No.

Ex-Post Evaluation Report of Japanese ODA Loan Projects 2009 (China III)

September 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

IC NET LIMITED

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

September 2010
Atsuro KURODA
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

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Japanese ODA Loan Project 2009

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Heilongjiang Province, Heihe-Beian Highway Construction Project

External Evaluator: Kenji Momota, IC Net Limited

1. Project Description

Project Site
(see Figure 1 for more details)

Trucks on the road reconstructed by the project

1.1 Background

Heilongjiang Province, the center of economy and industry in the northeast area of China, was growing in importance as a production base of oil, grain merchandise and forest resources, etc. With its 19 cities and counties adjacent to Russia along about 3,000 km of border, this province played an important role as a base of the border trade as well.

Heihe City[1], located in the northeast area of Heilongjiang, was one of the districts rich in natural resources in this province. Trade with Russia had been increasing year after year. Economic vitalization was advancing with seven economic development zones and resources development economic zones now located between Heihe City and Beian City about 240 km to the south.

There had been a growing demand for trunk road connecting Heihe via Beian with the capital city Harbin[2], due to the aforementioned economic development zones. On this route, however, a section of Heihe - Beian (approx.240 km) had been left as an unpaved gravel road. The traffic of dump trucks had been heavy here, and accidents had been liable to happen during the cold snowing season, thus the road had often been closed to traffic. Under these circumstances, paving reconstruction had been urgent task to secure

[1] Heihe City is the main city of Heihe district having six cities (including Beian City) and counties under its control. Its total population was about 1.68 million in 1999.
[2] The official name is "National Route G202"connecting Heihe with Dalian.

access to Heihe City through the four seasons.

1.2 Project Outline

The objective of this project is to secure stable accesses to Heihe and other target areas including impoverished local districts by constructing 240km of new national road from Heihe to Beian, and thereby contribute to the promotion of the Heihe - Russia border trade and the development and progress of the local economy.

Approved Amount/ Disbursed Amount	12,608 million yen / 12,187 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 2001 / March, 2001
Terms and Conditions	Main: Interest rate: 1.8% Repayment Period: 30 years (Grace Period: 10 years) General Untied Consulting Service: Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Bilateral Tied
Borrower/ Executing Agency	People's Republic of China / Heilongjiang Province Hei-Bei Highway Construction Co., Ltd
Final Disbursement Date	July, 2006
Main Contractor (Over 1 billion yen)	China Railway First Group Corp., Ltd.(China), Heihe Municipal Road & Bridge Company (China)
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.（if any）	Heilongjiang Department of Road Inspection and Design (1998)
Related Projects（if any）	None

*While the project was underway, the name of the executing agency was changed from Heilongjiang Province Hei-Bei Highway Construction Co., Ltd. to Heida Road Administration Office due to organizational reform.

