Pakistan

Indus Highway Construction Project (1), (2), (2B)

External Evaluator: Hajime Sonoda

Field Survey: September 2004

1. Project Profile and Japan's ODA Loan

Region Map of Project Site

Indus Highway

1.1 Background

Pakistan borders India, Iran, Afghanistan, and China. It is 796 thousand km^2 in area, which is approximately double the size of Japan. The population is 150 million people, approximately 1.2 times that of Japan. Pakistan's main industries are agriculture and cotton production. The country's domestic transportation network is formed mainly around the north-south corridor that connects the major cities where people and industries are concentrated: Karachi, the southern city which handles over 90% of the country's trade; Peshawar and Lahore, the major northern cities; and Islamabad, the capital city. The main road and railway routes lie along this north-south corridor. Currently, the network of national highways supervised by Pakistan's National Highway Authority (NHA) totals 8,885 km[1], approximately 60% of the country's road transportation. The centerpiece of the road network is National Highway 5 that runs along the eastern bank of the Indus River and connects Peshawar, Lahore, and Karachi.

The Indus Highway (National Highway 55) is a main road which lies along the western bank of the Indus River and runs nearly the entire length of Pakistan from north to south. It complements National Highway 5 in north-south bound traffic traveling medium to long distance. In recent years, however, the Indus Highway has been unable to cope with the increasing traffic volume and larger size of vehicles sufficiently due to the lack of road capacity and deterioration of the road surface. As a result, traffic has become excessively concentrated on National Highway 5, causing frequent traffic jams.

[1] In Japan, which has half of Pakistan's square area and approximately 80% of its population, limited access highways total 6,915 km, and ordinary highways total 53,866 km (as of 2002).

1.2 Objective

The project's objective was to promote the smooth flow of road traffic on National Highway 55 (Indus Highway) which lies along the western bank of the Indus River, by improving and constructing sections of the approximately 1,200 km roadway, and thereby contribute to strengthening of the north-south traffic route and balancing economic development in Pakistan.

1.3 Borrower/Executing Agency: President of the Islamic Republic of Pakistan/ National Highway Authority

1.4 Outline of Loan Agreement

	Indus Highway Construction Project (I)	Indus Highway Construction Project (II), (IIB)
Loan Amount/Loan Disbursed Amount	8,516 million yen/8,299 million yen	38,992 million yen/33,482 million yen
Exchange of Notes/Loan Agreement	March 1989/March 1989	(II) August 1990/January 1991 (IIB) August 1993/August 1993
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	2.5% 30 years (10 years) Partial Untied	(II) 2.5%, (IIB) 2.6% 30 years (10 years) Partial Untied
Final Disbursement Date	August 2000	(II) May 2000/ (IIB) January 2003
Contractors	China Petroleum, Saita Corporation, You One Engineering	(II, IIB) Saita Corporation, Sezai Turkes Feyzi Akkaya Construction Co., Frontier Works Organization, China Petroleum
Consultants	Pacific Consultants International	(II) Pacific Consultants International・Nippon Koei, Pacific Consultants International[2] (IIB) Pacific Consultants International・Nippon Koei, Pacific Consultants International・Engineering Associates
Feasibility Study (F/S), etc.	1988: Pakistan Government	1988: Pakistan Government

2. Results and Evaluation

2.1 Relevance

The road sector section in the 7th 5-year plan (1988-1993) stated that there was a need to respond to the rapidly increasing traffic volume. Particularly, an alternate route to reduce the concentration of traffic on National Highway 5 was necessary to construct. This project was to upgrade the Indus Highway[3], which would reduce the travel distance

[2] At the request of the Pakistan Government, the consulting service package was divided into construction management and other matters (detailed design, etc.)

[3] The travel distance on National Highway 5 is 1,819 km, and the travel distance on National Highway 55 is

from Karachi to Peshawar by 500 km compared to National Highway 5, in order to serve as an alternate route for north-south bound traffic. Therefore, the priority of this project was extremely high at the time of appraisal.

