalt and aggregate plants, land preparation cost, incidental works, and banking arrangement charges were agreed to be carried out and paid for by the government of Kyrgyzstan. It has been confirmed that all of these activities were implemented as planned.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned and actual costs of the project were 2,491 million yen and 2,459 million yen, respectively (99% of the planned cost[6]). In the beginning, the amount calculated by comparing the outline design with the detailed design exceeded the promised amount limit by 1.25%. Thus, the equipment was divided into three lots: (1) vehicle type, (2) construction equipment type, and (3) plant type at the time of procurement, based on the characteristics of the equipment to encourage competition among equipment manufacturers, and equipment was procured from only one manufacturer; as a result, the bidding prices were reduced due to economies of scale, and as a result, the actual project cost was lower than the estimated amount.

3.2.2.2 Project Period

The planned project period was 18 months: the beginning of the detailed design of the project took place in August 2014, and the approval date of procurement completion of the equipment in took place January 2016. The actual project period was 16 months that fell within the plan (88.8% of the planned period).

Both the project cost and project period were within the plan. Therefore, efficiency of the project is high.

[6] It was confirmed during the field study that all the portions on the Kyrgyz side were implemented, which was expected in the preparatory survey—but the detailed amount of each item was not known. Thus, the difference between the planned and actual costs was calculated using only the figures on the Japanese side.

3.3 Effectiveness and Impact (Rating: ②)[7]

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

<Operation indicators>

In the planning phase, no target value related to the operation indicator was established. Therefore, the operation status of the equipment at the time of ex-post evaluation was studied, along with the utilization status of the equipment (based on the questionnaires to DEUs and on-site review) and according to the operation types shown in Table 3.

The study confirmed that 349 out of 355 pieces of equipment installed in this project (98% operation rate) were used frequently at the time of the ex-post evaluation. However, two hand guide rollers (DEU-9 and DEU-26), one air compressor (DEU-21), and three portable load meters installed at the Weight Control and Tunnel Service (WCTS) of the Ministry of Transport and Roads (MOTR) were not used due to failure. In a review about the failed equipment involving the DEUs, MOTR, and the responsible road maintenance bureaus, it was found that the air compressors and portable weight meter failed shortly after initial use. The DEUs did not respond adequately to the equipment failure because they did not know well enough about the warranty provided by the manufacturers or the contact information for repair. The utilization status of the equipment (by operation type) is as follows:

(1) Equipment for road repair

The asphalt cutters, vibrating compactors, and hand breakers required for patching were used frequently; according to DEU staff, this is because patching equipment was provided as a package, and not as single pieces of equipment, and road works, such as the repair of potholes, could be immediately begun with the packaged equipment.

A road roller (left) / a tire roller (right)

Repairing a road shoulder using an air compressor

A limited number of heavy machines (such as asphalt finishers and road rollers) were installed and required for overlaying and replacing pavement; these were delivered to the

[7] Sub-rating for Effectiveness is to be understood with consideration of Impact.

road maintenance bureau of each region or DEU and were borrowed and lent among DEUs that were located relatively close to each other. The procedures for borrowing and lending equipment between DEUs differ depending on the road maintenance bureaus of each region. For example, BOUAD first issues an official document before lending equipment if it is to be lent for 2 days or longer. PLUAD 5 and Jalal-Abad Balykchy are not involved in the borrowing and lending of equipment, leaving it to the DEUs. OSIUAD is proactive in collectively managing the heavy machines for road repair and lends them to DEUs when needed. The borrowing and lending of equipment was mostly conducted between DEUs located about 1–2 hours from each other. In contrast, in DEUs located in mountainous areas and more than two hours from other DEUs, most of the work was carried out using each DEU's own equipment, because it took too much effort to borrow equipment from others.

All four asphalt and aggregate plants have been operating smoothly, and it was confirmed that they are operating approximately 10 hours a day, 6 months a year, thus producing approximately 300 tons of asphalt a day.