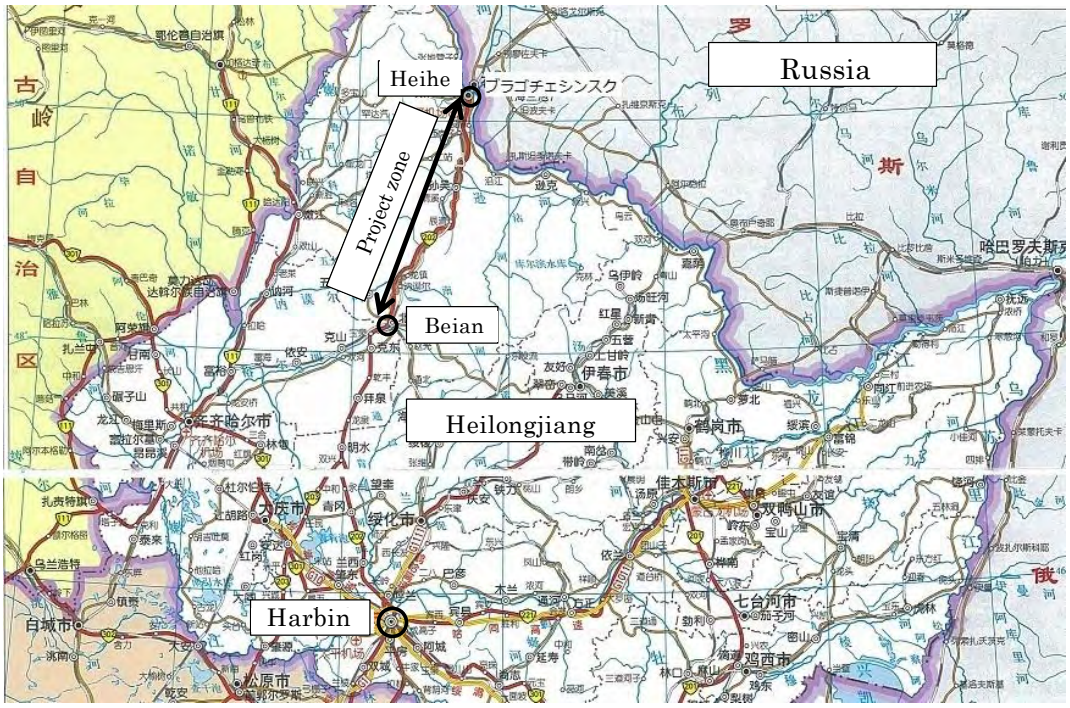

Figure.1 Project Site

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenji Momota, IC Net Limited

2.2 Duration of Evaluation Study

An Ex-Post Evaluation was conducted over the following duration:

Duration of the Study: October 2009 – June 2010

Duration of the Field Study: December 8 – 17, 2009 and April 20-24, 2010

2.3 Constraints during the Evaluation Study

Some documents prepared in the project planning stage could not be found as some members were reshuffled in the executing agency. Instead, therefore, in figuring out traffic forecast and EIRR (Economic Internal Rate of Return), existing data were used with assumptions were used.

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

3.1 Relevance (Rating: a)

3.1.1. Relevance with the Development Plan of China

(1) Development Policy at Appraisal

In the 9th 5-year plan (1996-2000), construction of a network of automobile dedicated roads represented by the "5-Vertical, 7-Horizontal Traverse Routes Plan" was planned to promote economic development in interior region. The development policy included construction of highways of high-grade specifications extending 20,000~25,000 km, construction of roads having access to large and middle cities, roads connecting ports with hinterland, roads for improving tourism, and roads running through slums, borderlands and mountainous areas.

(2) Development Policy at Ex-Post Evaluation

In the "Northeast Area Development Plan (2006)"[3] laid out by the Chinese Government on the basis of the 11th 5-year plan, two policies of "Harmonized Development of the Region" and "Change in Industrial Structure" were adopted. In line with these policies, plans for developing this local district and completing infrastructures of roads and railways were designed.

In the "Plan of National Expressways Network" made in 2004, development of the network commonly known as "7918" (7 metropolis radial routes, 9 north-south traverse routes, and 18 east-south traverse routes) was envisaged. Construction for improvement in the second traverse route (Huichun - Wulanhaote route), above all, is looked upon as important in promoting Sino-Russian border trade and improving access from the western part to the coastal areas. It is obvious that an improvement in the transportation infrastructure is regarded as one of the important tasks in economical development in the northeast district of China.

3.1.2 Relevance with the Development Needs in China

At the time when this project was in the planning stage, road maintenance in Heilongjiang was being conducted on the basis of "Heilongjiang 30-Year Route Network Plan, 1995". In those days, there still remained sections left in bad condition. The Heihe - Beian route taken up as this project was in great need of improvement, partly because cargo transportation in Heihe as the basis of border trade with Russia was on the increase and partly because there were seven "resources development economy zones,"

[3] This plan is positioned as a long-term local development plan in the northeast district centered in Heilongjiang up to 2020.

"agricultural economy zones" and other economy zones along this route. As the target roads remained unpaved and covered with gravel, traffic risk was high, resulting in accidents and damage to cargoes. Thus, improvement in the road conditions was required for better transportation.

Nowadays, its importance is more and more magnified. In the "Heilongjiang Core Routes Network Plan" enacted in January 2006, Heilongjiang Expressway Network was positioned as a partial route of the "7918" network (mentioned above) to be actualized in this province, and a plan to improve the "276" network (2 loop roads, 7 radial roads and 6 connection roads) was laid out. Harbin - Heihe route, as part of Jilin - Heihe Expressway[4], one component of the "276" network, is a key section for improvement. Since Heihe City relies mostly on land routes due to geographical factors, transportation by roads is indispensable in this city. The following table shows the present percentage of passengers vs. cargo by traffic route. The importance of road transportation is demonstrated by the fact that about 80 percent of passengers rely on it.