At the time of ex-post evaluation, road transport accounts for over 90% of passenger and freight transport. Moreover, the need for construction of an alternate route remained as high as ever because the number of registered vehicles and the road traffic demand increased by 7 to 8% annually throughout the 1990s, and 60% of all road traffic in the country was concentrated on National Highway 5. Hence, this project is included among the highest priority projects in the road sector on the 8th 5-year plan (1994-1998) and the 10th long-term plan (2001-2010). Especially in the 8th 5-year plan, 24% of the NHA project budget is allocated to the Indus Highway[4]. Furthermore, the role of the Indus Highway, which lies along the western bank of the Indus River, became even larger due to the increased demand for international distribution of goods to Afghanistan and the central Asia as a result of the end of Afghan War in 1989. For that reason, the importance of this project is considered to have grown even greater since the appraisal.

2.2 Efficiency

2.2.1 Output

Out of the total 1,200 km length of the Indus Highway, the project focused on sections which were in most urgent need of improvement[5]. The plan was to improve and construct a total of 797 km in five sections, consisting of improvement of the existing road (road widening in the three sections of A, C, and D) and bypass construction (in the two sections of B and E). The actual output was the below-mentioned improvement and construction of 761 km in five sections. The main alterations in the plan are as follow.

- In Section A, widening of the existing road was planned. However, the plan was changed to include the construction of additional lanes in some part based on the revision of the traffic volume forecast using the results of a new traffic volume study.
- In Section E, the plan for bypass construction was altered to improvement of the existing road based on the consideration for rare wild animals living in the area of the planned bypass[6].
- City bypasses (in two locations) were added in Section C and Section D in order to be

1,264 km.

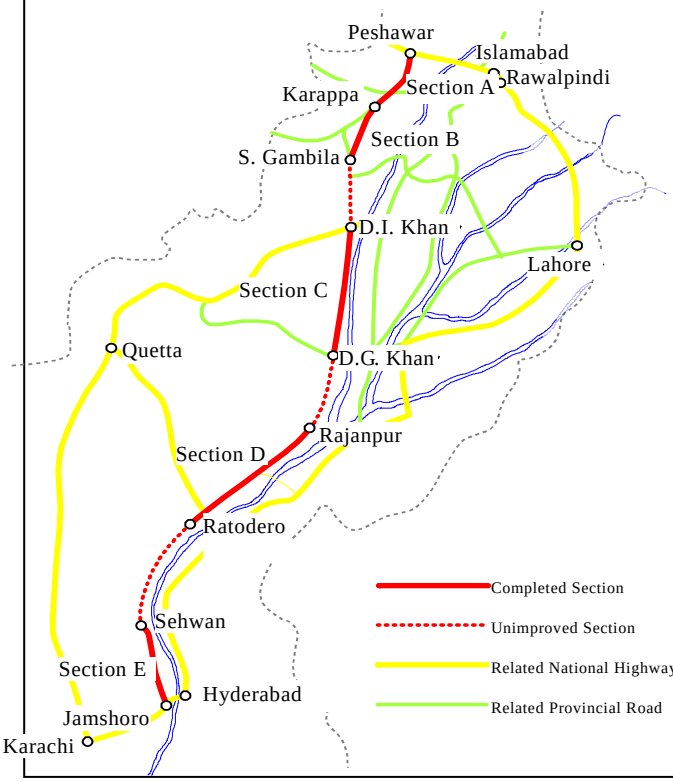
[4] This amount includes the Kohat Tunnel Construction Project (an ODA loan project) on the Indus Highway.

[5] The total length of 1,200 km is nearly equivalent to the distance from Tokyo through Fukuoka to Kumamoto, and the total improved distance of 761 km is nearly equivalent to the distance from Tokyo to Kurashiki

[6] According to environmental protection groups inside and outside Pakistan, hunters' access would have been improved by bypass construction. However, the planned route passes outside the preservation area and even if the bypass had been constructed as planned, it appears unlikely that there would have actually been direct or serious effects.

in line with a new policy which is to promote the building of bypasses on national highways where they pass through regional cities.

- In Section C and Section D, bridges (in four locations) were added to go across irrigation channels that were constructed in parallel with this project.