(2) Equipment for post-disaster reconstruction

According to the results of the questionnaire conducted with DEUs concerning the frequency of equipment use, most DEUs shared that excavators and wheel loaders were "Very often used" or "Well used"[8]; these machines were used to remove fallen rocks and landslide debris. For instance, DEUs use wheel loaders 200 or more days per year. The number of heavy machines for restoration and disaster response is limited to one machine per road maintenance bureau. Therefore, these were also borrowed and lent among DEUs as described in (1).

(3) Equipment for snow cleaning and melting

Snowplows, rotary snow blowers, and salt spreaders operate at full capacity round-the-clock during periods of snowfall for the security of traffic. Trucks with cranes, which were provided as support equipment, were utilized to transport snow removal workers and anti-slip materials to snowy areas. The equipment for snow cleaning and melting is essential for the DEUs throughout the winter; therefore, this kind of equipment was rarely borrowed and lent among DEUs except for emergency cases, such as road closure due to snowfall.

(4) Support operations

Of the support operation equipment, trucks with cranes and truck trailers were used very frequently, as they were convenient for transporting workers and equipment. In the planning

[8] The answers to questions regarding the frequency of equipment use can be one of 5 levels: "Very often used", "Well used", "Moderately used", "Somewhat used", "Not used at all".

phase, it was assumed that one mobile workshop van[9] would be installed in each region's road maintenance bureau, so that the repair vehicle could be circulated among the DEUs to carry out on-site maintenance and small-scale repairs of equipment. However, while mobile workshop vans were used frequently by the DEUs in which they were installed, some DEUs did not know of the mobile van's existence if they were located one hour or more from a DEU in which a mobile workshop van was installed. Therefore, the vehicles were less frequently borrowed and lent among DEUs.

Mobile workshop van

Inside of the mobile workshop van

<Effect Indicators>

The following two quantitative indicators were established for this project: area of repaired potholes (m^2/year) and overlay installation distance. The achievement statuses of these indicators at the time of the ex-post evaluation are as follows:

1) Area of repaired potholes

As Table 4 shows, the target value for the area of potholes to be repaired was not achieved: the area of repaired potholes in 2018 was 88,754 m^2, while the target area of potholes to be repaired in each of the three years after project completion was 156,800m^2 (56% achievement rate). In addition, the target was not achieved in either 2016 or 2017, when the areas of repaired potholes were 93,672m^2 (59%) and 138,372m^2 (88%), respectively. Only in 2017 did the area of repaired potholes exceed the 2012 area of repaired potholes, which was the baseline value. According to PLUAD 5, the targets could not be achieved because the area of repaired potholes decreased due to the installation of overlay. According to BOUAD and several DEUs, the targets could not be achieved because overall operations were behind schedule in fiscal year 2018 due to a delay in budget allocation; budget requests were made based on pothole repair and overlay installation plans, but

[9] Before the project, the breakdowns that occurred on site were fixed by the operator on site. However, due to the shortage of maintenance equipment in the field, the repair could take several days to a week, which had a significant impact on the construction schedule. The mobile workshop van is a vehicle equipped with maintenance equipment and that was provided to enable prompt on-site repairs.

operations were conducted while evaluating the situation, due to the difference between the budgeted amount and the actual allotment. When these opinions were verified, it was found that the area of repaired potholes was small in 2016, when the overlay installation distance was long; the area of repaired potholes in 2017 was larger than the previous year, when the overlay installation distance was short; and both indicators were low in 2018 (see Table 5 below). Additionally, expenditures in 2018 were lower than the previous year[10], as described in Sections 3.4 and 3.4.3. Consequently, the reasons given by interviewees for unachieved indicators are considered mostly credible.

On the other hand, interviews with the involved organizations revealed that they did not know about the target for the area of repaired potholes that was established for this project, and they were also unaware that the total area of repaired potholes by the four road maintenance bureaus was set as a target for this project (although the areas of repaired potholes were measured per bureau). Therefore, a lack of awareness is considered to have influenced low achievement rates of the indicator.