Table 1 Passengers vs. Cargo by Traffic Route in Heihe City (2008)

	Road	**Railway**	**Waterway**	**Airway**
Passengers	78.6%	19.3%	1.8%	0.3%
Cargo	49.8%	48.8%	2.0%	n.a

Source: F/S Report on Beian - Heihe Route Project of Jilin - Heihe Expressway

The Heihe - Beian route is to be upgraded into an expressway as part of the road network development plan of Heilongjiang Government. At the time of the Field Study (as of April 2010), additional construction of a median divider strip and widening construction of second-class roads[5] are being carried out (to be completed in 2011). The latter is to be fulfilled with one lane added on the left side, and ground work has already been started on certain sections.

According to the executing agency, the Heihe - Beian route can accommodate increasing traffic volume with the current width of road specifications (6,488 cars at its maximum per day on the average estimated at the time of planning). They said that this route is to be upgraded to an expressway as part of the development policies of the central government and Heilongjiang Government.

[4] Jilin - Heihe Expressway that is connected with Jilin-Shenyang Expressway at Jilin is positioned as the main route connecting three provinces in the northeast district.

[5] In parallel with upgrading to an expressway, the width of second-class roads (2 lanes) over the target section is to be enlarged.

Fig. 2 Construction of Median Divider Strip on First-class Road

Fig. 3 Construction of Widening the Second-class Road

3.1.3 Relevance with Japan's ODA Policy

At the time of appraisal, "The Country Assistance Policy (China)", then-guideline of ODA assistance to China, prioritized the infrastructures of transportation, telecommunications and electric power which then hampered the progress of the Chinese economy. With respect to the transportation sector, a principle was formulated to help China augment transportation capacity by construction of traffic roads and facilities and also improve maintenance and administration techniques for more efficient transportation. This project is consistent with this policy.

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

3.2 Efficiency (Rating: a)

3.2.1 Project Outputs

The original plan and the actual achievements of this project are as shown in the following table, and it was carried out almost as planned:

Project Outputs	Original	Actual
(1) Section	242.1km in total	240.5km in
First-class road	37.1km	total
Second-class road	204.9km	36.9km
(2) Number of lanes		203.65km
First-class road	Both ways 4 lanes (25.5m wide)	As planned
Second-class road	Both ways 2 lanes (12.0m wide)	As planned
(3) Bridges		
Large	12 (2,707m)	14(3,136m)
Middle	13(751m)	9(630.6m)
Small	18(524m)	22(788.42m)
(4) Interchange	2	3
(5) Service area	1	As planned
(6) Tollhouse	5	As planned
(7) Maintenance and Administration	2 wrecker trucks &4 road rollers	As planned
(8) Consulting service	30M/M (including 10M/M for overseas training)	17.5M/M

There were some changes in the original plan. Some bridges were lengthened from middle to large; at the detailed design drawing stage, part of the routes had to be redesigned for protection of swamps and for prevention of landslides. The number of interchanges was increased; and level crossings scheduled at some spots (crossings with railways) had to be changed into multi-level crossings in consideration of safety and predicted increase in truck traffic. As regards consulting service, overseas training was cancelled because the construction period was too short.

Fig. 4 Heihe Tollhouse

Fig. 5 First-class Road

3.2.2 Project Inputs

3.2.2.1 Project Period

The project period that originally had been planned to be 32 months from March, 2001 until October, 2003 was shortened to be 28 months from July, 2001 until October, 2003. In other words, the actual project period was 87.5 percent shorter than planned. Although the date of tender was delayed, by carrying out construction works scheduled in 2001 together with those scheduled in 2002-2003 in package, this project was completed mostly as planned. As a result, the entire period was shortened. The following are the reasons why this project could be completed efficiently:

(1) There was no change in the project plan itself and no big modification review in the design.

(2) The executing agency, Heibei Road Construction Co., Ltd., has accumulated experience of road construction, especially in the road maintenance work in cold areas. Its management ability was high as evidenced by its use of appropriate contractors and adoption of the right construction methods.