A) Peshawar - Karappa
Improvement of existing road (additional lanes) 29 km
Completed 1996
Improvement of existing road (widening) 22 km
Completed 1996

B) Karappa – S. Gambila
Bypass construction 96 km
Completed 1998

C) D.I. Khan – D.G. Khan
Improvement of existing road (widening) 211 km
Completed 2001

D) Rajanpur - Ratodero
Improvement of existing road (widening) 270 km
Completed 1999

E) Sehwan – Jamshoro
Improvement of existing road (widening) 133 km
Completed 1999

2.2.2 Project Period

The project period from the first phase through the second phase was planned for March 1989 to June 1996 (88 months), but the actual project period was March 1989 to January 2003 (167 months), extending 90% from the original plan. The main reasons for the extension were as follows: the alteration of the bypass plan in Section E; the reduction in the speed of construction due to security problems in Section D and Section E; inadequate management and adjustment capabilities among some contractors; alterations in the plan due to various external conditions[8]; resolution of multiple problems related to contract agreement content; and delays in land acquisition. In the second phase, an additional loan was necessary due to a rise in prices and the construction volume increase; hence, the project period was extended[9].

[8] Including adjustments with the irrigation project undertaken simultaneously in parallel in the beneficiary area of Section C.
[9] During 1994 to 97, the security condition was worsened in regional areas such as the conflict between tribes because of the political instability.

2.2.3 Project Cost

The project cost was 36.55 billion yen, but the actual cost was 51.36 billion yen, representing a cost overrun of 14.81 billion yen (141% of the planned amount). In the first phase, the increase in local currency portion was absorbed by foreign exchange fluctuations, and the total cost was within the planned amount. However, in the second phase, an additional loan was necessary due to the following reasons: unanticipated price increases during the delay in implementation, and price skyrocketing around the time of the Gulf War (increased 41% during 1988 to 1992); construction volume increase after reviewing the detail design conducted by Pakistan local consultants (31%); indirect cost increase due to security problem in Pakistan (30%).

2.3 Effectiveness

2.3.1 Traffic Volume and Its Special Characteristics

As shown on Table 2, the average traffic volume in 2004 on the 5 sections under this project is 4,539 vehicles/day[10], which is 89% of the revised target[11]. Almost half of the traffic volume (2,150 vehicles/day) is assumed to be triggered or diverted from other routs due to the improvement of traffic conditions under the project[12]. Also, the traffic volume is nearly tripled during 8 years from 1996. The average annual rate of increase in the sections that benefited from the project (13.5%) is more than double the national average in Pakistan (5% to 6%).

Table 2: Comparison of Planned and Actual Average Annual Traffic Volume (vehicles/day)

Project Sections	1996 Actual Traffic Volume	2004 Planned Traffic Volume(1)	2004 Actual		
			Traffic Volume	% of Plan	% of 1996
A) Peshawar –Karappa(2)	4,395	7,005	5,759	82%	131%
B) Karappa-S. Gambila	—	2,367(4)	3,092	131%	—
C) D.I. Khan – D.G. Khan	949	2,526	4,631	183%	488%
D) Rajanpur-Ratodero	1,696	5,245	5,043	96%	297%
E) Sehwan-Jamshoro	1,599	9,099	3,946	43%	245%
Overall Average(3)	1,647	5,108	4,539	89%	276%

Source: 1996 Actual Traffic Volume figures provided by NHA; 2004 Planned Traffic Volume figures calculated by evaluator based on appraisal materials; 2004 Actual Traffic Volume figures from the traffic volume study in the field survey.

Notes: (1) Revised figures (see footnote 10)

[10] It equals to approximately 6% of the average traffic volume of the Tomei Expressway (76,627 vehicles/day (2002)).

[11] The planned volume in the appraisal was calculated based on the traffic volume at the opening (traffic volume when road opened + estimated triggered and diverted traffic volume) assuming a fixed annual increase rate. However, the road opening was delayed for several years, and the increase in traffic volume during that time was considerably less than the estimation. Therefore, the planned volume was revised based on the actual traffic volume in 1996 (before completion) using the same conditions at the time of appraisal (the ratio of triggered and diverted traffic volume and the estimated annual rate of traffic volume increase). Furthermore, the average of traffic volume among all sections for 2004 prior to the revision was 8,716 vehicles/day. Comparing with this figure, the actual traffic volume is 52% of the plan.

[12] The estimated traffic volume in 2004 is calculated based on 1996 actual figures with 6% of the natural increase (the average rate in Pakistan). And it is compared against the actual measured traffic volume.

(2) The traffic volume is the weighted average from the road extensions of 2 sections included here.
(3) The overall average is the weighted average of the road extensions.
(4) Calculated from the planning figures at the time of appraisal.

