Islamic Republic of Pakistan

FY2017 Ex-Post Evaluation of Japanese ODA Loan Project

"Rural Roads Construction Project (II) (Sindh)"

External Evaluator: Hiroaki Nagayama, IC Net Limited

0. Summary

This project aims to improve traffic conditions in rural areas by improving pavement roads in remote locations of Sindh, thereby contributing to poverty alleviation and regional disparity correction through the improvement of access to neighboring urban regions and enhancement of rural living standards.   From the time of appraisal to now, this project has been consistent with the development policy of Pakistan and the development needs of the target area. In order to cope with the flood damage that occurred during the project implementation period, the section to be paved was changed dramatically. However, this is an appropriate change in accordance with the needs, and its relevance is high. Efficiency is moderate, as the project cost fell short of the plan while the expected project period was exceeded. Traffic volume on rural roads paved by the project roughly increased from before the project, almost reaching the target in about half of the sections. However, strict verification was not possible due to differences in the method of measuring the target value. As a result of road improvement, access to various public facilities and hospitals improved, and certain economic effects such as increased shipment quantities of agricultural products were observed. From the above information, the effectiveness/impact is moderate. Regarding sustainability, maintenance and management systems and technical aspects are not problematic, but uncertainty arises whether or not it is possible to secure a stable maintenance budget. Additionally, some road conditions are deteriorating. Therefore, the sustainability is moderate.

In considering the above observations, the evaluation of this project is assessed as having some problems.

1. Project Description

Project location

A paved road (Dadu District 2018)

1.1 Background

The total extension of the road network in Pakistan was about 260,000 km in 2006 and the road paving rate was about 60% throughout the country. These roads account for approximately 89% of passengers and 96% of cargo in land transportation, and road transport occupied an important position as a major means of transportation. The number of registered automobiles has also increased at an annual average of 4.3%, and the importance of road transport is expected to increase further in the future.

Meanwhile, about 40% of the national highways at the time were in bad condition due to damage from such things as overloading trucks, and there was a shortage of maintenance and management fund. In response to this situation, the Medium Term Development Framework (2005-2010) (hereinafter referred to as "MTDF (2005-2010) ")[1] strengthened the transportation capacity of existing road networks through rehabilitation, etc. rural development of new economically feasible roads including rural roads, improvement of road maintenance management.. Development of state and local roads among road networks is positioned among the rural development programs of each provincial government. The Sindh Province is located in the southeastern part of Pakistan. In their provincial development plan (Sindh vision 2015), shortening times for the transportation of agricultural products and raising incomes of farmers are listed as priorities, and rural road improvement is necessitated.

In 1993, the Japanese Government implemented an ODA loan called the "Rural Roads Construction Project" that covered all four provinces of Pakistan (a total extension of 936 km and a completion of 941 km) to contribute towards road improvement. This project has been effective and the need for ongoing support projects has increased.

1.2 Project Outline

The objective of this project is to increase traffic volume and to shorten traffic time in rural areas by improving pavement roads in rural area of Sindh Province, thereby contributing to improvement of living standards of rural area and the improvement of access to neighboring urban regions and activation of rural economies.

Loan Approved Amount/ Disbursed Amount	9,126 million yen / 7,752 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	May 2008 / May 2008
Terms and Conditions	Interest Rate: 1.2% (the consultant portion is 0.01%), Repayment: 30 years (Grace period 10 years),

---

[1] This is featured in the National Development Plan called the Mid-Term Development Framework (MTDF) from 2005 to 2010.

	Conditions for Procurement: General untied
Borrower / Executing Agencies	The President of the Islamic Republic of Pakistan / Sindh Province　Public Works and Services Department
Project Completion	October 2015
Main Contractors (Over 1 billion yen)	none
Main Consultants (Over 100 million yen)	Katahira Engineers International Co., Ltd. (Japan)
Related Studies (Feasibility Studies, etc.)	none
Related Projects	【ODA loan】 Pakistan Rural Road Construction Project (1993) East-West Road Improvement Project (National Route 70) (I) (2008) 【Grant Aid】 National Route 25 (Calaro-Wad) Renovation plan (2006) 【Technical cooperation】 The Project for the Enhancement of Training Capabilities of Construction Machinery Training Institute (2006)

2.　Outline of the Evaluation Study

2.1　External Evaluator

Hiroaki Nagayama [2]　IC Net Limited,

2.2　Duration of Evaluation Study

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

Duration of Study: September 2017-March 2019

Duration of the Field survey: October 21, 2017 - February 22, 2018, April 27, 2018 - June 4, 2018

2.3　Constraints during the Evaluation Study

For security reasons in Pakistan, field surveys including project sites visits were conducted by field survey assistants under the supervision of external evaluator, and external evaluator carried

---

[2] Support to IC Net Limited, Professor of Kyoto University

out desk evaluations. Moreover, the project covers large rural areas with 500km length of roads in Sind province. Due to the security situation, measuring the effects of all sections through this survey and conducting the survey with statistically representative characteristics was not possible. An evaluation was carried out based on the results of the sample survey in some sections pertaining to the measurement of effects such as section traffic volume.

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

3.1 Relevance (Rating:③[4])

 3.1.1 Consistency with the Development Plan of Pakistan

 At the time of appraisal (2008), rural development through the national level long-term plan's "Vision 2030" (2005-2030) was regarded as an important matter, and infrastructure development including rural roads was one of the countermeasures. MTDF (2005- 2010) mentioned a road sector development strategy in 1.1 for 1.Strengthening transportation capacity of existing road networks centered on rehabilitation and widening, 2 Selection for economically feasible new road construction including rural roads 3.Improvement of the road network to promote trade with Afghanistan, central Asia and India, 4. Promotion of private entry into the road sector, 5.Improvement of road maintenance and promotion of traffic safety measures, 6. Strengthening police control over overloading, and 7. Improvement of implementation for the capacity of the road sector executing agency.

 Under this circumstance, Sindh Province, the target area of this project, stated in its provincial development plan that it would "reduce the transportation time of agricultural products to the market, thereby increasing farmers' income" under Provincial Development Planning (Sindh vision 2015). Through this, rural areas of Sindh Province and cities are also intended to strengthen the connection with each other.