Table 4 Area of repaired potholes (m^2/year)

Baseline	Target	Actual			
2012	2018	Road Maintenance Bureau	2016	2017	2018
	3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion
118,100	156,800	OSIUAD	24,219	32,371	18,465
		Jalal-Abad Balykchy	25,848	31,050	35,000
		PLUAD 5	6,861	13,159	10,735
		BOUAD	36,744	61,792	24,554
		Total	93,672	138,372	88,754

Source: Preparatory survey (January 2014) and documents provided from the road maintenance bureaus.
Note 1: Although the project was completed (the certificate of completion of equipment procurement was issued) in November 2015, the equipment was delivered to each DEU, and the equipment operation training was carried out, in 2016. Therefore, we set 2016 as the year of completion of the project.
Note 2: Although the values for 2018 were set as of November of that year, they were virtually the same values as of the end of December, because pothole repair work was not carried out during winter (according to four road maintenance bureaus that were the subject of the study).

2) Overlay installation distance

As Table 5 shows, the overlay length almost achieved the target: the target distance of overlay to be installed in each of the three years after project completion was 40 km, and the actual distance of overlay installed in 2018 was 34.1 km (85% achievement rate). However, the actual distances of overlay installed in 2016 and 2017 were 66.74 km (166%) and 51.8 km (129%), respectively, which means the targets were surpassed in both years. Therefore, this indicator was mostly achieved. As with the pothole repair target, the overlay target was

[10] Ideally, both the budget amount and the actual expenditure should be confirmed; however, since the budget information could not be obtained, it was verified comprehensively from the expenditure and the interview survey results.

not achieved in 2018 due to the delay in allocation of the budget.

Table 5 Overlay Installation Distance (km/year)

Baseline	Target	Actual			
2012	2018	Road Maintenance Bureau	2016	2017	2018
	3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion
10	40	OSIUAD	18.5	12.7	16.5
		Jalal-Abad Balykchy	15.7	12	4.6
		PLUAD 5	14	11.5	5.4
		BOUAD	18.54	15.6	7.6
		Total	66.74	51.8	34.1

Source: Preparatory Survey (January 2014) and documents provided from the road maintenance bureaus.
Note 1: Although the project was completed (the certificate of completion of equipment procurement was issued) in November 2015, the equipment was delivered to each DEU, and equipment operation training was carried out, in 2016. Therefore, we set 2016 as the year of completion of the project.
Note 2: Although the values for 2018 were set as of November of that year, they were virtually the same values as of the end of December, because overlay installation work was not carried out during the winter (according to the four road managements that were the subject of the study).

3.3.1.2 Qualitative Effects (Other Effects)

In the planning phase, the following qualitative effects were set as expectations: (1) improved construction quality through pavement repairs using the fleets for pothole repair and the asphalt mixture manufactured at plants (enhanced strength and durability of repaired areas); (2) shortened road closure periods through enhanced snow removal, snow melting, and salt spraying operations; (3) shortened road closure periods through enhanced capacity to restore roads after a disaster; and (4) control of damage progression to roads through the implementation of flexible overload control/management.

In terms of (4) overload management, we confirmed through interviews with WCTS that the control at the border was stronger than in the planning phase, but all three sets of weight scales installed in this project broke shortly after installation. Therefore, this cannot be considered as a project effect. Since overload control was considered important to preventing road deterioration, WCTS purchased weight scales from another country with its own money after the ones provided in this project broke, and it has continued to use the new ones. Therefore, the effect related to (4) cannot be considered in this project.

The qualitative effects related to (1), (2), and (3) were confirmed from interviews with MOTR, road maintenance bureaus, DEUs, and the Ministry of Emergency Situations, and they are as follows:

(1) Enhanced road construction quality

According to the DEUs that used the asphalt manufactured at the plant that was

established in this project, the need to repair pavements decreased compared to before the project, because this asphalt was finer, easier to handle, contained less impure substances, and had a higher durability. The difference in quality was confirmed by comparing the roads improved with the asphalt manufactured in this project's plant to the ones improved without this asphalt, and the effect was to a certain extent visible.

