Mongolia

Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Construction of the Eastern Arterial Road and Improvement of the Related Equipments"

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0. Summary

This project was conducted to develop two of the six sections in the "Millennium Road Plan" which was formulated by Mongolia to enhance the quality of life in the region through the development of east-west transportation. Thus, as the project meets the needs and development policy of Mongolia and was consistent with Japanese assistance policy, its relevance is high. Since both project cost and period were within the plan, its efficiency is also high. By developing the road and bridges, the quantitative effects of decreasing travelling time on the target road, removing weight restrictions on bridges and increasing the traffic amount have been confirmed. Also mitigating the adverse impacts of a loss of grassland, reducing maintenance costs and securing better access to major cities were identified as qualitative effects. Furthermore, upon the project's completion, the standard of living has been improved through effects such as the lowering of prices and an increase in the number of shops in towns alongside the target road, hence the effectiveness is high. Although the road and bridges are well maintained under the current circumstance, minor concerns in terms of securing a budget and spare parts for equipment needed for maintenance works remain, thus the sustainability is fair. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description

Project Location

Developed Road

1.1 Background

In Mongolia, transportation of both people and commodity depends on road transportation

to a large extent. Therefore, poor road condition incurs adverse impacts to economic development. Particularly, east-westward transport from Ulaanbaatar fully depends on road transport, while the railway connected Irkutsk in Russia to Beijing in China via Ulaanbaatar from north to south. At the time of project planning, road condition of east-westward transport was, however, far from safe and stable means because of very few paved section and this poor road condition incurred adverse impact.

Under that circumstance, the Government of Mongolia approved the implementation of the Millennium Road Project (total length of 2,200km) to connect long-distance regions by arterial road, aiming to facilitate the transport efficiency, industries and service capabilities, as well as regional development and improves the quality of life. The Millennium Road Plan comprises one horizontal (east –west) arterial road as "Millennium Road" which advances the nations in the aspect of settlement and regional development project and five vertical (north-south) arterial roads to stimulate regional development. The "Eastern Arterial Road" is the road section from Erdene to Undurkhaan of Millennium Road, and it comprises six sections (total length of 260km). Since the Eastern Arterial Road was expected to bring about high economic effects, the Government of Mongolia put highest priority on its development in 2001 and the Government of Mongolia requested the Government of Japan to construct two sections and bridges which did not satisfy international standards and caused transportation bottlenecks.

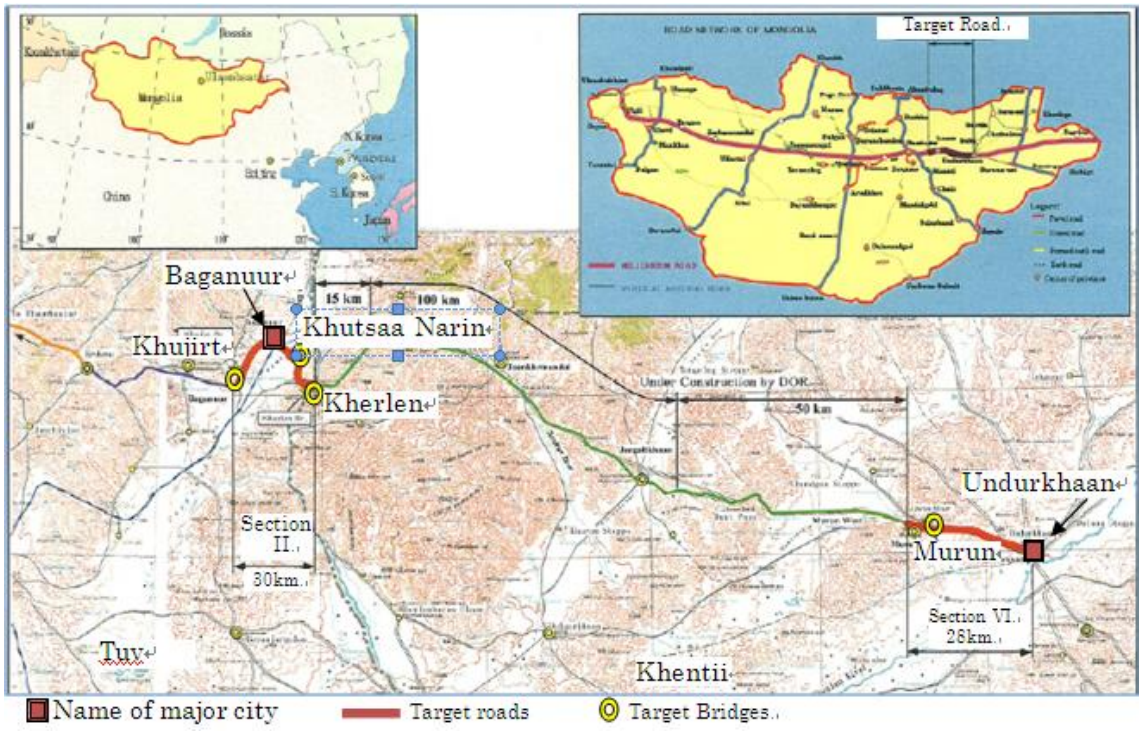

Figure 1 Project Location

1.2 Project Outline

The objective of the project is to ensure safe and smooth transportation through the rehabilitation of asphalt pavement, construction of a new road and bridge (as well as replacement of existing bridges) in two[1] sections of the entire eastern arterial road.