 The national development plan "Vision 2025[5]" (formulated in 2014) at the time of the ex-post evaluation is aiming at establishing an efficient and integrated transportation system promoting competitive economic development and improving regional connectivity. The main objectives are: to reduce transportation costs and increase mobility safety; ensure efficient connectivity between rural and market/urban centers, interstate high speed connections and the integrated road/rail network between economic bases (airports, ports and dry ports); and to establish a high-performance transportation road connecting major trading partners. Within the plan, the

---

[3] A：Highly satisfactory, B：Satisfactory, C：Partially satisfactory, D：Unsatisfactory
[4] ③: High, ②: Fair, ①: Low
[5] This was prepared by the Planning Commission Ministry of Planning, Development & Reform and approved by the National Economic Council in 2014.

transport sector will occupy 10% of GDP and 6% of employment, and the road density is targeted at 64 km/100 sq. km^2, doubling that of the previous 32 km/100 sq. km^2.

The Works and Services Department's (hereinafter referred to as the "WSD") "WSD Vision 2025" of the Sindh Province Public Works Bureau set up countermeasures against damage and deterioration to infrastructure caused by heavy rainfall and flooding, listing them as a new development subject. The countermeasures were prepared for the roads damaged by the flood that occurred in 2010. The countermeasures have had an influence on the selection of the paved roads as will be described later. Based on the above, it is highly consistent with the development policy of the country.

3.1.2 Consistency with the Development Needs of Pakistan

In the above-mentioned MTDF (2005-2010), we acknowledge that the current status of rural roads and the importance of maintenance are causing the poor quality of roads, congestion and economic loss due to undeveloped roads. It was positioned as a high-demand area along with the improvement of the living environment (food security, health sanitation, educational environment, etc.). According to a survey conducted by WSD which is the counterpart agency, it was pointed out that more than half of the existing roads in Sindh Province required improvement[6].

In addition to contributing to economic growth and poverty reduction in rural areas, rural road development makes it possible to efficiently transport agricultural products, and convenient access to social facilities such as schools and medical institutions is also improved.

Efficient transportation of agricultural products and improvement in access to social infrastructure facilities has contributed to the alleviation of the regional disparity by providing better living conditions of rural villages. Since the project has also contributed to the improvement of economic and social indicators, the project is highly recognized as an important project.

As described above, the improvement of rural roads is important from the viewpoint of economic and social development both during the appraisal and ex-post evaluation, consistency with the needs of the country is high, and the necessity of this project is recognized.

3.1.3 Consistency with Japan's ODA Policy

Pakistan's Country Assistance Policy by the Japanese Government in 2012 had three priority areas with a major goal of building a stable and sustainable society through economic growth. One of them, "Improvement of the economic base", will support assistance for productivity

---

[6] In the International Roughness Index (IRI) that quantitatively evaluates road conditions, many roads were regarded as bad.

improvement and poverty reduction in the agricultural sector, which accounts for a large proportion of the workforce. The relevance of this project will therefore be recognized.

The 'Overseas Economic Cooperation Operation Implementation Policy' (April 2005) by JICA sets the foundation for sustainable growth as one of its priority areas. As a country-specific policy for Pakistan, Japanese government focuses on areas that contribute towards a balanced regional society and economic development. In addition, it is necessary for strengthening the road sector, which is responsible for nearly 90% of domestic transport to support private-led economic development that is also in the "Country-specific business implementation policy" (February 2007). Regarding rural roads, importance is also placed from the viewpoints of, among other things, poverty reduction, securing access to markets, assisting in earthquake reconstruction and rectifying disparities. Based on the above, it is highly consistent with Japan's aid policy.

3.1.4 Appropriateness of the Project Plan and Approach

In this project, the total length and the target section were greatly changed due to several reasons after the start of the project. Below is a history of the time series.

1) Extension of the total length of the Road (2008): At the start of the project, a total extension of approximately 450 km was approved, and the subject road was selected by the Works and Services Department, based on selection criteria of the country after signing the ODA loan agreement. Then, the total extension was changed to 500 km in 2008. This is because it was assumed that the unit cost can be lowered by lengthening the road to be maintained. Construction started in 2010 in the initial section selected above, and 232 km out of 500 km has been developed as the "Selection Section" as of October 2012.

2) The plan changes due to flooding (2012): Recordable heavy rains occurred in various parts of Pakistan from the end of July 2010, and flooding caused severe damage to rural roads in Sindh Province. In September 2010, both the Japanese and Pakistan governments began considering prioritizing roads in flood-damaged areas. In December 2012, 268 km of not constructed road (out of the initial plan of 500 km) was selected as an "alternative section" to adopt criteria for flood damage countermeasures.

3) Extension of the total length of the road (Second extension, January 2014): Since the project cost of the civil engineering work in the above alternative section fell within the plan and surplus funds are made, further maintenance of "the additional 28.5 km section" was decided. As a result, the maintenance section general extension by this project increased from the initial plan of 450 km to 528.5 km.

Regarding the above circumstances, it can be said that it was an appropriate change that resulted

in an increase in output, as the total extension of the road increased by the planned ratio due to the efficiency of the project cost, etc. The flood damage that occurred during the implementation period was enormous, and the priority for restoration was significantly high. For this reason, it can be said that the drastic change of the alternative section from the initial maintenance section was appropriate in accordance with the project purpose.

However, about 160 km out of 232 km of the selected road was also damaged by the flood after selection. The surrounding environment of the road is largely changed from the time when the planned value used for the effectiveness of this evaluation was set at 2010 when the economic and social survey was conducted. Therefore, it may be difficult to achieve the level of effect expected by this survey. The effect of this project, which will be described later, will be analyzed taking this point into consideration.

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

3.2 Efficiency (Rating:②)
3.2.1 Project Outputs

The output of this project is as follows. For the planned 452 km, the actual result was maintained at 528.2 km. The initial selected section was 226 km, the alternative section was 274 km and the additional section was 28.5 km.