(2) Enhanced operation capacity related to snow removal, snow melting, and salt spraying

The snow-removing trucks, rotary snowploughs, salt spreaders, and motor graders are essential for getting through passes smoothly and safely. The number of days that the studied roads were closed due to snowfall, and the number of days required for restoration, were not monitored quantitatively. According to the DEUs for which snow removal equipment was provided, they can now dispatch workers immediately to the affected areas to conduct snow removal operations; before this project, the equipment frequently failed due to deterioration, and they sometimes had to rent equipment from private companies depending on the condition of their equipment. In addition, according to DEU-17, before this project, they sometimes had to close roads for three days or more due to snowfall; however, by the time of the ex-post evaluation, it became possible for them to immediately dispatch workers and equipment to affected areas using trucks with cranes, and they could open the roads within a day. Thus, the high performance of the equipment provided in this project contributed to shortening road closure periods.

In addition, on mountain roads, several workers were frequently observed during this study spraying snow-melting salt and sand from the back of a truck with a crane that had been provided by this project. Before this project was implemented, many DEUs could not take sufficient preventive measures before snowfalls because they did not have trucks with cranes and had to rent them from private companies. However, after the project was implemented, they have been able to take action both before after snowfalls.

A worker spraying snow-melting salt and sand

A rotary blower removing snow on a mountainous road

(3) Enhanced operation capacity in the event of a disaster

Although this study did not quantitatively monitor either the number of days when the

studied roads were closed due to disaster or the number of days required for restoration, roads need to be cleaned frequently in the beginning of spring due to landslides, rockfalls, and sediment disasters caused by snowmelt. In these situations, the trucks with cranes that were installed in each DEU in this project were particularly useful. According to the interview with DEU-17, they used to have to rent a truck with a crane from another DEU or from a private company and then transfer the equipment required for cleaning roads onto the rented truck before going to the affected area. However, after this project was implemented, it became possible to go immediately to the affected area after receiving a report of a disaster. By the ex-post evaluation, the time required to dispatch workers and equipment to an affected area after receiving a request for response was approximately one-third the time required before the project was implemented. Although the scope of operation of the excavators and wheel loaders was limited due to their limited numbers, it was confirmed that they were useful in road restoration work in the event of a large-scale disaster. Therefore, this project contributed to the enhancement of operation capability in the event of a disaster.

3.3.2 Impacts

3.3.2.1 Intended Impacts

In the planning phase, "an increase in the efficiency of travel and transportation" was assumed as a potential impact of this project; however, no quantitative indicator was established to measure its achievement. Therefore, this project is verified by the following indicators: the numbers of passengers carried by vehicles, and the volume of goods transported by road, in Bishkek City[11], Osh Oblast, Jalal-Abad Oblast, and Talas Oblast[12].

Tables 6 and 7 show the changes in number of passengers carried by vehicles and volume of goods transported by road in the regions studied in this project. From 2014 to 2018, the number of passengers and the volume of goods increased in all the regions. Although this project's contribution to these value increases is unknown, Section 3.2 shows that this project made it possible for road maintenance bureaus to better maintain roads. It can be concluded that the project responded to the increasing number of people and goods transported while maintaining the trust of road users.

[11] The target of this project are Osh Oblast, Jalal-Abad Oblast, and Talas Oblast; however, the Bishkek-Osh road includes the Bishkek City area, so the data for this city was also analyzed.

[12] "Number of days of road traffic controlled by the four road maintenance bureaus" and "average road speed managed by the four road maintenance bureaus" were also considered as supplementary indicators that more directly measure this project's impact. However, since the data related to these were not quantitatively aggregated, the number of passengers and the volume of goods by road were used instead.