(3) The contractors took the necessary steps to shorten the construction period.[6]

3.2.2.2 Project Cost

The total project cost actually incurred was lower than planned, being 20,441 million yen (including 12,187 million yen as Japanese ODA loan portion) as against 20,890 million yen (including 12,608 million yen as Japanese ODA loan portion) planned.

[6] In order to shorten the construction period, a measure was taken to carry materials for roadbed to the mixing stations at each construction spot during the winter season when construction work was discontinued. Another measure was to use materials that are quick to lay on concrete-paved road surface, which accounts for the large proportion of the section (about 210km).

(Foreign currency portion is Japanese ODA loan). Although there was a cost-increasing factor of having built more interchanges and having lengthened bridges, due to cost reduction in negotiations with the contractors for competition in tender, reduction of administration cost by shortening the project period and cancellation of overseas training, the actual total project cost was lower than planned.

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

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Effects

3.3.1.1. Results from Operation and Effect Indicators

(1) Change in Traffic Volume

The following is average traffic volume on the Heihe-Beian route after the project completion:

Table 2 Average Traffic Volume on the Project Section

(Unit: number of cars)

		2003 **Completed in October**	2004	2005	2006	2007	2008	2009
Auto-mobiles only	Planned	1,756	1,896	2,048	2,211	2,388	2,579	2,785
	Actual	**1,106**	**1,153**	**1,285**	**1,436**	**1,797**	**2,052**	**2,310**
All cars	Planned	2,245	2,424	2,618	2,827	3,053	3,297	3,561
	Actual	**1,420**	**1,511**	**1,633**	**1,796**	**1,836**	**2,150**	**2,395**
Auto-mobiles only	Actual/ Planned	**63%**	**61%**	**63%**	**65%**	**75%**	**80%**	**83%**
All cars	Actual/ Planned	**63%**	**62%**	**62%**	**64%**	**60%**	**65%**	**67%**

Source: Heida Road Administration Office

Note 1: Average traffic volume was obtained by obtaining the weighted average in each section from eight observation spots.

Note 2: A number of data were available for obtaining the planned traffic volume, but the F/S forecast was employed in this study. Figures obtained were only in 2003 and 2020, and therefore the planned traffic volume in each year was calculated with eight percent as a growth rate on average.

Note 3: "All cars" mean the total traffic volume including automobiles and motorbikes.

Actual/planned traffic volume on the average is 67 percent for all cars (83 percent for automobiles only) in 2009. In general, the Heihe-Beian route has good utilization with about 10 percent % of growth each year. In addition, Heilongjiang Government made the toll free in June 2006 as part of its policy to boost economic conditions. Consequently, traffic volume in 2009 was 11 percent higher than in the previous year. In

the years to come, traffic volume is expected to increase even more.

The fact that the actual traffic volume was only 60 percent of the original plan is thought to be due to an overestimated forecast by the executing agency. The present traffic volume is considered to be reasonable. This gap had something to do with the background that no reliable data and no answers could be available to help inquirers figure out a forecast. In understanding exactly the effectiveness of the project and in considering the relevance of having expressways as mentioned above, a scheme to get reliable data and to do effective monitoring work needs to be established.

(2) Influence of the Road Reconstruction on Transportation and Logistics

Transportation and logistics between Harbin and Heihe have been vitalized by this route opening. For the purpose of learning the effect of the road reconstruction, a survey was made with beneficiaries to see their opinions and to analyze evaluations of local people and those concerned with transportation. A face-to-face inquiry was made by investigators by use of a questionnaire[7] with a total of 100 random sampling subjects, consisting of 80 bus passengers and 20 express companies. The following analytical results are based on the official statistical data compiled by Heihe Road Transportation Administration Office and the results obtained from the investigation with beneficiaries.

1) Traffic Volume of Bus Passengers

As a result of the road opening of the target section, bus services between Heihe and Beian and between Heihe and Harbin have remarkably increased. The traffic volume was 2.99 million passengers by buses registered in Heihe City in 2004, and increased by about 2.5 times up to 7.36 million passengers in 2008. As shown in the following table, bus services between main cities are showing remarkable increase.