Table 1 List of Outputs

Item	Plan	Actual in parentheses, ratio to the planning value
(1) Civil engineering work	56 sections Total Length 452km	73 sections Total Length 528.2km (117%)
1)Dadu	5 sections 31.4km	6 section 41.70km(133%)
2)Hyderabad	4 sections 22.8km	2 sections 16.42km(72%)
3)Thatta	5 sections 30.6km	4 sections 27.589km(90%)
4)Khairpur	16 sections 157.8km	25 sections 183.9km(117%)
5)Sukkur	2 sections 10km	2 sections 10.57km(106%)
6)Jacobabad	12 sections 89km	14 sections 103.155km(116%)
7)Shikarpur	9 sections 79.9km	10 sections 71.636km(90%)
8)Larkana	3 sections 30.6km	10 sections 73.21km(239%)
Road specification	Pavement width 3.7m Shoulder width 2m	As planned

(2) Consulting Services	Detailed design, bidding assistance, construction management work, capacity building of executing agencies, etc.	There is no change in work content. As a result of the civil engineering change mentioned above, the business volume increased by 20%.

As mentioned in 3.1.4, approximately half of the roads were changed from the maintenance target section at the time of the plan due to flood occurrences in this project. Allowing only one interpretation for the purpose of road maintenance also differs between the road selected as originally planned and the road sections developed as a restoration project from countermeasures against floods, both of which were selected based on an appropriate review process. Therefore, it can be evaluated that appropriate sections and distances have been established according to the project purpose. There are no major changes in other basic road specifications.

3.2.2 Project Input
3.2.2.1 Project Cost

The actual project cost was 8.384 billion yen (of which the yen loan portion was 7.752 billion yen) against the initial plan of 9.869 billion yen (with a yen loan portion of 9.126 billion yen), amounting to 85% of what was planned. Due to the depreciation of the rupees[7] mainly during the period, yen-denominated project costs were drastically reduced. As mentioned above, more than half of the maintenance sections were selected from the alternative roads sections, and due to the nature of restoration from flood damage, the maintenance cost was higher than usual. However, the construction method leading to the bidding effect and cost reduction (Triple Surface Treatment) was introduced, and the project cost was lower than planned and implemented without exceeding the planned project costs.

3.2.2.2 Project Period

The project length actually exceeded the plan of running from May 2008 to June 2013 (62 months), but in reality from May 2008 to June 2015 (85 months / 137% of the plan). The main reason for the postponement was because the project plan needed to be drastically reviewed due to the 2010 abovementioned flooding. This required approximately one and a half years for the selection, planning and approval of the alternative 268 km section. About project period, we could not conduct evaluation in detail due to following reasons; 1) Lack of information on project design and details, which was extended due to response to the flooding, 2)The possibility that increase in the total length of the road as main output by around 17% from the plan may have influenced

---

[7] The assumed exchange rate at the time of planning was 1.93 yen per rupee, and the average rate during the project implementation period (2008 - 2015) was 1.08 yen, which remained significantly strong.

the extended days of the road construction.

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

(1) Financial Internal Rate of Return

Due to the fact that this project pertains to a rural road, it is difficult to directly measure its benefits as a concrete amount, and FIRR calculation was therefore not implemented from the beginning.

(2) Economic Internal Rate of Return

In the original plan, IRR was supposed to be calculated again in the socio-economic survey carried out by the consultant after the start of the project[8]. The economic internal rate of return (EIRR) in this survey was calculated as project and maintenance costs within the project lifespan of 20 years with the benefits being the reduction of travel expenses.

In this ex-post evaluation, we attempted the same calculations and comparative analysis as the results of the socio-economic survey that were adopted as the planned value. These results were based on the actual measurement data of a traffic survey in 14 sample sections selected by the method described in the clause of effectiveness. The following is the calculation result, but this comparison is also not described as a comparison under the same conditions strictly due to constraints[9] of the investigation plan, etc. It is thus used as a reference.

Table 2 Economic Internal Rate of Return (EIRR)

Province	Section	Preliminary Survey	Recalculation	Ratio to plan	Comparison with social discount rate (12%) [10]
Dadu	D-2	41.0%	19.0%	low	high
	DA-3	30.0%	37.0%	high	high
Larkana	LA-8	13.0%	21.0%	high	high
	LA-4 & LA-7	31.0%	11.0%	low	low
Shikarpur	SH-52	50.0%	35.0%	low	high

[8] In the initial plan, meeting the EIRR 12% or more is regarded as the criterion for section selection, and the predicted value of 13.9% was set as a whole. However, with regard to this calculation, details of the basis and calculation method cannot be confirmed at the screening mission conducted at the time of planning, and eventually it was decided to reset the planned value based on the calculation result after the start of the project.

[9] As we could not confirm the presupposition of the original plan, the traffic volume survey in the economic and social survey was measured for 12 hours from 6 o'clock a.m. to 6 o'clock p.m., and for 12 hours during the nighttime. The annual average daily traffic volume was calculated by multiplying the measured data by the coefficient of 0.24. The survey time and the survey spot of each section are unknown. In this ex-post evaluation, we measured for 6 to 9 hours in different time zones for each section due to security problems, etc., and regarded this as daytime traffic volume. As described above, there are differences in several points such as implementation time, measurement time and place, prediction coefficient of traffic demand, etc. in the economic and social survey and this ex-post evaluation study. In general, the calculation was carried out based on a more conservative estimate in the calculation of this ex-post evaluation. Therefore, the internal rate of return may be lower than the planned value.

[10] As the EIRR's plan comparison is significantly difficult, we also added a comparison based on the social discount rate of Pakistan as a criterion. Here, we adopted 12% used by the Asian Development Bank, etc. as a standard.

	SHA-2	24.0%	19.0%	low	high
Hyderabad	HA-1	16.0%	10.0%	low	low
	H-5	37.0%	50.0%	high	high
Sukkur	SK-4	29.0%	1.0%	low	low
	SK-5	28.0%	3.0%	low	low
Thatta	TA-2	15.0%	2.0%	low	low
	TT-2	20.0%	3.0%	low	low
Khaipur	KA1-1 & KA1-2	42.0%	22.0%	low	high
	K-31	31.0%	3.0%	low	low
	Average	29.1%	16.9%	low	high

From the above assessment, we could confirm the following.

1) Section 11 had a low internal rate of return from the plan and Section 3 had a high internal rate.

2) In the initial plan, the internal rate of return of 12% was adopted as the selection criteria. Since this number was adopted as the selection criteria in other international organizations as well, we tried to compare the result this time with this standard, the section exceeding 12% is half of seven sections, the average of the whole is also 12% exceeded. Although it is not an exact comparison under the same condition, it can be inferred that a section with a certain validity is selected based on the result of the internal rate of return for the selected road.