Grant Limit / Actual Grant Amount	2,944 million yen /2,913 million yen
Exchange of Notes Date	June, 2005 (Phase I), May, 2006 (Phase II)
Implementing Agency	Ministry of Road and Transportation
Project Completion Date	December , 2006(Phase I), September, 2009 (Phase II)
Main Contractors	Konoike Construction, ITOCHU Corporation
Main Consultants	Japan Overseas Consultants
Basic Design	"Basic Design Study on the Project for Construction of the Eastern Arterial Road and Improvement of Equipment for Road Construction and Maintenance in Mongolia", JICA, March, 2005.
Detailed Design	June, 2004 – March, 2005
Related Projects	(JICA)Feasibility Study on Construction of Eastern Arterial Road in Mongolia(2001-2002), (ADB)Master Plan for National Road Network, and Feasibility Study(1994), (World Bank)New low Cost Road Development and Rehabilitation(1997-2000)(2001-2003), (USA)Road Surface Rehabilitation (2002-2004)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi (Ernst & Young Sustainability, Co., Ltd.)

2.2 Duration of Evaluation Study

Duration of the Study: November, 2012 – October, 2013

Duration of the Field Study: May 19 – June 1 and June 30 – July 5, 2013

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Mongolia

The "Action Plan of the Government of Mongolia for 2004 -2008", a development policy in place when planning this project, primarily emphasized 1) quality improvement of public services, 2) development of political, economic and social legal systems as well as a safe living

[1] Two sections: namely section II which connects Baganuur and Kherlen in Tuv Province and section VI which connects Murun and Undurkhaan in Khenri Province.

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

[3] ③: High, ②: Fair, ①: Low

environment, 3) high economic growth led by the private sector, 4) improvement of the legal system and standard of living, and 5) human resource development. This plan emphasized road development as one of the strategies to eliminate the gap between urban and regional areas through 3) the above mentioned high economic growth led by the private sector. Also, in the development policy released at the time of ex-post evaluation, the "Action Plan of the Government of Mongolia for 2012 -2016", development of infrastructure was described as an important area to ensure economic development and to promote sustainable development. This plan set a road sector goal to connect all the major cities and Ulaanbaatar with paved road by 2016.

Recognizing that delays in road development hinder economic development, the "Millennium Road Project" was formulated in 2001 in Mongolia. This plan was comprised of the east-west road acting as an arterial road to contribute to national development and five south-north arterial roads[4] to promote regional development. This plan aimed to facilitate transport efficiency, improve industries, service capabilities and the standard of living in regional areas through regional development from the perspective of settlement and regional development plans. As of the ex-post evaluation, the "Government Policy for Developing Road Sector of Mongolia" which was formulated by the Road Construction Department of the Ministry of Road and Transportation in 2012, includes the scope of the "Millennium Road Plan". This policy stated that 60% of unpaved road will be developed to paved road by 2012 and 100% will be developed with financial resources by 2016.

As mentioned above, development of the regional economy and road development which helps to stimulate the economy have been placed as priority areas both at the time of project planning and ex-post evaluation. The road sector policy has also been aimed to develop infrastructure in order to consistently connect major cities with Ulaanbaatar, the capital city. Thus, it can be concluded that this project which aimed for a safe transportation service by developing a road which connects Ulaanbaatar and the eastern area has been consistent with development policies and measures both during the planning and ex-post evaluation.

3.1.2 Relevance with the Development Needs of Mongolia

In Mongolia, where transportation of both people and commodities is largely dependent on road transport, poor road conditions produce adverse impacts on economic development. This is particularly true east-west which fully depends on road transport and is far from a safe and stable means throughout the year. At the time of project planning, 75% of the total 11,000km of

[4] The subject of this project was for two sections out of six sectionsof the eastern arterial road where development had not commenced. This eastern arterial road includes the sections started from Erdene to Undurkhaan with a total length of 260km. For the other four sections, road development was completed for one section and the process for construction for development was commenced for three sections at the time of planning.

national road in Mongolia remained unpaved. The ratio of unpaved national road in the eastern area, except Tuv province, was even higher and 99% were earthen road or gravel road, thus the development of an arterial road in the eastern area was an urgent issue.

Roads are the only means of transportation to connect the eastern area while railways only connect south-north even at the time of ex-post evaluation. Furthermore, the unpaved national road ratio is still 24% of the total 12,722km of national roads in Mongolia and 85% of the total 2,610 km national roads in the eastern area. Since the eastern area has many historical sites for tourism and an arterial road to the eastern area is one of the major routes to connect the sea side, an arterial road to the eastern area is a critical road for economic development in Mongolia.