According to the traffic study and hearings with road users[13], the Indus Highway plays a large role particularly in long-distance freight transport, as a main trunk road in Pakistan. The traffic patterns show following characteristics:

- Half of the traffic volume is long-distance traffic traveling 400 km or more, and half of that (one-fourth of all traffic) is extremely long-distance traffic traveling 1,000 km or more from Karachi or Quetta to northern Pakistan (Peshawar, Lahore or Islamabad).
- 60% of the traffic volume is passenger traffic, and 40% is freight traffic. In the past 8 years, the increase in freight has been remarkable, and the longer the distance being traveled, the larger the proportion of freight. In keeping with that, the size of trucks has grown bigger, and they are used for international distribution which constitutes 1% to 2% of all traffic volume.
- Out of 5 sections, Section A and Section E, which are at the ends of the Indus Highway, have a lower percentage of long-distance traffic and freight traffic than the other sections. They have relatively higher proportion of short-distance passenger traffic.
- Increase in traffic volume in Section C is outstanding. It seems to be due to the synergistic effects of the bridge improvement over the Indus River and the irrigation project in the D.I. Khan region, in addition to the high population density in the area.


Large trucks traveling north in Section C

- In the three middle sections, there is a relatively large amount of long-distance freight traffic. Among them, Section D has the largest percentage of both long-distance traffic and freight. Moreover, it plays a significant role for eastbound and westbound traffic[14].
- The reason why the percentage of long-distance traffic and the percentage of freight is low in Section A seems to be that population density is high in this section and there

[13] In the field survey, a traffic volume study and an origin-destination study (OD study) were conducted for 24 hours in eight locations on the sections under evaluation and on the Karachi-Hyderabad Super Highway (National Highway 9). Group interviews with freight transport company personnel and truck and bus drivers were conducted in the three locations of Islamabad, Peshawar, and Karachi with the cooperation of the Pakistan Road Users Association.

[14] In Section D, traffic that originated in eastern Punjab and Quetta in western Pakistan passed through National Highway 5 constitutes 20% of the total, the highest percentage of any of the five sections. This traffic is probably using National Highway 65 in Shikarpur and National Highway 70 in D.G. Khan.

is large amount of short-distance passenger traffic between cities.

- The reasons why the traffic volume is considerably below the planned level in Section E include: the planned bypass was altered to improvement of the existing road; some unimproved portions remain; there are few facilities such as gas stations and repair shops; and some truck drivers prefer not to drive on that road even if it is shortest route because of high crime in the past.
- At least 20% of the traffic originating in Karachi and bound for Punjab Province and Northwestern Frontier Province uses the Indus Highway. Also, at least one-third of the trucks bound for Afghanistan use some sections of road that benefited from this project.

Table 3: Traffic Volume by Vehicle Type (vehicles/day (2004))

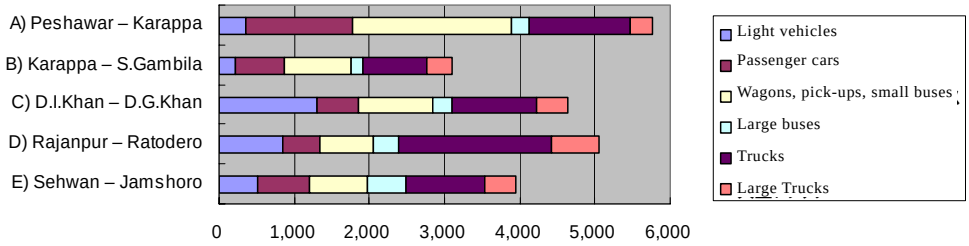


Table 4: Passenger and Freight Traffic Volume (vehicles/day (2004))