3) On the other hand, the internal rate of return of cities such as Sukkur, Tatta, etc. are particularly low. The traffic volume in these sections is sluggish (20~60%) to be described in the clause of effectiveness, may have influenced on lower EIRR figures.

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

3.3 Effectiveness and Impacts[11] （Rating:②）

  3.3.1 Effectiveness

        3.3.1.1 Quantitative Effects

At the time of this project plan, there is supposed to be an apparent degree of achievement regarding "whether the volume of traffic in the project target area has increased" or "the required time has shortened" as the main effect indicator, and the increase in traffic volume based on this project's estimated values were calculated[12]. However, this evaluation was affected by the external

---

[11] Sub-rating for Effectiveness is to put with consideration of Impacts.

[12] The indicators set at the time of appraisal are "annual average daily traffic volume" and "required time" in 56 business sections. The "annual average daily traffic volume" was set as the reference value of 516 to 3,468 (machines / day) in 2003 and the target value of 927 to 6,282 (machines / day) two years after completion of the project. However, because the data for each section was not set to this reference, it was impossible to evaluate by comparison between the plan and actual result.

factors such as flood during the project implementation period. Therefore, in this ex-post evaluation, the analysis was made based not by comparison with the plan at the time of appraisal, but on the resetting the following planned value;

(1) Resetting the target value of the effectiveness index

As stated in efficiency, the flood that occurred in July of 2010 under this project also caused major damage to Sindh Province. As a result, the planned value of the project effect, especially pertaining to the annual average daily traffic volume of each road, the following needs were identified to be revised from the time of appraisal;

1) As mentioned in the efficiency section, JICA was considering measures at that time to support flood- damaged areas in September 2010. Given that part of this project was changed among the unselected section (about 265 km) of this project, about 60% of 165 km was selected as a measure to support areas with significant flood damage. As a result, the sections where the target and the planned value were not set increased greatly at the time of appraisal.

2) In February 2011 and October 2013, an economic and social survey was carried out as a consulting service for this project[13] that include the measurement of the road traffic volume of the target sections. The former was a process determined at the time of planning, and the planned value of this project was to be decided by the results of this investigation in the preliminary evaluation table. Furthermore, in October 2013, an additional socioeconomic survey was carried out on the newly-affected flood areas in response to the change in the project plan of 2) above.

3) Traffic volume measured by both surveys can be thought of as the most correctly-reflected and recent data of each road situation. Therefore, in this evaluation: 1. the data of the survey conducted in 2010 is used as the reference value for roads selected before the flood occurrence, and 2. the actual traffic volume in 2013 is adopted as a reference value for the roads selected after the flood occurrence. Based on the same way of thinking, we adopted the increase prediction of the traffic volume established in every survey for each planned value after the maintenance of this project.

In order to adjust the resetting the target value of the effectiveness index of this project, we will analyze the target achievement level for the traffic volume increase of each road and make a judgment after comprehensively taking the development of other effects into consideration. For the traffic volume data, the analysis is based on a limited sample survey, and these data therefore

---

[13] This survey was conducted in the consulting and service contract, which is in charge of construction management of this project, and was confirmed from JICA's record at the time that it was used as a criterion for judging roads, etc. in flood-damaged areas. From this, it can be said that it is reasonable to adopt it as a formal planned value.

do not represent the entire project effect.

(2) Traffic volume at the time of ex-post evaluation (October 2017)

Since we did not measure accurate traffic volume on a daily basis for this project road in order to grasp the current traffic volume, traffic volume survey was conducted by this method in the following way.

1) The total number of roads on which actual measurements were taken was 14 sections[14], of which 7 sections were already selected before the flood occurred, and 7 sections were additionally added after the flood occurred, more than 20% of the whole 65 sections. Although it is not a sample with strict representation due to restrictions such as safety and access to the survey site, we have selected certain sections from the target 6 districts without exception after consideration.

2) Traffic survey conducted in this ex-post evaluation took the form of a fixed-point observation by the researcher's team that conducted surveys for 6 to 8 hours during the daytime at multiple points on the target road. As stated above, this survey does not make rigorous comparison because there are differences between the socioeconomic survey such as with measurement points, time and the method of calculating actual measurement values.

Based on the above observation, the plan and actual results of the annual average daily traffic volume[15] for the 14 sections' surveyed target areas are as follows.

Table 3 The plan and actual results of the annual average daily traffic volume for the 14 sections' surveyed

(Unit: number / day)

	District	Section	Reference value	Planned value	Actual (2017)	Ratio to plan	Achievement
Initial Section	Dadu	D-2	136	391	583	149%	high
		DA-3	304	651	1,005	154%	high
	Larkana	LA-8	39	90	967	1074%	high
		LA-4 /7	227	431	191	44%	low
	Shikarpur	SH-52	976	2,542	1,018	40%	low
		SHA-2	315	796	474	60%	moderate
	Hyderabad	HA-1	130	286	255	89%	high

---

[14] Selection of the section to be investigated was decided in consultation with the Works and Services Department, JICA Pakistan Office and a consultant company in charge of construction management of this project. There are differences between roads regarding the time when we conducted the measurement. This was because we needed to avoid early morning or after sunset in road sections which have safety problems during those hours.

[15] Totalization was carried out by vehicle type such as rikisyas, trucks and vehicles in totalizing traffic volume. However, since there are some differences between the vehicle type of the reference value and the planned value and the vehicle type at the actual aggregation, it is difficult to strictly compare the planned results for the total traffic volume in sections by type.

		H-5	138	405	1,422	351%	high
Alternative Section	Sukkur	SK-4	115	310	93	30%	low
		SK-5	116	348	104	30%	low
	Thatta	TA-2	100	218	128	59%	moderate
		TT-2	138	369	87	24%	low
	Khaipur	KA1-1/1-2	1,176	1,812	388	21%	low
		K-31	150	392	90	23%	low
		Average	4,060	9,041	6,804	75%	moderate

Note 1: For the reference value, the year of confirmed data of traffic volume are different between the roads where selection and construction was advanced before the flood occurred and the roads selected after the flood. Therefore, we adopted the figures for 2010 and 2013, respectively.