Table 6 Number of Passengers Carried by Vehicles (supplemental indicator)

unit: 1,000 persons

	2014	2015	2016	2017	2018
Bishkek City	348,482	354,139	373,530	390,054	402,567
Osh Oblast	21,407	23,038	24,165	25,630	25,949
Jalal-Abad Oblast	31,367	31,164	32,074	33,017	33,427
Talas Oblast	14,318	14,381	14,501	14,628	14,790

Source: National Statistical Committee of the Kyrgyz Republic

Table 7 Volume of Goods Transported by Road (supplemental indicator)

unit: 1,000 tons

	2014	2015	2016	2017	2018
Bishkek City	4,967	5,226	5,543	5,603	5,886
Osh Oblast	2,466	2,489	2,515	2,531	2,552
Jalal-Abad Oblast	2,068	2,114	2,363	2,449	2,540
Talas Oblast	927	935	946	957	971

Source: National Statistical Committee of the Kyrgyz Republic

3.3.2.2 Other Positive and Negative Impacts

1) Impact on the natural environment

The road maintenance equipment installed in this project was designed using state-of-the-art technology to generate less exhaust fumes and to be friendlier to the environment, compared to the previous equipment owned and used by DEUs for many years. In terms of the construction of the asphalt and aggregate plants, environmental impact assessments were conducted; however, the reports were not available at the time of the ex-post evaluation. These plants are also designed to be more environmentally friendly than existing plants. In addition, from the on-site reviews and the interviews with the organizations involved, no problems were found related to influence on the surrounding natural environment caused by the construction of the plants. Therefore, this project had negligible impact on the natural environment.

2) Relocation of residents, site acquisition

Since the road maintenance equipment was installed in sites owned by DEUs, relocation of residents and site acquisition did not occur. In terms of the asphalt and aggregate plants, it can be determined from on-site reviews and interviews with the road maintenance bureaus that the sites were acquired in properly and this project had no impact related to the relocation of residents or site acquisition. The details related to the construction of each plant are shown in Table 8.

Table 8 The Statuses of Relocation of Residents and Site Acquisition Related to the Construction of Plants

Road Management Bureau	Plant construction Site	Status of relocation of residents, site acquisition
OSIUAD	Karatai village	As this plant was constructed on the site of an existing plant, no problems of relocation of residents or site acquisition occurred.
Jalal-Abad Balykchy	Jergatal village	Although this plant was newly constructed, the site was grassland and the construction of a plant on this site had been planned in the past. Therefore, no problems of relocation of residences or site acquisition occurred.
PLUAD5	Aksai village	As this plant was constructed on the site of an existing plant, no problems of relocation of residents or site acquisition occurred.
BOUAD	Kara-Kuljya village	This plant was initially planned in the basic design phase to be constructed in the Kurshab village, where DEU-959 was located. However, the MOTR suggested constructing a plant in the Kara-Kuljya village, as it was more suitable. As a result, the plant was constructed in the Kara-Kuljya village. The site where the plant was constructed was already owned by the government, so no issues of relocation of residences or site acquisition occurred.

Source: Prepared by the evaluators based on the information provided from the road maintenance bureaus

An asphalt plant

An aggregate plant

To summarize the effectiveness and impacts, almost all the equipment installed was frequently used at ex-post evaluation. Among the effectiveness indicators set at the ex-ante evaluation, “the area of repaired potholes” was below the target but “overlay installation distance” almost achieved the target. In addition, effects were confirmed in: improved construction quality through the construction of asphalt and aggregate plants; enhanced snow removal, snow melting, and salt spreader capabilities; enhanced capability to restore roads after disaster; and more effective transport of people and goods.

This project has achieved its objectives to some extent. Therefore, effectiveness and impact of the project are fair.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional Aspects of Operation and Maintenance

The executing agency in the planning phase was the Ministry of Transport and Communication (MOTC), while the Ministry of Transport and Roads (MOTR) was the executing agency at the time of ex-post evaluation (as mentioned in Footnote 1, this is because the Transport Department became independent due to organizational change). Although the organization name changed, the organizations responsible for all equipment installed in this project since the planning phase have been the road maintenance bureaus in MOTR. No system-related problem is found with maintaining the equipment installed in DEUs: the chief mechanic of each DEU serves as the equipment manager, and the equipment operators perform daily inspections and maintenance of the equipment of which they are in charge, all under the supervision of the region's road management bureau.