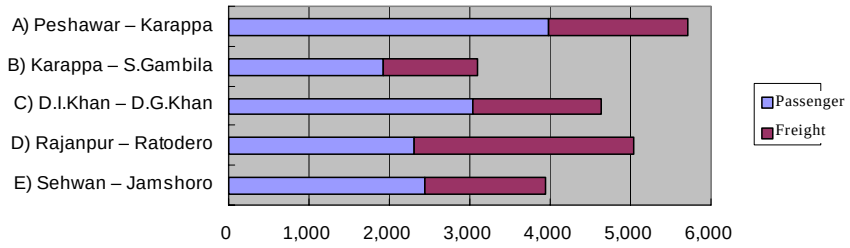
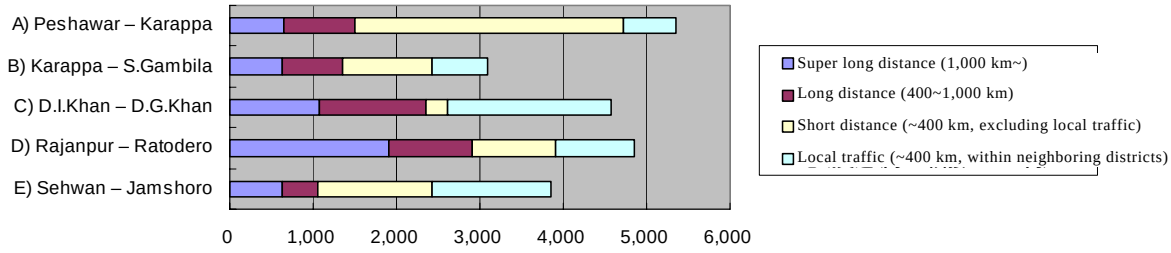


Table 5: Traffic Volume by Travel Distance (vehicles/day (2004))



2.3.2 Increased Travel Speed and Shorter Travel Time

The average travel speed in the sections that benefited from this project was found to be 70 to 80 km/hour[15], which shows an increase from the 40 to 45 km/hour prior to the

[15] It is based on actual speeds measured in the field survey and on hearings with truck and bus drivers.

improvements. Also, due to the widening of the road, it appears that there has been a reduction of traffic jams and traffic blockage which used to be caused by low-speed vehicles transporting large amounts of farm products or those which were broken down or had accidents. In a hearing with transport companies, the companies responded that travel time has been considerably reduced, from 50 hours to 22 hours between Islamabad and Quetta and from 72 hours to 36 hours between Peshawar and Karachi.

2.3.3 Reduction of Traffic Accidents

According to the hearing, the overall number of traffic accidents is considered to have decreased because the wider road increases the safety when opposing traffic passes[16]. However, it was pointed out that the death rate has conversely increased when accidents do occur because of higher speeds and the larger size of trucks. Also, in Section E, where there are many sharp curves designed for low speeds, it was reported that accidents have increased by 50% to 60% instead because there are no speed limits[17].

2.3.4 Economic Analysis

The economic internal rate of return (EIRR) for each section of road was recalculated at the time of evaluation. Except Section E, the results were higher than at the time of appraisal[18]. The reasons are: the traffic volume at the time of opening was larger than the volume forecast in the original plan, although the opening of the new road was delayed; the increasing rate of traffic volume following the opening in Section B and Section C was larger than expected; and the actual construction cost (discounting the inflation that occurred during the delay in implementation) was 60%

A truck turned over on a curve in Section E

[16] Prior to road improvement, the passing of opposing traffic was often dangerous because, in addition to the fact that the road was not wide enough for large vehicles to pass safely, the road shoulders were in such poor condition that drivers of large vehicles did not want to use them.

[17] It is based on the hearing with the local police chief. In addition to head-on collisions and accidents resulting from attempts to avoid them on sharp curves with bad visibility, there occur many accidents where overloaded trucks turn over after losing their balance on sharp, steeply banked curves (the faster the design speed, the greater the angle of the bank) (see photo).

[18] The same condition was applied in the recalculation that 100% of the benefits from induced or diverted traffic belongs the project. When a trial calculation was done with more realistic conditions wherein 50% of those benefits belong to the project, the following results were obtained: (This does not apply to Section B due to the bypass.)

A) Peshawar －Karappa 22.6%
C) D.I. Khan － D.G. Khan 14.7%
D) Rajanpur - Ratodero 18.6%
E) Sehwan – Jamshoro 14.0%

to 70% of the planned amount. Meanwhile in Section E, no reduction in travel distance was realized because the bypass was not constructed, and the fact that traffic volume is considerably below the planned level led to a decrease in the economic effects. The EIRR in all five sections together is 24.7%[19]. The conditions applied to the calculation of EIRR are shown in Table 7.

Table 6: Recalculation of Economic Internal Rate of Returen (EIRR)

Project Section	Appraisal	Recalculation
A) Peshawar - Karappa	15.2%	23.6%
B) Karappa – S. Gambila	14.7%	31.7%
C) D.I. Khan – D.G. Khan	13.1%	22.5%
D) Rajanpur - Ratodero	18.8%	26.0%
E) Sehwan - Jamshoro	30.3%	18.8%

Table 7: Conditions for Calculation of EIRR

Project Life	20 Years
Cost	Construction, improvement, and repair costs and operation and maintenance costs
Benefits	Travel expense reduction, travel time reduction

2.4 Impact

2.4.1 Changes in Road Traffic Patterns

Table 8 shows a comparison of the traffic volumes and traffic patterns (origin and destination distribution) for each section in 1988 and 2004[20].