Note 2: Planned value, which was compared against actual, was set as the forecasted data for target per section considering the change of traffic volume year by year after constructing roads. Because the measured traffic volume data is for 2017, traffic volume forecast data predicted by the elapsed years up until 2017 after completion of each road was adopted.

Note 3: The degree of accomplishment has been arranged in three stages: over 80% of the plan is considered high, over 50% to less than 80% is medium and less than 50% is low.

Survey of traffic volume (January 2018)   Survey of traffic volume (January 2018)

As a whole, the project has reached 75% of the planned value, and 5 sections' traffic volume has reached 80% of the planned value. The medium degree of achievement is 2 sections, and the section with the low achievement degree is 7 sections. The majority is lower than the plan, especially in the alternative sections selected after the flood occurrence. Below we analyze the degree of accomplishment and its factors. For detailed traffic by the type of vehicles, please refer to reference 1.

1) High achievement sections (5 out of 14 sections)

1. In Dadu (D - 2, DA - 3), motorcycles in particular increased significantly and boosted the total value. D - 2 is a road connected to the major city, Jochi, where schools and hospitals are located, and it is thought that this kind of traffic volume increased due to improved access.

According to interviews with local residents, DA - 3 is a road leading to a temple considered as a sanctuary, and many people started to use the road because access became easier.

2. In Lalcana (LA - 8), there has been a drastic increase despite the security problems. It is a road connecting the city Hailepur and Mohenjoda and it has become possible to move to Mohenjohdaro in a short time with road the improvement.

3. Hyderabad (H-5) has had a large increase in motorcycles. It is apparent from the interview survey of local residents that the movement to the city of Hyderabad with the hospital has become easy.

2) Sections with low degree of accomplishment (7 out of 14 sections)

According to an interview with local resident of Thatta (TT - 2, TA - 2), Khaipur (KA 1 - 1 & KA 1 - 2), Shikapur (SH - 52, SHA - 2) Larcana'LA-4/L-7),and Sukkar (LA-4 / L-7), in particular, inhabitants tend to refrain from going out from night to dawn since public safety has deteriorated, such as the occurrence of bicycle-theft As a result, the traffic volume has declined also declining considerably.

3) Other changes by vehicle type

In assessing by type of vehicle, the increase in motorcycles is conspicuous, whereas industrial vehicles such as trucks are decreasing. Regular vehicles such as compact cars, pickups and wagons are on the rise due to improvement of roads, but there are few large vehicles such as four or five-wheeled trucks. This is thought to be due to the fact that there are increased opportunities for individual households to buy motorcycles for commuting to work rather than traveling by large vehicles. The purpose of this project is to improve pavement of rural roads, and it is thought that access to neighboring urban areas was improved and contributed to an increase in the traffic volume of motorcycles and rikisyas that are farmers' means of transportation. It is presumed that the maintenance section of each road is as short as 5 to 11 kilometers and is not connected to the main road, so it contributed to intra-regional traffic. The fact that security problems have not been solved affects the insufficient increase in traffic volume.

(3) Time required change

In this evaluation survey, the assessment was conducted by investigators every 14 sections. As a result, except for two sections, the time reduction effect was confirmed and the required time was shortened to 40% or less in 11 sections. As a whole, the expected effect is occurring and it can be said that the time reduction effect by road improvement is high.

Table 4   Duration of traffic time by the roads

District	Section	Before Maintenance (min)	Now (2017)	Shortening effect (min)	Time required ratio
Dadu	D-2	15	5	10	33%
	DA-3	15	10	5	67%
Larkana	LA-8	17	20	-3	118%
	LA-4 & LA-7	15	15	0	100%
Shikarpur	SH-52	20	7	13	35%
	SHA-2	11	4	7	36%
Hyderabad	HA-1	13	4	9	31%
	H-5	24	8	16	33%
Sukkur	SK-4	12	4	8	33%
	SK-5	11	4	7	36%
Thatta	TA-2	10	3	7	30%
	TT-2	22	7	15	32%
Khaipur	KA1-1 & KA1-2	15	5	10	33%
	K-31	16	5	11	31%
	Average	15.4	7.2	8.2	47%

As mentioned above, the average annual daily traffic volume has reached a moderate level or more in the target ratio, and the time required for section travel has been improved within almost all of the sample sections, and its constant improvement effect was seen in the target area. On the other hand, it is difficult to accurately compare the target value at the time of appraisal with the actual result, and this data cannot say the effectiveness of this project is high or low.[16]

3.3.2 Impacts

3.3.2.1 Intended Impacts

The impact expected from this project was the "improvement of living standard of rural areas", "improvement of access with neighboring urban areas" and "revitalization of regional economy". A qualitative survey was conducted with the aim of confirming the occurrence situation of these impacts. The main survey items were examined to gauge: whether mobility improved through project implementation such as convenience and comfort of buses, whether access to social services such as schools and hospitals improved (improvement of living standards in rural areas), if the time to reach to the city has shortened (improvement of   access to neighboring urban areas), whether the distribution increased and contributed to the revitalization of the regional economy

---

[16] According to the JICA 'External Ex-post Evaluation Reference', in cases where it is impossible to compare the planned value with the actual value of the operation effect indicator, or when it is impossible to objectively judge because data/information cannot be obtained, the rating is not ③ or ①, but ② .

(regional economy revitalization). We interviewed local residents, chambers of commerce and business owners in a group interview format[17].

In Dadu (D - 2, DA - 3), where bicycles and motorbikes have increased significantly, local residents mentioned the improved access such as " I have access to other areas and hospitals easier" " make it easier for milk drums to transport to the city", "I got more chance to local assembly" and "I got to be able to go to the temple." On the other hand, there were opinions that it did not lead to regional development such as "there are no entertainment facilities after the road is formed" and "there is not an increase in local employment opportunities".

Dadu District (D2) Karam Village
Interview with residents

Dadu District (Da - 3) Saeed Mad Village
Interview with self-employed residents

In Lalkana (LA - 8), the road connecting the city Heilpur and Mohenjoda was renovated, and the distance between Hypur and Gos Prani Good was shortened by 20 kilometers. Since agriculture is the main source of income for many residents, there is an opinion that agricultural chemical companies in other areas can easily access villages to sell their products, and the convenience for residents has also increased. In Hyderabad (H - 5), there were many people who owned motorcycles and say that the time to travel to school in the center of Hyderabad was shortened. It is said that access to schools and hospitals in Rahimabad City has become easier with Shikarpur (SH - 52).