As of November 2018, a system was considered to be supposed to bring the road maintenance bureaus under the control of government-owned companies—and not under MOTR—with ADB support; the method of renting some pieces of road maintenance equipment to DEUs for a fee was introduced on a trial basis, using OSIUAD as a pilot. However, this system—in which DEUs pay rental fees to OSIUAD—has not been functioning properly, because DEUs are essentially funded only by the government budget. It has already been decided that this model will be suspended in May 2019 for the time being. It is uncertain when this effort will be resumed, but the road maintenance equipment provided in this project has not been affected by this pilot project. Therefore, it is determined that the sustainability of this project was not affected by the temporary trial run.

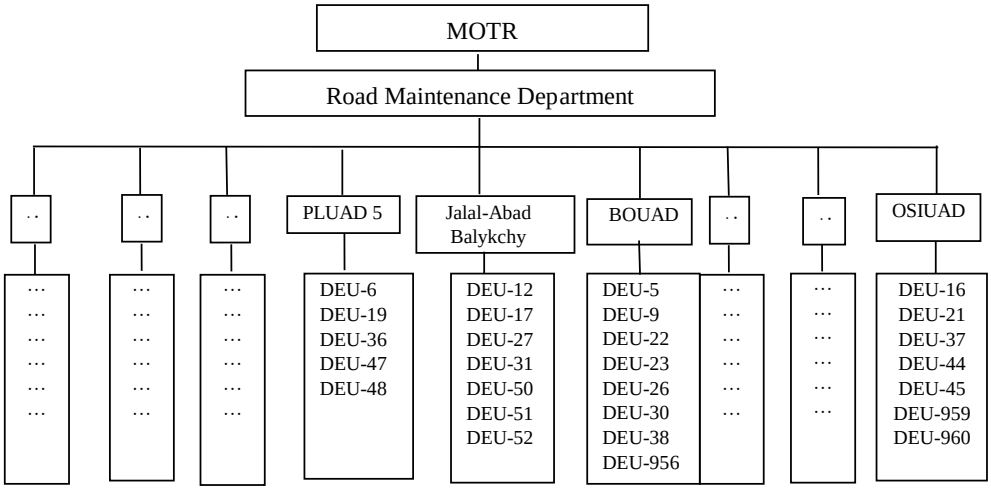


Chart 1 Organization Chart of Road Maintenance Department

Source: Preparatory Survey Report of the project (January 2014)

3.4.2 Technical Aspects of Operation and Maintenance

Most of the types of road maintenance equipment installed in this project have been owned by DEUs since before this project was initiated, and most of the DEU personnel—including those who responded to the interviews—had already been working for a DEU and were very experienced. Therefore, no problems were encountered in terms of the skill to handle and maintain the installed equipment. In addition, the interviews with DEU equipment operators and mechanics confirmed that the initial handling instructions and operation training conducted at Bishkek upon equipment delivery helped them learn how to handle and maintain the latest equipment very much. Furthermore, the interview with DEUs confirmed that the technicians and operators who handle the equipment feel responsible and proud of handling the latest equipment and work diligently on maintaining it, as they think that they will lose their job if the equipment becomes unusable.

DEUs located in urban regions such as Osh City and Jalal-Abad City are finding it difficult to secure young personnel, in particular because an increasing number of engineers and mechanics get jobs with private companies that pay higher salaries than those earned by civil-service workers in economic development. However, the retirement age of male workers in Kyrgyzstan is 63 years old, and veteran employees of DEUs subject to this study could continue to work for 15 or more years until their retirement. Therefore, at the time of ex-post evaluation, it was not urgently necessary to employ young technicians.