Table 8: Overview of Changes in Traffic Volume and Traffic Patterns

		Section A	Section B	Section C	Section D	Section E
Traffic volume	1988	1,812	1,867	531	751	1,516
	2004	5,759	3,092	4,631	5,043	3,946
Percentage of long-distance traffic (see note)	1988	44%	37%	18%	42%	na
	2004	53%	61%	56%	68%	29%
Percentage of traffic bound for cities other than those along the Indus Highway	1988	7%	13%	7%	28%	na
	2004	15%	16%	16%	23%	8%

Note: Due to limitations of the data, long-distance traffic volume is defined herein as follows: (long-distance traffic volume) = (total traffic volume) − (traffic volume from each section to neighboring section). This differs from the definition of long-distance traffic used in "2.3 Effectiveness" (where it is defined as traffic traveling 400 km or more).

[19] The recalculated EIRR of the "Kohat Tunnel Construction Project" which opened in 2003 and which is located in Section A is 14.8%. If this is included in the calculation, then the EIRR for all five sections is 24.0%.

[20] It is based on *Indus Highway: Technical and Economic Feasibility Study* (1988) and the origin-destination study in the field survey. There was no data for Section E in the origin-destination study of 1988.

In the 16 year period, the average traffic volume increased by more than four times, and the proportion of long-distance traffic increased in all four sections that can be compared. This trend was strongest in Sections C, D, and B, in order. In Sections A and C, the proportion of traffic to the regions other than those along the Indus Highway (such as Quetta, Afghanistan, and Punjab) relatively expanded. Therefore, in Sections C and D, traffic volume bound for cities other than those along the Indus Highway increased considerably. It appears that this project was effective in attracting relatively long-distance traffic from other routes such as National Highway 5 to the Indus Highway.

2.4.2 Social and Economic Impact on Roadside Regions

Along the Indus Highway, which stretches a total of 1,200 km, lie regions featuring a wide range of natural, social, and economic conditions, and the project's impact varies together with those conditions[21].

On the project road sections in general, one can observe a reduction in travel time, a reduction in transportation cost, an increase in the amount of public transportation (i.e. buses), and an increase in the size of vehicles. As a result, residents who live along the highway travel more frequently longer in distance. There observed more distribution of goods and information. That has brought about the expansion of social services utilization, such as healthcare and education. It also caused an increase in economic activities along the road, and thus appears to have led to an increase in employment and population.

Loading rice on a truck on Section C

In Sections A, C, and D where the population is relatively large, many new service facilities for vehicles en route have been built, such as gas stations, rest areas, and repair shops. Particularly, in the northern part of Section C, where the population is large and land was sparsely used before the project implementation, there are gas stations almost every 2 km. In Sections B and E where population is thin, such facilities exist fewer than in Section C, with approximately one in every 15 km.

Along the northern part of Section C where the greatest impacts were observed on economic activities, access to agricultural markets was improved by this project. Irrigation agriculture is also rapidly expanding due to new irrigation facilities which began operation around the time of the project completion. Other visible effects

[21] In the field survey, observation of roadside regions and hearings with heads of local administrative bodies, NHA regional offices, and residents along the road were conducted. A wide variety of information was collected concerning the social and economic impact on the roadside regions. See Box 1 for specific examples.

associated with the project include the new building of agricultural processing facilities such as sugar refineries, an increase in stores in villages along the road, and increased incomes for the farmers.

In Section E where the road lies next to the mountains, the security of road traffic was greatly improved by the project. In this section, there formerly were 20 to 30 robbery and kidnapping incidents per month by bandits based in the mountains who preyed on passing vehicles with the aim of obtaining ransom money. After the completion of the project, almost no such incidents have occurred[22]. The possible reasons behind are the fact that vehicles traveling faster speed makes it difficult for bandits to stop; the traffic volume has increased; and police vehicles are able to respond more swiftly.

[22] In adjacent unimproved sections, similar kidnappings still occur even now at the rate of three to four per month.