Based on the above, the need for developing roads to connect major cities has been high both at the time of project planning and now for the economic and social development in Mongolia. Furthermore, improvement of road conditions for two sections which play the important role of connecting Ulaanbaatar and the eastern major cities is critical for smooth transportation and economic and social development in the region, hence the road development in the eastern area is still high at the time of ex-post evaluation.

3.1.3 Relevance with Japan's ODA Policy

In the country assistance program to Mongolia which was formulated in 2004, four priority policy targets were set. Among them was "support for infrastructure development to promote economic activities", thus this project was consistent with Japan's ODA policy.

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

3.2 Effectiveness[5] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

At the time of project planning, reducing travelling time (increasing the average travelling speed) and diminishing weight restrictions on bridges were expected as quantitative effects of the project. In addition to those indicators, changes in traffic volume were also examined in this ex-post evaluation.

3.2.1.1 Changes in Travel Speed

When this project was planned, the average speed on the target roads was 20-40 km/hour (h) and it was expected that this speed would increase to 60-80km/h through road improvement. In this ex-post evaluation, it was confirmed that the average travelling speed in the two target sections improved to 80km/h according to the interview survey of the executing agency. The

[5] Sub-rating for Effectiveness is to be put with consideration of Impact

speed was measured in both section II and VI during this survey and the result shows that travelling at a speed of 80km/h was possible without issue, excluding intersections or speed bumps. However, a part of section VI between Murun Bridge and Undurkhaan, the capital of Khentii Province in the eastern area, is now under maintenance works due to a crack caused in 2012, therefore the average travelling speed in this particular area is currently about 50km/h.

Additionally, travelling time also decreased along with the improvement of travelling speed. For example, it took about four hours from Ulaanbaatar to Baganuur in section II before project implementation, but now it has been shortened to about two hours. From Ulaanbaatar to Khentii Province in section VI, travelling time decreased to about five hours, despite having taken about eight to ten hours before road development as shown in Table 1.

Table 1 Changes of Travelling Time before and after the Project

Section	Travelling Time	
	Original	Actual
Ulaanbaatar ⇒ Baganuur (Section II)	About 4 hours	About 2 hours
Ulaanbaatar ⇒Undurkhaan (All 6 sections of Millennium Road including section II and VI)	About 8-10 hours	About 5 hours

Source: Prepared based on the interview survey of the Ministry of Road and Transportation, Road maintenance authority and results of a measurement survey of the target road.

3.2.1.2 Increase of Heavy Vehicles

As two[6] of the target four bridges were wooden bridges before the project, only small trucks were able to pass on them. On another two bridges[7], only heavy vehicles with a loading capacity less that 14 tons were allowed to pass as they were also heavily dilapidated. According to the project documents prepared at the planning period, it was expected that 20 ton trucks as well as trailers with loading capacities of 43 tons would be able to pass on all of the bridges. By upgrading bridges through this project, all four bridges increased their strength and now there are no weight restrictions except on Kherlen Bridge[8], thus it can be judged that the target has been achieved.

(Photo) Rehabilitated Bridge
(Khutsaa Narin Bridge)

On the other hand, due to the mitigation of weight restrictions, heavy vehicles loaded with a large amount of construction materials and coal were frequently observed and there is a concern of damage to the road conditions in the future. As a countermeasure, the Ministry of Road and

6 Khutsaa Narin Bridge and Murun Bridge.
7 Khujirt Bridge and Kherlen Bridge.
8 At Kherlen Bridge, a loading capacity of 44tons was allowed though it was not actually measured by measuring equipment.

Transportation has placed measurement equipment to regulate the overloading of vehicles at the Kherlen Bridge and is now preparing to start their operation.

3.2.1.3 Increase in Traffic Volume

The traffic volume was not set as an indicator for the effect of the project, however, the Basic Design report (hereinafter referred to as "B/D) indicated the original and planned traffic volume which was surveyed in the Feasibility Study report (hereinafter referred to as "F/S"). Traffic volume was therefore collected in the ex-post evaluation survey and it was confirmed that the daily traffic volume including cars, trucks and busses rose threefold. Figure 2 shows the original traffic volume in 2004 and the planned traffic volume in 2010 and 2015, as well as the actual volume in 2012. Actual numbers as of 2012, (the second line from the right) has increased threefold from the original volume as of 2004, and it has even exceeded the planned traffic volume of 2015. This result can be said to demonstrate that the developing road has contributed to stimulating smooth transportation of both people and commodities.

When conducting the interview survey at Tsenkhermandal, a town used as a resting and eating spot located between section II and VI, it was heard that the number of bus operations[9] have increased from once a week to twice a day after project completion which has contributed to better transportation and revitalization of small commercial activities.