3.4.3 Financial Aspects of Operation and Maintenance

As Table 9 shows, MOTR's actual expenditures for road maintenance increased in 2012-2017[13]. Among the four road maintenance bureaus studied here, the expenditures increased in Jalal-Abad Balykchy and BOUAD but decreased in OSIUAD and PLUAD 5, while the total expenditure increased (see Table 10). In addition, interviews with MOTR, the four road maintenance bureaus, and DEUs confirmed that no financial problems were encountered with operating and maintaining the equipment. While the budget for road maintenance had never been sufficient, the budget actually increased after the project planning phase.

Table 9 Actual Expenditure for Road Maintenance by MOTR

(unit: 1,000 KGS)

2012	2013	2016	2017	2018 (November)
1,274,132	1,368,785	1,866,827	1,999,496	1,894,813

Source: MOTR

[13] Since the budget data was not available, analysis was based on the actual expenditures.

Table 10 Actual Expenditure for Road Maintenance by Road Maintenance Bureaus

(unit: 1,000 KGS)

	2016	2017	2018 (November)
OSIUAD	248,836	290,088	226,395
Jalal-Abad Balykchy	198,511	193,360	234,380
PLUAD 5	168,470	139,077	105,875
BOUAD	319,436	527,784	434,355
Total	935,253	1,150,309	1,001,005

Source: MOTR

3.4.4 Current Status of Project's Operation and Maintenance

As described in Section 3.3.1, the on-site reviews and interviews confirmed that 98% of the equipment installed in this project that was utilized, but much of equipment needed new parts, as three years had passed since the provision. According to the DEUs' answers to the questionnaire, the parts that were particularly needed were disks for asphalt cutters (at least 7 out of 27 DEUs), drill points for air compressors (at least 9 out of 27 DEUs), and oil filters and tires for trucks with cranes (at least 15 out of 27 DEUs). In addition some parts in the asphalt and aggregate plants were worn out and require replacement. The equipment parts that had not yet been procured are all made in Japan[14].

The parts needed to repair the road maintenance equipment are supposed to be procured through an open bidding process under DEU leadership; however, DEUs cannot submit bids, and the procurements are pending, because they do not know the procurement route or general market prices, even though they need to replace parts. Many DEUs said that they requested craftspeople to fabricate the parts or used parts made in China as alternate solutions; however, in the meantime, the equipment performance has been deteriorating, and the use of substitute parts has increased the frequency of equipment failure, leading to a decrease in operation efficiency. Meanwhile, DEUs are expected to secure a budget for purchasing parts and are eager to obtain the genuine parts made in Japan. Under such circumstances, the sustainability of this project will decrease in terms of operation and maintenance if no countermeasures are taken.

In summary, some minor problems have been observed in terms of the current status. Therefore, sustainability of the project's effects is fair.

[14] Among the equipment that has been prepared, those not made in Japan are motor graders, multi-purpose vehicles, snow ploughs, rotary blowers, and snow spreaders.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of the project is to improve the maintenance of the roads, including the Bishkek-Osh road, managed by four road maintenance bureaus under the jurisdiction of the Ministry of Transport and Roads in three oblasts: Osh, Jalal-Abad, and Talas. This will be accomplished by modernizing road maintenance equipment, thereby contributing to the enhancement of transfer and transportation efficiency.

The implementation of this project is highly relevant because it is highly consistent with Kyrgyzstan's transportation policy—with the development needs seeking to improve the maintenance of damaged and deteriorated roads—and with Japan's ODA policy—which focuses on supporting the development of transportation infrastructure. Furthermore, the efficiency of the project is high: not only was all road maintenance equipment procured and installed as planned, but both project cost and period remained within the planned range.

In terms of effectiveness, all the installed equipment was generally utilized effectively, including at the ex-post evaluation. Furthermore, among the effectiveness indicators that were set at the ex-ante evaluation, "the total area of repaired potholes" was below the target but "overlay installation distance" almost achieved the target. Moreover, other effects were also confirmed, including improved construction quality through the use of newly built asphalt and aggregate plants, enhanced application efficiency of snow-removing and snow–melting anti-slip materials, enhanced road restoration efficiency after disasters, and more. In terms of impact, it is confirmed that the transportation of people and goods has been increasing, based on the trends in both number of passengers carried by vehicles as well as volume of cargo transported by vehicles. Therefore, the effectiveness and impact of the project are evaluated as fair.