Box 1: Example of Social and Economic Impact in the D.I. Khan – D.G. Khan Section (Section C)

D. I. Khan is located on the southern edge of the Northwestern Frontier Province and D. G. Khan is located in the southern part of the Punjab. They are both on the west bank of the Indus River, and their main agricultural products are rice, wheat, sugar cane, raw cotton, and chickpeas. Since 1985, an irrigation project was implemented in this area, and by 2001 when the third phase of the project was completed, the total irrigated area has become approximately 140,000 ha, spreading around the improved section (211 km in length) of the Indus Highway.

Road prior to improvement

The road in this section prior to improvement was extremely narrow, around 4 meters. In addition to the poor road surface, the road was often blocked during the rainy season due to flooding. While D.G. Khan was connected to National Highway 5 by a 60 km length of road including National Highway 70, D.I. Khan was an isolated town due to poor transportation for many years. However, people's lives were greatly changed by the improvement of the Indus Highway. The head of D.I. Khan, Mr. Latifullah Khan Alizai, states, "It's as if our dreams came true."

Following road improvement, the trip to Peshawar that formerly required 8 hours by bus, now takes 5 hours. It is safe to drive at night nowadays, and the services have been increased by three times. Two sugar refineries have been constructed, and the third one is in planning. Because this region produces high quality rice, rice is now exported through brokers. None of these would have been possible without the road improvement and irrigation project.

Bus bound for D.I. Khan (in Ramak)

In the village of Ramak, which is 50 km south of D.I. Khan, irrigation began in 2003, and it developed rapidly as an agricultural distribution center. Residents moved in from the surrounding farm villages, and the number of shops and restaurants increased. In addition, an elementary school, a junior high school, and a high school were built, as well as a small clinic and pharmacy. A shop owner explains, "The schools were built because the villagers now have extra money to spend on education."

In Retra village, 100 km north of D.G. Khan, a variety of products is now available from the nearby town Taunsa due to the road improvement. According to interviews, the number of shops increased from 15 to 50. Moreover, a vegetable shop opened for the first time, and newspapers are now available in the morning.

Along the road, there are commercial facilities, such as gasoline stations, truck driver rest areas, rice pick-up facilities, and motorbike repair shops, every few kilometers. Large brokers from Hyderabad come by truck to make purchase. Farmers around the area formerly received almost no cash income from agriculture, and they depended on migrant work for cash. However, during the past 5 to 6 years, irrigation farming has become established, and income has increased as farmers rent land to grow rice and sugarcane. A farmer who responded to the interview said that they now possess motorbikes and refrigerators with their increased income. Next, they are thinking of buying a jeep.

2.4.3 Environmental Impact

Any particular negative impact on the environment was not indicated as the time of appraisal, as nearly all the project roads lie in granary area with sandy soil, and the scope of civil work were widening and improvement of the existing roads, except for some sections. For the consideration of dust and noise for nearby residential areas, water was regularly sprinkled and construction hours were limited during the construction.

2.5 Sustainability

2.5.1 Executing Agency

2.5.1.1 Technical Capacity

NHA, which is in charge of operation and maintenance, outsource a fairly large portion of the technological work to outside consultant; for it lacks technicians in overall, and its technological level is low. However, starting in FY2002, NHA began strengthening competency in various technological fields, including preparation for appointment of outside technicians, organizational reform, utilization of Management Information System (MIS), and drawing up technological standards tailored to conditions in Pakistan. If such effort continues, then technological level of NHA will be ensured[23].

2.5.1.2 Operation and Maintenance System

NHA is founded in 1991 as a public corporation under the Ministry of Communication. Subsequently, organizational reform took place repeatedly accompanying personal reduction, and the current staff number is approximately 1,200 persons. The project budget which has tripled in the past 10 years has been carried out without delay, so it appears that the organizational efficiency has improved. NHA has 21 national highway operation and maintenance offices across Pakistan for the operation and maintenance of the national highway network. Of those, six offices are involved in the operation and maintenance of the Indus Highway.