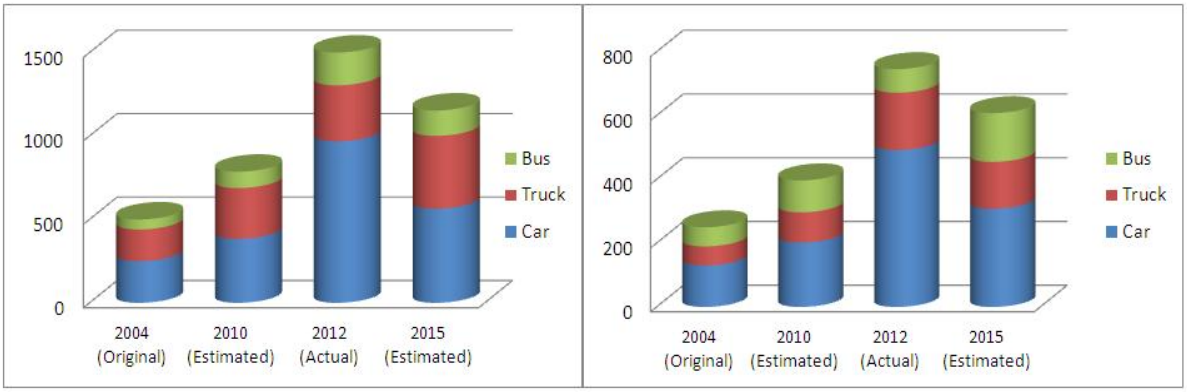

Figure 2 Original, Planned and Actual Daily Average Traffic Volume
(Left: Section II, Right: Section IV)

Note: Calculated based on a 24-hour traffic-volume survey conducted at Kherlen Bridge in Section II and Murun Bridge in Section IV (two days).
Source: Prepared based on the B/D report and the documents provided by the Road Supervision and Research Centre's Ministry of Road and Transportation.

[9] Busses operate mainly between Ulaanbaatar, the capital of Mongolia and Undurkhaan, a main city in the eastern area.

3.2.2 Qualitative Effects

3.2.2.1 Mitigation of Adverse Impacts of a Loss of Grassland

Before the road was improved by the project, the road was unpaved and multiple shifting tracks were made. Therefore it was expected that those adverse impacts caused by vehicle and truck dust to grassland would be mitigated by the project implementation. The B/D report explained that the approximate lost area of 12% would be reduced even after consideration of the loss caused by the road embankment. When interviewing the executing agency, no quantitative data has been collected on this issue, however it was explained that multiple shifting tracks have been changed to a single paved road and so no vehicles drove on the road side after the road was paved. Accordingly, grassland which used to be disturbed by vehicles and dust has started to re-grow. This situation shows that the adverse impact to grassland has been mitigated. When driving along the road at the ex-post evaluation, new grass was confirmed to have started growing at some parts of the target road side.

(Photo) The target road where some new grass has started growing on the road side.

3.2.2.2 Reduction of Travelling Costs and Maintenance Costs

Based on the results of a beneficiary survey[10] and interview survey conducted at the ex-post evaluation, reduction of travelling costs and maintenance costs of vehicles were raised as effects of road development. Although specific quantitative data or amounts were not available, 88% of the respondents answered that the maintenance costs for vehicles had been reduced after the road development. In addition, a half of them indicated that approximately 20-40% of maintenance costs was saved, which means that the improvements of road conditions had contributed to lower fuel costs as well as reductions in abrasions and tire damages.

【Result of beneficiary survey】

【Question】Have travelling cost or maintenance costs been reduced compared to the situation before road development?	Largely reduced	Reduced	Same	Increased	No Answer
	22 %	67 %	5 %	1 %	5 %

Respondents who answered that the costs were reduced【Question】How has it been reduced?	<20%	20-40%	50%	50%<	No Answer
	9 %	51 %	20 %	11 %	9 %

[10] Beneficiary survey was conducted in June 2013 by interviewing 100 beneficiaries at the project road section. Details of beneficiaries were as follows: 8 bus drivers, 15 truck drivers, 41 car drivers, 7 merchants, 18 residents and 8 tourists and 3 others.

3.2.2.3 Better Access to Major Cities and Social Services

Access to major cities has been improved by developing the arterial road between the neighbouring area of Ulaanbaatar and major cities in the eastern area. It relates to the above mentioned effects which include increases in the traffic amount, shorter travel and transport times. Also, nowadays large sized share-ride buses operate twice a day which was the once a week due to bad road conditions before the road development. In addition, taxis also frequently shuttle between major cities at present. Those changes have increased the choice and ease of transportation for people in the eastern area. Even in the beneficiary survey results, all respondents stated that access between major cities[11] has been improved.

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Stimulated Regional Economic Activities

When project planning, stimulating the economy in the eastern area was expected as an indirect effect through the elimination of weight restrictions on vehicles on bridges and the reduction of travelling or transportation costs. Since regional industry data or macro data including those on regional Gross Development Product were not available, the impact was not analysed quantitatively. Therefore, a beneficiary survey and interview survey were conducted to ascertain the impact of the project. The results show that 88% of respondents answered that regional economic activities were “highly stimulated” or “stimulated”, which indicates a certain level of economic impact was produced in the target area. In particular, petrol stations and stores were opened on the target road side, which resulted in an increase in employment, and also access to major cities was increased which contributed to smooth transportation of people as well as goods. Also, according to the data on unemployment, the rates of Baganuur district (Section II) and Khentii Province (section VI), where the target road is located, are relatively lower than the national average or other regions (it was almost the same before project implementation in 2004 as shown in Figure 3).