---

[17] A traffic volume survey of 127 people were surveyed in total in the 14 residential areas, including 40 farmers, 30 self-employed persons and 57 with other occupations. Between January 2nd and 11th of 2018, we set up residences and shops near the roadside roads and extracted samples that agree with the purpose and contents of the survey. Considering local cultures and customs, we conducted interviews only to men in this evaluation. Therefore, it was difficult to get female opinions.

| Shell Khanjatai Village in Larkana District | Baulam Village Shilarpur District |
| Interview with residents | Interview with self-employed residents |

Even in the districts where no significant increase in traffic volume was observed, the residents mentioned the contribution to regional development saying such things as "dairy farming and sericulture   was activated " and " the number of rice flour mills and ice factories increased", and people commented on how access was improved by the road by saying things such as "it became possible to go to sell fish caught nearby ", "it became easy to go to hospital and school" and "time required for city was shortened".

Although we could not examine a clear relationship with how much this project has contributed to activation of the regional economy, it can be estimated that this project has made certain contributions due to the many cases in which improvement of distribution resulting from the enhancement of roads are more significant in areas with less improved roads, especially in rural areas. Furthermore, the actual responses of those who have benefited support this claim.

On the other hand, issues that are constraining regional development and traffic volume increase were also revealed with people stating "there are safety concerns especially at night and early morning time", "there is no entertainment facility" and "road maintenance is bad".

From these facts, it can be said that the implementation of this project improved access to neighboring urban areas and had a certain impact on rural life improvement and activation of regional economy.

3.3.2.2 Other Positive and Negative Impacts
(1) Impacts on the Natural Environment

In 2010, JICA and the WSD were supposed to carry out environmental surveys based on the checklist and make public announcements. When there was a change in the environmental consideration matter, they agreed to revise them in a timely manner. However, I could not confirm the record in these ex-post evaluation studies. In April 2011 after the flood, an environmental impact assessment report on alternative roads was prepared by WSD. Here, it is assumed that the project target area does not fall near or within sensitive areas such as national parks, and

undesirable effects on the natural environment are minimal. Since it was not possible to obtain an environmental impact assessment report at the time of the ex-post evaluation, the impact on the natural environment was difficult to be evaluated.

(2) Resettlement and Land Acquisition

This project's purpose was to expand and improve existing roads, excluding some sections, and was to be built on unpaved roads and walking roads that do not affect existing houses, farmlands and property. At the time of appraisal, although it was necessary to acquire land, landowners were supposed to offer their land to the public utilities department free of charge[18]. In addition, if it is necessary to acquire additional land after the detailed design, it is said that the WSD and the owner will consult and, if necessary, proceed according to domestic procedures in the country. In addition, WSD submitted a transfer report to JICA in 2010 when land acquisition and relocation became necessary. WSD decided to carry out smoothly and appropriately in accordance with the Land Acquisition Act of 1894 under the assistance of related agencies such as local governments.

According to the executing agency, there are some landowners that are incentivized to offer the land free for expecting the land price increase in the area, the better distribution road of agricultural products, better access to schools and hospitals. Therefore they voluntarily transferred the land. Although such cases of voluntary transfers are seen, it was not possible to confirm whether such a consensus was made in the entire land acquisition, or whether an involuntary relocation of residents occurred, as we could not get opportunities of interviews to operational institutions and owners[19].

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

3.4 Sustainability (Rating :②)

3.4.1　Institutional / Organizational Aspects of Operations and Maintenance

The executing agency of this project, the WSD, has not changed since its appraisal. The WSD is engaged in designing, constructing and maintaining Sind State provincial roads and local roads. At the time of appraisal, the total number of staffs was 5,294, of which 634 were engineers, and the operation, maintenance and management of this project was supposed to be carried out by the road department with 181 engineers. The organization chart of the station at the time of the ex-post evaluation is shown in Figure 1. The road department is in charge of the operations and maintenance of the local roads but adopts the form which the private contractors assume the actual maintenance and management. A group of qualified civil engineering experts work in a

---

[18] The policy of the Sindh Government decided that the authority to compensate local governments would not be given.
[19] JICA follows the Safeguard Policy of "Involuntary Resettlement" in the World Bank's Operation Manual 4.12. In the safeguard policy, the definition of "non-voluntary" is taken as "measures that can be done without consent or transfer of residents after providing the information".

system to select a target section over 5 years after construction and is responsible for its maintenance. Although detailed information could not be obtained, WSD realized that additional maintenance is not needed for the new roads until five years after construction. Therefore, even if repairs are ever required on the road, O&M will not be implemented for at least 5 years, as roads are not become scope of repairs till 5 years pass after construction. Although it is presumed that there is no major institutional problem in the structure of the whole organization, judging from the state of the road described later, the system where maintenance will not be carried out for the initial five years after construction is thought to have problems.
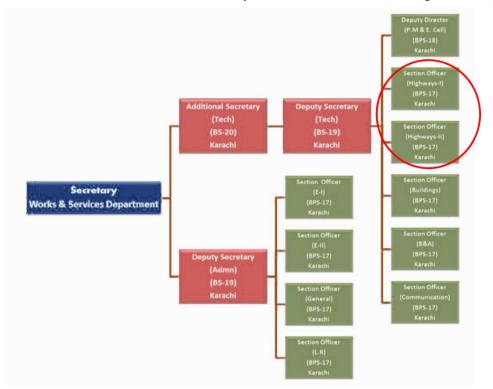

Figure 1 Organization chart of the WSD

Note 1: BS: Basic Scale and BPS: Basic Pay Scale of government employees represents salary level.
Note 2: The Co-Chief is responsible only for business related to technology.
Source: http: // wsdsindh.com/index.php/organogram/ (Access：December 10, 2018）

3.4.2 Technical Aspects of Operation and Maintenance

At the time of appraisal, the WSD had experience in handling the construction of the Sind province under the ODA loan project, "Rural Promotion Road Construction Project" conducted by the Federal Government Local Autonomous Development Department for all four Pakistan provinces. They also had the experience of financing projects for the Asian Development Bank. Therefore, it was judged that there are no particular concerns about the technical implementation capacity. At the time of ex-post evaluation, we could not obtain information on the technical level related to the operation and maintenance of the road section and the civil engineering expert group mentioned above. The WSD plans to allocate qualified engineers to the staff in charge of

operations and maintenance as shown in Table 5.