Table 3 Number of Daily Bus Services between Heihe and Main Cities (Round Trip)

	Heihe - Sunwu	Heihe - Harbin	Heihe - Beian	Heihe - Wudalianchi
Before project	2	2	4	2
After project	4	10	8	6

Source: Survey with bus/express companies

Eight bus services are available between Heihe and Beian as a round trip from 7 a.m. to 3 p.m. every day. It is surmised from the inquiry survey with beneficiaries that passengers

[7] The inquiry survey was conducted mainly at bus terminals in Heihe City and its vicinity.

prefer bus service than railways in light of convenience on the frequency of services, travel time and fare. The survey with bus companies revealed that the bus services are in great demand with the use rate for the Heihe-Beian service reaching about 80 percent on average. The daily number of bus passengers between Heihe and main cities increased dramatically after construction, as shown below:

Table 4 Daily Number of Bus Passengers between Heihe and Main Cities

	Heihe-Sunwu	Heihe-Harbin	Heihe-Beian	Heihe-Wudalianchi
Before Reconstruction	60	58	120	60
After reconstruction	132	350	264	198
After/Before	220%	600%	220%	330%

Source: Survey with beneficiaries

In case the railway is taken for the same section, it takes about six hours, but the bus service takes you to the destination in almost half that time (3-4 hours). Daily services are more frequent on buses; eight services a day as against only one service on the railway. In this respect, an increase in bus services resulting from the road reconstruction gives much more convenience to the residents than before. Many of the bus companies inquired predict that bus passengers will increase, and about 40 percent of the respondents are considering increasing the frequency of bus services.

Fig. 6 Buses Running on the Route

Fig. 7 Heihe Bus Terminal

The following findings were obtained from the survey with bus passengers:

1. From among a total of 80 subjects, there were 33 bus passengers who had been using the railway before the road reconstruction. The reason was mainly that they found advantages in bus services in terms of travel time and convenience.
2. All of the respondents who had been taking buses before evaluated highly the

improvement in the road following reconstruction.

3. About 75 percent of the respondents responded that they came to avail themselves of bus services more often or a little more often than before.
4. Travel time was dramatically shortened by about 49 percent from 6.42 hours before the road reconstruction to 3.25 hours.

It is evident from the above findings that about 96 percent of the respondents are satisfied with the new bus services, and evaluate highly the effect of the road reconstruction. This demonstrates that improvement in roads plays an important role in making the daily life of the local people more convenient.

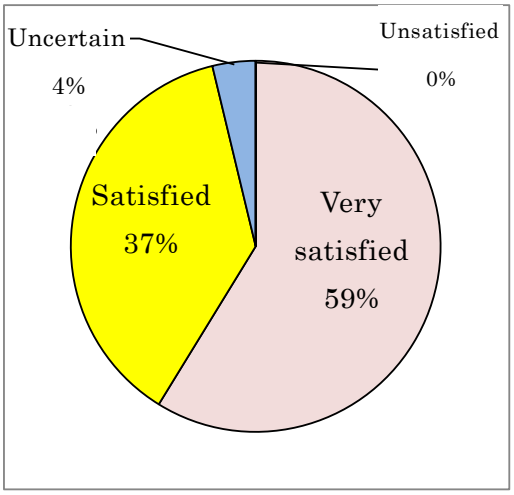

Fig. 8 Survey Results on Satisfaction of Bus Passengers

Fig. 9 Scene of the beneficiary Face Survey

2) Increase in the Number of Trucks and Cargo Handling

There was a remarkable increase in the number of trucks registered in Heihe City and cargo handling volume after the project was completed. Most of the trucks were small (5-8 tons) before, but as cargo handling volume has increased, large container trucks have become more prevalent.

Table 5 Cargo Handling Volume by Trucks Registered in Heihe City

	Before Project (2003-04)	2009
Cargo Handling Volume (10 thousand ton)	652	935
Truck (Number)	400	1,800~2,000

Source: Heihe Road Transportation Administration Office

In the survey results obtained from express companies, 80 percent of them recognize that there was an increase in cargo handling volume in terms of quantity and variety after the road reconstruction. Annual cargo handling volume on average by the respondents increased from 3,023 tons before reconstruction to 5,520 tons after reconstruction (about 180 percent up). Their recognition is in conformity with the data shown above.