[11] In particular, access between Ulaanbaatar, a capital of Mongolia and Baganuur, which is known as a coal mine city or Undurkhaan, the capital of Khentii Province in the eastern region was significantly improved.

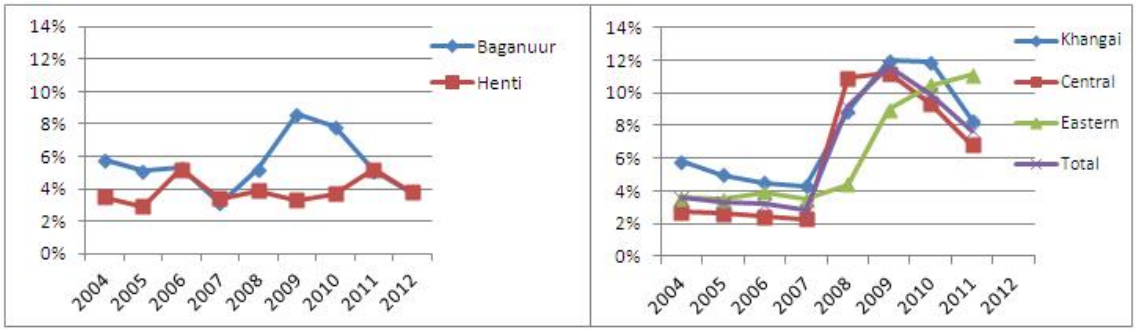

Figure 3　Unemployment of the Target Area and Each Province of Mongolia

Source：Prepared by the evaluation team based on documents provided by the Baganuur District Office, Khentii Provincial government office and the National Statistical Office of Mongolia, "Mongolian Statistical Year Book".

It is difficult to prove the direct relation between the unemployment rate trend and the project, but it can be considered that better transportation of people and goods as well as the increase in stores stimulated the regional economy and then contributed to the improvement of the employment situation.

3.3.1.2 Improvement of Standard of Living

At the time of planning, it was expected that the standard of living would be improved as the improvement of bridges and road conditions would enable people to have better access to markets and social facilities including schools, hospitals, etc. But in fact, it was not the improvement of access to those facilities but rather the following positive impacts for daily life that were explained as indirect effects by the development of the arterial road.

- Lowering price of commodities
- Increase in the number of shops and variety of goods
- Reductions in travelling time and securing leisure time

According to the results of interviews and beneficiary surveys on staff of the Baganuur district office, Khentii Provincial office and road maintenance companies of the target sections, almost all respondents answered “commodity prices have become cheaper and the varieties of commodities have increased thanks to the improved transportation after the road development”. In inland country Mongolia, goods are basically transported from the capital or major cities to regional areas, thus commodity prices get higher and the variety smaller the farther one gets from major cities. Before the road development, the prices of both food and daily commodities were relatively high compared to those in Ulaanbaatar. Under the current circumstances, however, it is possible to get these commodities at almost the same price as Ulaanbaatar in Khentii Province. The main reasons for this positive impact are considered to be the better access and smooth transportation brought about by the road development.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

As mentioned in "3.2.2 Qualitative effect", multiple shifting tracks have changed to one paved road thanks to the road improvement, which has resulted in a mitigation of adverse impacts to grassland. On the other hand, no negative impacts due to the project's activities were confirmed through the interview survey of the executing agency's staff or the beneficiary survey.

3.3.2.2 Land Acquisition and Resettlement

The target road is located in the middle of grassland where there are no residential areas or stores except a few urban sites. In some of these urban sites, including Baganuur district and Undurkhaan, the project rehabilitated the existing road and therefore no land acquisitions or resettlements were required, which was also confirmed by the beneficiary survey of the executing agency's staff .

3.3.2.3 Unintended Positive/Negative Impact

Other unintended positive impacts explained in the beneficiary survey were as follows.

【Degree of satisfaction of beneficiaries】

According to the beneficiary survey, 95% of respondents indicated an improvement of transportation services such as bus operations and 80% indicated smoother road conditions as an effect of the road development. As a result, 72% of respondents were satisfied with the current road condition.

【Increase in the number of tourists】

According to the statistics of Khentii Province, the number of tourists visiting Khentii Province doubled for Mongolian tourists and foreigners increased threefold compared to before the project as shown in table 2. Before the road was improved, even the arterial road was unpaved, therefore it took a longer time for transportation and the operations of bus services were also very limited. It is considered that the shorter travelling time, better road conditions, accessibility of large size busses and various other factors have contributed to increases in the number of tourists.

Table 2 Number of Tourists in Khentii Province

Before project implementation (2005)		After project implementation (2012)	
Mongolian	Foreigners	Mongolian	Foreigners
5,356	980	12,208	2,839

Source: Documents provided by Khentii Provincial Office

As explained, this project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

In this project, two of the six sections of the road of the Millennium Road Project, namely section II located in Baganuur district in Ulaanbaatar and section IV located in Khentii Province, with a total length of 260 km connecting Erdene and Undurkhaan were rehabilitated and constructed. Also, bridges alongside the two target roads were upgraded or newly constructed. In addition, equipment was procured and soft components implemented for road maintenance. The comparison of planned and actual outputs is listed in table 3 and table 4.