Also, no new technology has been adopted for roads subject to this project. The ordinary water tightening macadam method[20] and granular roadbed method[21] are currently being used, and triple surface treatment is commonly used as the final process of road construction in rural streets of Sindh province. We presume that there is no problem with the technology related to the basic operations and maintenance of this project.

Table 5 Position and required degree of maintenance and administration department

Staff position/title*	Expected academic degree
Chief Engineer	Bachelor of Engineering (Civil)
Superintending Engineer	Bachelor of Engineering (Civil)
Executive Engineer	Bachelor of Engineering (Civil)
Assistant Engineer	Bachelor of Engineering (Civil)
Sub-Engineer	Diploma of Associate Engineer (Civil)

Source: WSD

3.4.3 Financial Aspects of Operations and Maintenance

The WSD relies on the budget allocation from the Sindh Provincial Government for the majority of revenues, and there is other income from state jurisdiction toll roads. At the time of appraisal, there was no particular financial concern thus far since a sufficient budget was allocated without major problems of budgetary measures. According to the materials provided by the WSD at the time of the ex-post evaluation, there is a Maintenance & Repair Fund in the fund that the Road Department can use. As shown in Table 6, the funds tripled from the previous year in 2014/2015, and increased by 28% compared with the previous year in 2016/2017. In FY 2017/2018 as well, the fund secured approximately 4.8 billion rupees. On the other hand, expenditures have always exceeded the funds, and it is apparent that the budget for maintenance and repairs is not sufficient. An interview with the budget inspector of the WSD revealed that funds for maintaining and repairing all roads under WSD management were not sufficient.

Table 6 Maintenance and repair funds in the road section (Unit: million rupees)

Year	Allocated Budget	Actual disbursed
2012-13	776	678
2013-14	776	738

---

[20] One of the road construction methods which constructs by meshing the aggregate called macadam, a grainy roadbed. It is used for paving roads with little traffic.
[21] A method of spreading, leveling and granulating granular materials such as sand and gravel on the lower roadbed.

2014-15	2,395	1,513
2015-16	3,740	4,522
2016-17	4,804	5,827
2017-18	4,867	5,732

Source: WSD

The fund will not be allocated for five years after the construction of the road, and the project will be assessed for maintenance and repair expenses for the first time after five years; the budget will be based on the result. At the time of the ex-post evaluation, it has not yet reached five years after completion, and it is unclear how much repairs and maintenance expenses of this project will be, nor whether budgetary measures will only be taken to cover the cost. However, as described above, the maintenance and management expenses of the WSD continue to exceed the budget every year, and it is not expected that a stable maintenance and management budget can be secured in the future. Therefore, financial sustainability is evaluated as moderate.

3.4.4 Status of Operation and Maintenance

On the ex-post evaluation, we conducted a field survey of 16 roads and visually checked the road conditions. As a result, there were places where conditions were bad such as unevenness of the road surface in 13 sections, and as far as we visually checked, some repairs may be necessary. Therefore, we think it is necessary to conduct further investigation in more details.   The deterioration of the roads is thought to have been influenced by weather conditions such as drying, geography[22] and the number of overloaded trucks. For example, in Tata and Hyderabad where the air is dry, the road conditions are relatively good. However, in Khaipur where there is significant rainfall, there is a road where irregularities are occurring even though the evaluation of the contractor is high. Also, as with Shikapur, there is heavy rainfall and high temperatures, and there are roads in bad condition where they are frequently used for closely located with the house. This is especially so in places like Dadu where traffic is high, and urgent repairs are necessary on roads where flooding easily occurs.

---

[22] Larkana and Dadu were influenced by flash floods several times a year from the neighboring Balochistan Province and the road flooded. Also, there are creeks in Sindh province that have drawn agricultural water from the Indus River. In cases where creeks are adjacent to the road, flood damage caused by rainfall frequently increased the amount of water.

Good condition road
Cicar Poole (SH-52)

Bad condition road
Dadu (DA - 3)

From the above observation, the operations/maintenance of this project has no problem pertaining to the system/technology. However, some minor problems have been observed in terms of the financial situation, repairs and maintenance situation. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1   Conclusion

This project aims to better traffic conditions in rural areas by improving pavement roads in remote locations of Sindh, thereby contributing to poverty alleviation and regional disparity correction through the improvement of access to neighboring urban regions and enhancement of rural living standards.

From the time of appraisal to now, this project is consistent with the development policy of Pakistan and the development needs of the target area. In order to cope with the flood damage that occurred during the project implementation period, the targeted section to be paved was changed dramatically. However, this was an appropriate change in accordance with the needs and its relevance is high. Efficiency is moderate, as the project cost was less than the planned amount, while the project period was exceeded. Traffic volume on rural roads paved by the project roughly increased compared to before the project, almost reaching the target in about half of the sections. However, due to differences in the method of measuring the target value, comprehensive verification was not possible. As a result of road improvement, access to various public facilities and hospitals improved, and certain economic effects such as increased shipment quantities of agricultural products were observed.

From the above considerations, the effectiveness/impact is moderate. Regarding sustainability, maintenance and management systems and technical aspects are not problematic. Nonetheless, there is uncertainty whether it is possible to secure a stable maintenance budget or not, and some

roads we inspected conditions are deteriorating in this evaluation. Thus, the sustainability is moderate.

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

4.2　Recommendations

4.2.1 Recommendation to the Executing Agency

The state of some of the roads has already deteriorated, and it is becoming a condition that requires repairs. However, the WSD is not able to grasp the details of the state of the road section. It was also confirmed that the budget for operations and maintenance was not started until 5 years after completion. It is thought that an efficient maintenance plan can be established to conduct repair work while road condition deterioration is minimal, and maintain regular upkeep of the maintenance plan according to regular inspection of road conditions and the state of deterioration. Thus, it is necessary to "reassess the entire management plan.