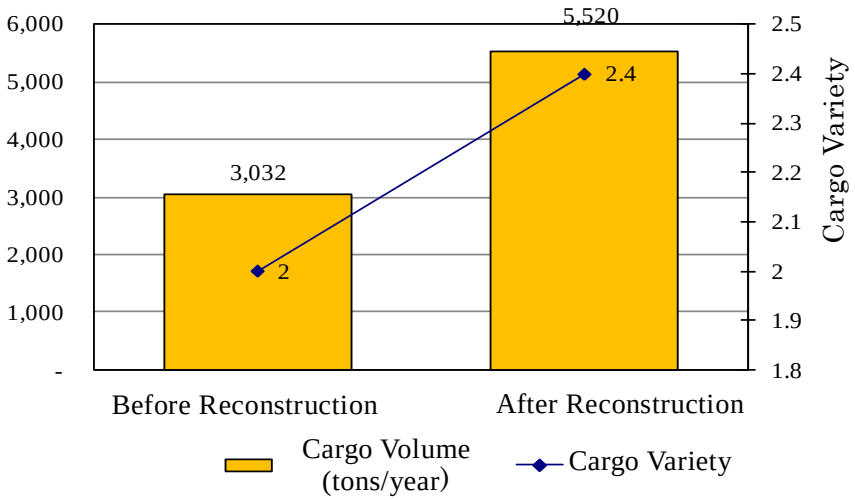

Figure 10 Cargo Handling Volume before and after Road Reconstruction

In general, the actual growth of traffic volume on average is 60-80 percent smaller than planned, but it has been increasing constantly since the project was started. Also, in consideration of an increase in passengers of long-distance buses, the road opening can be evaluated as having contributed much to the vitalization of logistics and traffic conditions.

(3) Travel Time

The original plan and the actual achievements in running time and average speed are as follows:

Table 6 Change in Travel Time and Speed

Item	At Appraisal(1995)	Original	Actual(2009)
Travel Time Saved	6-8 Hrs. Required	4.1Hrs. Shortened	Summer: 4.39Hrs. Winter: 4.15 Hrs. Shortened
Average Speed First-class Road Second-class Road	 24km/h 33km/h	 70km/h 60km/h	 89.5km/h 67.5km/h

Source: Heida Road Administration Office/ Running time at appraisal is based on the survey results with beneficiaries.

Travel time was shortened as planned, and also average running speed could be attained as planned. At the time of the Field Study, the evaluator actually drove this road section, and could reach the destination in less than four hours to find the required time shortened by half as against eight hours before the road reconstruction. As seen from the above table provided by the executing agency, clear effect on travel time was confirmed[8].

The beneficiary survey with express companies showed that all respondents were satisfied with the improvement in road conditions (compared to that before the project). The reasons were, shortened travel time between Heihe and Beian (Before project:10 hours/ After the project about 4.36 hours), lowered risk of accidents, and saving overall transportation cost.

(4) Traffic Accidents

As a result of the road construction, the incidence of traffic accidents was reduced down to the 30 percent-level (decreased by 70 percent) compared to before construction. This achievement cleared the appraisal goal set at 60 percent decrease during the design stage. A great improvement was seen in the incidence of traffic accidents in relation to the average traffic volume.

Table 7 Number of Traffic Accidents on Target Section

Year	At Appraisal (1995)	2004	2005	2006	2007	2008	2009
Accidents	80	24	21	20	25	20	18
Comparison w/ Appraisal		30%	26%	25%	31%	25%	23%
Incidence	3.5%	1.59%	1.29%	1.11%	1.36%	0.93%	0.75%
Dead	25	18	20	18	15	15	12
Wounded	50	20	22	26	22	18	10

Source: Heida Road Administration Office

[8] According to Heihe Road Administration Office (Transportation Dept. of City Government), the time required between Harbin and Heihe was shortened from 13 hours to 7.5 hours as a result of the road opening. The time required for the same route by the railway is about 12 hours.

According to the executing agency, safety campaigns were strengthened, following in the wake of the road reconstruction, and this step contributed much to the decrease in incidence of accidents. The measures taken in this line were that the traffic police formed a team for expressways, placed signposts of speed limits, increased patrol frequency by patrol cars[9], and intensified inspection of trucks carrying overcapacity cargoes.