Regarding sustainability, no issues were found with the institutional, technical, or financial aspects of operation and maintenance; however, it is necessary to take measures to maintain the current status of operation and maintenance, due to a delay in replacing parts for some pieces of road maintenance equipment. The information on how to obtain parts has not been well disseminated to the staff at the project sites. Therefore, the sustainability of the project's effects is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Most of the DEUs subject to this project needs to replace certain parts for the Japanese-made equipment but they cannot procure the parts because they cannot submit bids, due to the unknown prices and sources. DEUs are requesting craftspeople to create substitute parts and are using inauthentic parts as temporary solutions; however, this deteriorates the equipment

performance, which fails more frequently compared to equipment operating with genuine parts. Therefore, DEUs are eager to purchase the authentic parts. Among the pieces of equipment installed in this project, parts required for the asphalt and aggregate plants are urgently needed, as they have a significant influence on the sustainability of this project's achievements. Therefore, MOTR should provide information on parts prices and distributors as quickly as possible for the DEUs through the road maintenance bureaus in each region, so that they can begin procurement procedures.

4.2.2 Recommendations to JICA

It is recommended that the JICA Kyrgyz office monitor the progress of the above suggestion and support MOTR as needed.

4.3 Lessons Learned

<u>Fully disseminating the information on the warranty for equipment as well as the prices and procurement method of parts</u>

The air compressors and portable load meter broke shortly after they were delivered, and even though some pieces of equipment were still within the warranty period, no action was taken. In addition, it was confirmed that bids could not be submitted and procurements were pending even though parts needed to be replaced, because information on the procurement route and on general market prices was not available. The preparatory survey of this project pointed out that a review of The Project for the Improvement of the Equipment for Road Maintenance in Naryn (2006) and The Project for the Improvement of the Equipment for Road Maintenance in Issyk-kul and Chuy (2010) found cases where part procurement was described in the contract documents; however, the road maintenance bureaus and DEUs were unaware of these In response, the review stated that explaining the procurement route should be ensured by informing the road maintenance bureaus of MOTR, to prevent the same problem from occurring again. In spite of this suggestion, the road maintenance department of MOTR did not share this information with the road maintenance bureaus or DEUs in this project. As any equipment will require part replacements, it is crucial to distribute copies of the information on equipment warranties and procurement methods, not only to the project's executing agency but also to all organizations involved in implementing the operation and maintenance of the equipment. This will enable DEUs to respond more promptly to equipment problems, leading to enhanced equipment operation.

Consideration of organizational and geographical constraints in the placement of shared equipment

In this project, one mobile workshop van was provided to each road maintenance bureau to be dispatched to DEUs for on-site equipment maintenance and minor repairs. However, the equipment sharing system differed among the road maintenance bureaus of various regions, and in many cases, the equipment was borrowed and lent only between DEUs that were geographically close to each other. Considering the time and cost required to borrow and lend the equipment, it is not realistic for a DEU to share its equipment with a DEU located more than two hours away or with a DEU located on a mountain pass. For equipment installation with the premise of sharing among multiple organizations, it is important to analyze the existence of an organizational system for sharing and the geographical constraints in the preparatory survey, in order to establish a workable plan.

Thorough implementation of monitoring of outcome indicators and target values based on agreement with the executing agency

As reviewed in Section 3.3, the data on the area of repaired potholes and the overlay installation distance were monitored by each road management bureau; however, the bureaus were not aware that the total values of the four bureaus would be used as the target value in this project.

Unlike in a technical cooperation project, the project design matrix of a financial cooperation project is not produced together with the executing agency. Thus, JICA needs to review the indicators and target values with the executing agency, both in the planning phase and in the implementation phase, and record agreements in a written form. This effort will ensure a smooth monitoring and undertaking of the ex-post evaluation of the project.

End