4.2.2 Recommendations to JICA

In this ex-post evaluation, since necessary preparation to receive external evaluator has not been made by the WSD, access to the information was limited, making proper data collection and interviewing was difficult. Also, some of the figures which are the basis of the planned value of effectiveness cannot confirm the basis of the figures, which restricted the appropriate evaluation. These data are also important from the viewpoint of business supervision in the future, and it is necessary to encourage executing agencies to manage information appropriately at each stage of the project planning and implementation.

4.3　Lessons Learned

A large flood occurred in 2010 during this project, and so the target section to be paved was changed significantly. Such changes may affect the project purpose. However, in this project, the target value was not formally modified and the unmodified value was left in official written document between the two countries based on this influence. It would be desirable to establish a system that enables the project monitoring and monitoring results to be quickly reflected in the project plan, such as reviewing and redefining the project purpose, installing appropriate indicators and baseline data etc., as soon as the environment surrounding the project has changed.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1.Project Output (1) Civil engineering work 1)Dadu 2)Hyderabad 3)Thatta 4)Khairpur 5)Sukkur 6)Jacobabad 7)Shikarpur 8)Larkana 9)Road specification (2) Consulting Services	**56 sections** **Total Length 452km** 5 sections　31.4km 4 sections　22.8km 5 sections　30.6km 16 sections　157.8km 2 sections　10km 12 sections　89km 9 sections　79.9km 3 sections　30.6km Pavement width 3.7m、 Shoulder width 2m Detailed design, bidding assistance, construction management work, capacity building of executing agencies etc.	**73 sections** **528.2km(117%)** 6sections　41.70km(133%) 2sections　16.42km(72%) 4sections　27.589km(90%) 25sections　183.9km(117%) 2sections　10.57km(106%) 14sections 103.155km (116%) 10sections　71.636km(90%) 10sections　73.21km(239%) As planned There is no change in work content. As a result of the civil engineering change mentioned above, the business volume increased by 20%.
2.Project Period	May 2008 - June 2013 (62 months)	May 2008－June 2015 (85 months)
3.Project Cost Amount paid in foreign currency Amount paid in local currency Total 　ODA loan portion exchange rate	522 million yen 9,347 million yen (4,868 million rupees) 9,869 million yen 9,126 million yen 1 rupee=1.92 yen (June 2007)	470 million yen 7,914 million yen (7,354 million rupees) 8,384 million yen 7,752 million yen 1 rupee=1.08 yen (2000-2015)
4.Final Disbursement	May 2015	

(Reference 1) The plan and actual results of the annual average daily traffic volume for the 14 sections' surveyed by types of vehicles

	Province	Sections' name	Cars·Jeeps·Pickups			Minibuses·Wagons			Buses			Two-wheeled trucks			Three-wheeled trucks			Motorcycles		
			Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual
Selected Sections (sections selected before the flood)	Dadu	D-2	22	53	10	4	9	3	4	9	0	15	35	3	8	19	0	67	215	533
		DA-3	61	121	42	46	90	7	30	58	0	17	33	0	0	0	0	82	191	720
	Larkana	LA-8	3	6	132	0	0	21	0	0	0	0	0	18	0	0	6	27	63	655
		LA-4 & LA-7	30	56	17	7	13	5	6	11	0	15	27	0	10	18	0	152	291	129
	Shikarpur	SH-52	128	289	148	39	88	14	23	50	0	110	243	6	109	241	11	389	1116	668
		SHA-2	17	36	40	3	6	2	0	0	0	10	17	0	0	0	0	265	685	330
	Hyderabad	HA-1	23	46	27	0	0	0	0	0	1	24	47	2	0	0	70	70	163	132
		H-5	17	41	370	5	11	22	2	5	38	14	33	38	8	19	5	75	241	820
Alternate sections (sections selected after the flood)	Sukkur	SK-4	12	27	17	3	7	0	2	4	0	9	20	13	5	11	0	73	209	63
		SK-5	13	31	20	2	5	0	2	5	0	9	21	14	5	12	0	73	235	62
	Thatta	TA-2	18	36	66	0	0	0	0	0	0	24	47	0	0	0	0	54	126	55
		TT-2	12	27	30	5	11	0	2	4	0	15	33	0	8	18	0	78	224	42
	Khaipur	KA1-1/1-2	418	883	43	18	37	2	0	0	0	50	101	7	0	0	0	652	1583	287
		K-31	23	52	29	5	11	0	0	0	0	26	57	16	5	11	0	88	252	43

	Province	Sections' name	Rikisyas			Animalcarts			Bycicles			Tractor-trolleys			Four-wheeled trucks			Five-wheeled trucks		
			Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual	Original traffic volume	Planned	Actual
Selected Sections (sections selected before the flood)	Dadu	D-2	16	51	24	0	0	32	0	0	65	0	0	9	0	0	0	0	0	0
		DA-3	68	158	135	0	0	148	0	0	125	0	0	100	0	0	0	0	0	0
	Larkana	LA-8	9	21	89	0	0	115	0	0	10	0	0	43	0	0	2	0	0	0
		LA-4 & LA-7	37	71	32	0	0	32	0	0	15	0	0	8	0	0	0	0	0	0
	Shikarpur	SH-52	178	511	123	0	1	60	0	1	50	0	1	39	0	1	7	0	1	1
		SHA-2	20	52	95	0	0	39	0	0	23	0	0	6	0	0	0	0	0	0
	Hyderabad	HA-1	13	30	20	0	0	4	0	0	0	0	0	2	0	0	0	0	0	0
		H-5	17	55	128	0	0	45	0	0	19	0	0	0	0	0	0	0	0	0
Alternate sections (sections selected after the flood)	Sukkur	SK-4	11	32	0	0	0	12	0	0	9	0	0	0	0	0	0	0	0	0
		SK-5	12	39	8	0	0	19	0	0	9	0	0	0	0	0	0	0	0	0
	Thatta	TA-2	4	9	6	0	0	14	0	0	4	0	0	0	0	0	0	0	0	0
		TT-2	18	52	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Khaipur	KA1-1/1-2	38	91	19	0	0	25	0	0	22	0	0	29	0	0	0	0	0	0
		K-31	3	9	2	0	0	16	0	0	12	0	0	0	0	0	0	0	0	0

Note   In the table above, sample data of the plan and actual results of the annual average daily traffic volume for the 14 sections' surveyed by types of vehicles are compared