3.3.1.2 Results of Calculations of Internal Rates of Return (IRR)

Recalculation of the economic internal rate of return (EIRR) of this project was made with the following assumptions, since no detailed data on the calculation method at appraisal were available. The result obtained was 18.3 percent as shown below, a little better than 17.4 percent in the original plan. Simple comparison is difficult because of the difference in calculation assumptions, but the shortening of travel time and reduction in transportation cost brought about by the road construction were conspicuous. It is concluded, therefore, that the economic benefits expected at the time of the plan were obtained.

Table 8 Recalculation of Economic Internal Rate of Return (EIRR)

(1) Economic Internal Rate of Return (EIRR) 17.4% at Appraisal	18.3% at Ex-Post Evaluation
(2) Economic Benefits 1) Travel time shortening effect 2) Travel distance shortening effect 3) Economic effect through decrease in accidents 4) Economic effect through expansion of road network	(3) Economic Cost 1) Converted economic cost of initial investment 2) Converted economic cost of operation and maintenance costs

3.3.2 Qualitative Effect

In interviews during beneficiary survey, favorable opinions were expressed by them in that opportunities for human communications were enlarged, as more frequent bus services resulting from the road reconstruction enabled them to go to other cities on day trips to see their relatives and friends. Also qualitative improvements in comfort and safety were evaluated as an effect of the road reconstruction. It is evident that the road construction made a certain contribution to the qualitative improvement in society and

[9] In driving the target section, the evaluator often could see patrol cars on alert and lookout along the road, and had the impression that they were stationed in many more places than on other roads.

human life.

In general, although the traffic volume remains 60 percent of the original plan, a high evaluation could be made for successful road reconstruction in that travel time and distance saved and that bus services, truck services and passengers were increased as a result of the road opening. As the toll has been made free since 2009, a certain degree of growth can be expected for the traffic volume in the future. Moreover, the incidence of traffic accidents has been on the decrease, and no negative effects due to the road reconstruction have so far been reported.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Impact

3.4.1 Intended Impacts (Regional Economic Development)

3.4.1.1 Promotion of Border Trade with Russia

The total foreign trade of Heihe amounted to $1.297 billion in the time frame of January - September, 2009. It occupied 14 percent of the total export/import amount of Heilongjiang. The main import items are structural steel scraps and pulpwood, while the main export items are machinery and electric products as well as clothes, which occupy half of the total exports. The export/import amount fluctuates largely year after year under the influence of economic conditions, but this amount in the past few years has been doubled as compared with the level in 1995. The number of people entering into and departing from China is showing steady growth, totaling about 1.4 million in 2008. This figure is four times larger than that in 1995 before this project was started. All these phenomena reflect rapid growth of Heihe as a base of the border trade and international exchange with Russia.

Table 9 Export/Import Amount in Heihe

	Export/Import			People Entering into / Departing from China
	Total	Import	Export	Total
1995	158,557	116,098	42,459	376,773
2003	216,900	135,486	81,414	407,100
2004	372,075	253,675	118,400	627,923
2005	443,941	315,846	128,095	920,025
2006	296,503	129,023	167,480	1,085,125
2007	386,122	130,148	255,974	1,262,924
2008	337,485	61,127	276,358	1,398,812
2009	207,815	57,506	150,309	867,447

Source: Heihe Custom Office

Note: 2009= January-September

Heihe City is implementing measures for promoting foreign trade, having a free trade zone in its downtown and admitting visa-free travel of Russians. Many Russians come to Heihe from the neighboring city Blagoveshensk for shopping or sightseeing. It has a shopping mall where there are many electric appliances and clothing shops. These products come from various areas of China. Some shops are run by people from South China. It was learned from interviews with express companies that these products are carried here by trucks and by railway. In this connection, they evaluate highly the road construction from the aspect of logistics. There is a sightseeing spot called Wudalianchi City, which is famous for hot springs, in two-hour driving distance southward from Heihe. Blagoveshensk dispatches a sightseeing bus going straight to Wudalianchi, and sightseers enjoying hot springs are on the increase. This prosperity can be evaluated as one of the good effects brought about by the road reconstruction.

Fig. 11 Shopping Mall in Heihe

Fig. 12 Grocery Shops Handling Russian Products

3.4.1.2 Growth of Regional Economy

The main economic statistics in Heihe show that both GRDP and per capita GDP are growing far larger than the level at the time of the project planning and that the scale of the transportation and telecommunications sectors has grown three times larger. The growth of the border trade with Russia and international exchange with the Russians is considered to have made Heihe what it is today.