Table 3 Planned and Actual Outputs (Japanese Side)

	Planned	Actual
Road and Bridges Section II	Rehabilitation of existing asphalt pavement 15.8km Construction of new road 14.0km Bridge construction 2 Bridge upgrading 1	Implemented as planned
Section VI	Rehabilitation of existing concrete pavement 0.25km Construction of new road 27.6km Bridge construction 1	0.21km 27.9km Implemented as planned
Equipment *Numbers in brackets indicate the numbers of procured equipment.	Motor grader(2), Vibration roller(4), Asphalt finisher(2), Asphalt plant(2), Water tanker(2), Crusher plant(2), Asphalt cutter(7), Plate compacter(5), Pickup truck(7), Cargo truck with crane(2), Line maker(2), Asphalt testing equipment(2), Backhoe loader(7), Road maintenance truck(5), Vibratory rammer(7), Dump truck(6), Wheel loader(4), Trailer(1), Asphalt Sprayer(2)	Implemented as planned
Soft Component	Purpose: Enhancing O&M capacity on a maintenance management system for equipment Contents: 1) group trainings for equipment maintenance, and 2) pilot construction technical training	Total 16.9M/M Equipment maintenance: 3M/M, Technical training: 13.9 M/M Contents : -Development of a manual for Operation and Maintenance (Hereinafter referred to as "O &M") -Group training (O&M seminar: 58 recipients) -Technical training (paving and O&M seminar: recipients 79)

Table 4　Planned and Actual Outputs (Mongolian Side)

Planned	Actual
・Securing lands and clearing construction sites ・Securing concession on borrow pits, sand pits and quarry sites ・Securing land for plant, and installation of gate and fences. ・Constructing road side stations(michi no eki), monuments and planting trees ・Providing distributing line and telephone trunk line	Implemented as planned

The designs of side drainage and casting were partially amended for securing safety based on the results of a detailed design survey on geological and rainfall investigations. It is, therefore, considered reasonable. There were no other modifications on outputs.

In the soft component, manuals for O&M were prepared, and group training for O&M on equipment as well as pilot construction technical training was conducted to transfer the skills for road maintenance to technical staff and the operators of road maintenance companies, namely Baganuur AZZA and HARGUI. The Mongolian side also carried out the foundation construction, monument construction, etc. as planned without any delay.

(Photo) Kherlen bridge constructed in Section II

（Photo） Procured equipment: Crasher plant

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned project cost covered by Japan was set at 2,932 million yen[12] and the actual project cost totalled 2,913 million yen, 99% of the original plan, which was mostly as planned. Figures on the amount covered by the Mongolian side were not available from either the Mongolia or Japanese side, however, it was confirmed that the executing agency carried out all the planned foundation construction. Thus, the planned cost was thought to be covered by the Mongolian government.

12 Total project cost of Phase I and II.

3.4.2.2 Project Period

The scheduled project period was 55 months, including a period of detailed design and tendering processes. The actual period was 50.2 months (June, 2005 – September, 2009), shorter than the original plan.

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

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

Road Maintenance Companies, Baganuur AZZA (Section II) and HARGUI (Section VI), are in charge of the O&M of the target road, bridges and equipment as shown in table 5. The major role of the Ministry of Road and Transportation for O&M is to formulate policies and plans for the road sector, and allocate a budget.

Table 5 Role of Each Institution on O&M for the Road and Bridges

Institution	Role
Ministry of Road and Transport	Formulation of policy, strategy and plans, Identify the sections of rehabilitation, Allocation of budget
Road Maintenance Companies	Maintenance of road, Preparation and submission of lists of sections requiring rehabilitation, Inspection and maintenance of road and bridges

Through the interview survey of staff of Baganuur AZZA and HARGUI, no major issue in terms of staff shortages have been identified. In Mongolia, maintenance works are made in spring and summer since it cannot be done in winter. In case the number of workers is not sufficient, both road maintenance companies hire workers on a contract basis during summer, thus no critical issues were confirmed. On the other hand, the maintenance department and Road Supervision and Research Center of the Ministry of Road and Transportation as well as the Mongolian Road Association, which provides training courses for road construction, explained that a lack of technical staff is a common issue in Mongolia as a whole, though currently the number of workers is sufficient. In fact, the required number of operators is not allocated in HARGUI as shown in Table 6.