2.5.1.3 Financial Status

Between 1996 and 2000 when this project is completed, the national highway operation and maintenance budget allocated by the government was approximately 570 million rupees, which consist only 20% of the required amount. Thereupon, NHA has made effort to secure its operation and maintenance budget by establishing the Road Maintenance Account which has resources mainly from toll fees collected from approximately 60

[23] Following the implementation of the field survey, NHA planned the establishment of a Research and Development Institute as a JICA technological cooperative project. This technological project, which will aim to boost the number of technicians and raise the technological level, was selected in FY2004 and is scheduled to be implemented starting in FY2005.

stations on major national highways. The annual income of the Road Maintenance Account was 2.4 billion rupees in FY2002 and increased to 2.9 billion rupees in FY2003. According to the road maintenance section in NHA, 5.7 billion rupees were required for the FY2004 national highway operation and maintenance, and approximately 88% of the necessary amount was secured from a combination of the Road Maintenance Account (approximately 3.6 billion rupees), income from the National Highway and Motorway Police (NHMP) (approximately 500 million rupees) and the government budget allocation (approximately 900 million rupees). Also, NHA increased the toll fee for highway in July 2005. Toll revenue is expected to increase 10% annually due to the increase of traffic volume and collection ratio of the toll fees. Thus, the condition of the road operation and maintenance budget has been greatly improved due to the establishment of the Road Maintenance Account.

2.5.2 Operation and Maintenance Status

Sections B and E have serious wheel ruts, and NHA is currently investigating the causes. On the other sections, the necessary maintenance work is being conducted appropriately. Also, improvement work such as pavement of road shoulders was carried out in sections which are out of this project scope. Asian Development Bank (ADB), JBIC, and the government are now considering a full-scale improvement in these sections.

Furthermore, overloaded trucks traveling on the national highways are hastening the damage to the roads, and that may cause road maintenance costs to rise. NHA is making effort to improve the situation by promoting the building of truck weigh stations. It plans to establish 59 truck weigh stations by the end of 2005 and 85 by the end of 2007. Moreover, police control will be tightened through expansion of the NHMP[24] patrol area. In addition, NHA and the Pakistani Government are discussing with the Ministry of Commerce, the Prime Minister, and the National Assembly to include the fine system for overloading on the revision of the National Highway Safety Ordinance[25].

[24] The National Highway Safety Ordinance was enacted in 2000, and simultaneously the NHMP was established under the Ministry of Communications. The NHMP patrols the Motorway and part of National Highway 5, and it has brought some positive outcomes.

[25] In addition to the above-mentioned reasons, NHA is also aware that the lack of trucks is one of the factors which leads to overloading. It is now considering reducing customs duty on imported four-axle trucks.

3. Feedback

3.1 Lessons Learned

None

3.2 Recommendations to the Ministry of Communications and to NHA

Overloading and reckless driving could be one of the causes of frequent traffic accidents and damage in the early stage to road surfaces in some sections of this project. Therefore, it is recommended for the Ministry of Communications and NHA to expand the area patrolled by the National Highway and Motorway Police, to increase the number and efficient management of truck weigh stations, to promote repairing and maintenance incidental facilities on highways for traffic regulations and safety through advocating users. Moreover, it is also recommended for NHA to immediately take appropriate measures to prevent accidents at the sharp curves in Section E, where frequent accidents have been reported, and at the causeway in Section C, which is considered dangerous[26].

[26] For the sharp curves in Section E, NHA has already taken temporary measures to raise drivers' awareness, such as posting signs and placing markings on the road surface, after the feedback of the site survey. It will consider the permanent measures after conducting a geographical survey. Regarding the causeways in Section C, NHA is planning to replace them with bridges following a geographical survey by 2007.

Comparison of Original and Actual Scope

Item	Planned	Actual Performance
1.Output	Improvement and construction of 797 km in 5 sections ・ Improvement of 544 km of existing road in 3 sections ・ Bypass construction of 253 km in 2 sections	Improvement and construction of 761 km in 5 sections ・ Improvement of 665 km of existing road in 4 sections ・ Bypass construction of 96 km in 1 section
2. Project Period	March 1989-June 1996 (88 months)	March 1989-January 2003 (167 months)
3. Project Cost Foreign Currency Local Currency Total ODA Loan Portion Exchange Rate	(I＋II) 17,938 million yen 18,607 million yen (2,680 million rupees) 36,545 million yen 29,294 million yen 1 rupee ＝ 6.94 yen (weighted average of the rate at the appraisal)	(I＋II＋IIB) 30,643 million yen 20,715 million yen (6,792 million rupees) 51,358 million yen 41,781 million yen 1 rupee ＝ 3.05 yen (weighted average of the rate at PCR)