Table 6 Number of Staff of National Road Maintenance Management Agency (Baganuur AZZA and HARGUI)

Category	At the time of planning		At the time of ex-post evaluation(2012)	
	Tuv AZZA	HAGURI	Baganuur AZZA[13]	HARGUI
Operators	17	24	5	8
Drivers	7	9	10	12

Source: Prepared based on a B/D report and document provided by Baganuur AZZA and HARGUI

3.5.2 Technical Aspects of Operation and Maintenance

Baganuur AZZA and HARGUI, which are in charge of the O&M of the road, bridges and equipment, recognizes that there are no issues in the capacity of technical staff, thus the road condition has been kept in good condition. Technical staff for both road maintenance companies learned how to maintain asphalt paved road, where they used to have less experience, and how to utilize and maintain procured equipment for O&M through the practical trainings conducted as a soft component of the project. Thanks to those trainings, they enhanced their capacity, and the skills and experiences acquired have been fully utilized for O&M under the current circumstance. One concern for the future is that there are no opportunities for those technical staff to receive training regarding O&M in the Ministry of Road and Transportation. Though Mongolian Road Associates provided paid training courses[14], chances to take this training is very limited for staffs of AZZA or HARGUI, which have a limited budget. There are no critical problems under the current circumstances, however a certain level of support in technical or financial aspects would be required if new technical capacities became necessary for O&M on new road or equipment in the future.

3.5.3 Financial Aspects of Operation and Maintenance

O&M budget for the road and bridges in Mongolia, which had been decreased both at the time of project planning and after, increased drastically in 2013 as shown in table 7. O&M costs for the target road and bridges was estimated at approximately 1% of the annual road O&M budget of the executing agency, therefore it was expected that an appropriate budget would be secured without problems according to the estimation at the time of planning. Both Baganuur AZZA and HARGUI, however, have not secured adequate amounts of budget as shown in table 8 due to the increase of the O&M cost for these years. In interviewing accounting and O&M staff of both companies, they state that they report information on sections needing O&M to the

[13] At project planning, Tuv AZZA was planned to be the responsible entity for O&M of section II. However, it was divided to three maintenance companies including Ulaanbaatar Azza which is in charge of road of Ulaanbaatar, Erdenesant AZZA, for western area of Tuv Province and Baganuur AZZA for the eastern area of Tuv Province which covered section II of the project. The number of staff at the time of planning in Table 6 indicates the numbers of Tuv AZZA before division.

[14] Training provided by the Mongolian Road Association is mainly for road construction or management, thus O&M for road or equipment are not included at present. The Mongolian Road Association, however, is now considering putting road maintenance in the future curriculum.

Ministry of Road and Transportation every year, however, only 20 or 30% of the needed amount has been allocated.

Table 7 Annual O&M Budget on Road and Bridges of the Ministry of Road and Transportation

(Unit: Million tugrik (Tg))

At the time of planning(2010)	2011	2012	2013
14,000	10,000	11,200	19,000

Source: Documents provided by Ministry of Road and Transportation

Table 8 Annual O&M Budget of the Road Maintenance Company[15]

(Unit: Million Tg.)

	2012	2013
Baganuur AZZA	314.2	500.0
HARGUI	802.9	1079.9

Source: Documents provided by Baganuur AZZA and HARGUI

3.5.4 Current Status of Operation and Maintenance

【Current condition of roads and bridges】

Target roads and bridges are in good condition when conducting actual observation at the ex-post evaluation. There were some cracks on the road surface in section VI, but it was confirmed that HARGUI has already started the maintenance works for these damaged parts from spring, 2013.

Though the B/D report pointed out that an overlay[16] should be done once every seven years, only three years have passed since the road development. Thus, inspection and minor maintenance are required under the current circumstances as shown in table 9. When reviewing the checklist of inspection of each road maintenance company at ex-post evaluation, the specified works have been carried out as planned. Basically those

Table 9 Items to be Inspected for Maintenance

	Facility	Maintenance and Repairing Works
Road	Road surface	Inspection , patching and smoothing
	Shoulder and slope	Surface treatment, vegetation, additional embankment
	Side drainage	Removal of earth deposit
	Marking	Repainting
	Culvert	Repair of crack, stripping and join
Brides	Drainage pipe	Cleaning of sediments
	Expansion joint	Repair of damaged members
	Handrail	Repairing damages by traffic accidents
	Bearings	Removal of earth deposit
	RC slab and curb	Repair of crack and stripping
	Pavement	Repair of crack and potholes
	Main structure, floor system, Lateral bracing	Repair of damaged members
	Substructure	Repair of crack and stripping
	Revetment	Repair of scours

[15] O&M costs for the target sections were estimated at the time of project planning. In the ex-post evaluation, the O&M budget for the target road was not able to be counted accurately, thus the total O&M budget of each company was shown.

[16] Overlay means that only the surface is improved without replacing the roadbed when cracks were caused on the surface and they do not affect the roadbed.

maintenance works are conducted during spring and summer since those works normally cannot be made in the winter season in this country.

However, one concern of possible damages caused by overloaded vehicles has been noted. In the eastern arterial road, there is no regulation on overloaded vehicles except for the Kherlen Bridge. Even there, no controls for measuring the weight of vehicles has been enforced. Therefore, occasionally overloaded trucks will cross carrying massive amounts of building materials from Ulaanbaatar to regional areas or carrying coal from Baganuur which is famous for its coal complex[17]. Overloaded vehicles may hurt the road condition in the future, thus countermeasures to control heavily loaded vehicles is one of the challenges to maintain the sustainability in the future.

【Condition of procured equipment】

Procured equipment has been operated and maintained by Baganuur AZZA and HARGUI. Equipment has been fully utilized for O&M works, but problems with regards to spare parts for some equipment not being available in Mongolia or too expensive to purchase, have been raised by both road maintenance companies. In case spare parts are not available, it is unclear whether those spare parts are available in Mongolia because manufacturers or agents do not deal in the relevant spare parts. At ex-post evaluation, agents in Ulaanbaatar who were designated in a list prepared by the consultant were contacted and it was clarified that these agents did not deal in the specified spare parts, thus it can be said that there is some misinformation in the list prepared by the project. Due to the lack of spare parts, some equipment is currently out of order.

Equipment which is not being utilized now due to this issue is: a pickup truck, a cargo truck with crane, a vibratory rammer and a dump truck. Also for the crusher plant procured for HARGUI, spare parts for a corn crusher made in China, available in the market at Ulaanbaatar, has been substituted since the genuine product was not available in Mongolia. According to the engineer of HARGUI, it is a big concern that the use of spare parts which are not the genuine products may damage the crusher plant itself.

Thus, some problems have been observed in terms of budget for O&M and availability of spare parts of equipment, therefore sustainability of the project effect is fair.

[17] Based on Interview survey at the Baganuur district office and beneficiary survey.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was conducted to develop two of the six sections in the "Millennium Road Plan" which was formulated by Mongolia to enhance the quality of life in the region through the development of east-west transportation. Thus, as the project meets the needs and development policy of Mongolia and was consistent with Japanese assistance policy, its relevance is high. Since both project cost and period were within the plan, its efficiency is also high. By developing the road and bridges, the quantitative effects of decreasing travelling time on the target road, removing weight restrictions on bridges and increasing the traffic amount have been confirmed. Also mitigating the adverse impacts of a loss of grassland, reducing maintenance costs and securing better access to major cities were identified as qualitative effects. Furthermore, upon the project's completion, the standard of living has been improved through effects such as the lowering of prices and an increase in the number of shops in towns alongside the target road, hence the effectiveness is high. Although the road and bridges are well maintained under the current circumstance, minor concerns in terms of securing a budget and spare parts for equipment needed for maintenance works remain, thus the sustainability is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

【Strengthen O&M of the eastern arterial road as a whole】

Under this project, two of the six road sections, which connect the capital city of Ulaanbaatar in Tuv province with Undurkhaan (Khentii Province) and the major cities of the eastern region, were rehabilitated or developed. Although two target sections have been in good condition, some cracks on the road surface were confirmed in some parts of other sections which disturb smooth transportation. In the arterial road, if there are damaged sections, even in limited parts, it will disturb the effect of smooth transportation as a whole, therefore, O&M not only for the target sections by road maintenance companies but also for the eastern arterial road as a whole will be taken care of based on the plan by the Ministry of Road and Transportation.

【Strengthen the control of overloaded vehicles】

At the time of ex-post evaluation, no weight restrictions had been enforced in the eastern arterial road except at the Kherlen Bridge of Section II. This allows overloaded vehicles to frequently drive between Ulaanbaatar and major cities in the eastern region. The executing agency also recognized the issue on heavily loaded vehicles, therefore, measurement equipment has been set at the Kherlen Bridge and a plan to control the overloaded vehicles is now being prepared. On the other hand, strengthening the control of heavily loaded vehicles only at

Kherlen Bride cannot regulate the vehicles which pull into the eastern road before and after the Kherlen Bridge. Therefore, measures to strengthen the regulations for heavily loaded vehicles at not only Kherlen Bridge but also at major cities such as Baganuur, where many vehicles merge, are needed.

【Supplying the spare parts of procured equipment】

Both Baganur AZZA and HARGUI have issues in getting the spare parts for equipment for O&M, and some equipment is out of order due to the supplying route of spare parts being unclear, or the price of spare parts being too expensive. Although the executing agency explained that the O&M of equipment is totally under the responsibility of road maintenance companies, it is necessary for the Ministry of Road and Transportation to attempt to figure out the supplying route as an executing agency in the case of maintenance companies not being able to manage these issues.

4.2.2 Recommendations to JICA

【Follow up for replacing the spare parts for the procured equipment】

Regarding the issue which was mentioned above in "Supplying the spare parts of procured equipment" of "4.2.1 Recommendations to the Executing Agency", it is recommended that JICA also provide support for establishing the supply route of spare parts for equipment by contacting business agents, manufacturers or suppliers in case the executing agency cannot deal with the issue.

4.3 Lessons Learned

【Arrangement of spare parts】

As mentioned, there's concern on the sustainability in terms of spare parts for equipment. In both Baganuur AZZA and HARGUI, some equipment needed for O&M are out of order since they cannot figure out a supply route for spare parts. Also concern remains that a substitute product which is not the genuine product can damage the equipment itself in the future. The main reason for this issue is that the spare parts are not available at the specified agents which had been designated in the list prepared by the project in Mongolia. In similar type projects, it is necessary to scrupulously prepare a list of supply routes for each spare part to avoid such issues.

(End)