Table 10 Main Economic Indexes

(Unit: per capita GDP by Chinese yuan, the other indexes by 10 thousand Chinese yuan)

		1995	2003	2004	2005	2006	2007
GRDP	Results	573,921	914,289	1,059,846	1,204,960	1,389,153	1,663,188
	Growth rate			15.9%	13.7%	15.3%	19.7%
Transportation/ Telecommunications	Results	32,541	98,498	107,650	77,773	82,019	90,999
	Growth rate			9.3%	-27.8%	5.5%	10.9%
Wholesale/Retail /Trade/Restaurants	Results	50,022	87,184	91,185	101,024	111,665	129,945
	Growth rate			5%	11%	11%	16%
Per capita GDP	Results	3,549	5,264	6,098	6,911	7,981	9,573
	Growth rate			15.8%	13.3%	15.5%	19.9%

Source: Heilongjiang Statistics Almanac

3.4.1.3 Benefits for Regional Residents

In parallel with economic growth in Heihe, the average income of impoverished residents in agricultural villages is also on the increase. The table below shows chronological changes in the income of the residents in agricultural villages in main cities and counties in Heihe district. It can be seen that the average income in this area has been almost doubled as compared with the level in 2003. The growth rate of the income in entire Heilongjiang is about 65 percent during the same period, and it is thus noticeable that growth in Heihe is far better than the level in Heilongjiang as a whole. The survey with beneficiaries revealed that some of them expressed appreciation for increased work opportunities in this area as trade and economic activities were vitalized. In interviews conducted at the time of the Field Study, some of the respondents evaluated highly this growth trend in that residents in agricultural villages are having more opportunities to go to Heihe area for work and to open shops in the shopping mall for Russian visitors.

Table 11 Chronological Changes in Income of Residents in Agricultural Villages in Main Cities and Counties in Heihe Area

(Unit: Chinese yuan)

	Heihe City	Beian City	Wudalianchi City	Nenjiang Xian	Xunke Xian	Sunwu Xian	Average	Heilong-Jiang Province
2003	1,831	1,971	1,500	1,817	3,050	1,202	1,895	2,509
2004	2,609	2,778	2,515	2,841	3,705	1,869	2,720	3,005
2005	3,323	3,217	3,000	3,808	3,934	1,937	3,203	3,221
2006	3,505	3,412	3,180	4,026	3,707	1,995	3,304	3,552
2007	3,947	4,003	4,067	4,356	3,893	2,154	3,737	4,132

Source: Heilongjiang Statistics Almanac

It is difficult to exactly identify what direct influence this project gave to such growth because there is an external factor represented by economic growth in China as a whole. Meanwhile, the growth rate of income in Heihe area is higher than that in entire Heilongjiang, as mentioned above. As a major public undertaking, this project has built up part of the main road as one of the key infrastructures indispensable for promotion of foreign trade, for instance, and in this sense can be evaluated as having played an important role in supporting high growth in the Heihe area.

3.4.2. Other Impacts

It was pointed out that this project may have impact on the natural environment due to outflow of soil, noise and vibration during reconstruction and noise and air pollution thereafter. In the planning stage, a report was prepared concerning evaluation on the influence of the project on the environment, and this project was carried out with approval from the National Environmental Protection Department. Certain measures were taken to mitigate noise by means of planting trees and placing a median divider strip and to prevent outflow surface water by means of setting up a drainage way. There have so far been no particular problems.

Therefore, this project, having played an important role to establish a key infrastructure through the road reconstruction, contributes much to the economic growth of Heihe area as a center of border trade.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

This project was carried out by Heibei Highway Construction Co., Ltd. under the control of Heilongjiang Government. This company is a national enterprise entirely owned by Heilongjiang Government and an enterprise owned by Heihe City Government as its stockholders. Up until now there has been no substantial change in its operation and maintenance, but this company changed its name to “Heida Road Administration Office” after this project was completed, and assumes the responsibility of administering and maintaining the roads under its control. It is in the scope of this office’s responsibility to upgrade the roads under its control into expressways, as mentioned above in “3.1 Relevance.” At the time of planning this project, there was a rumor that Heibei Road Construction might be reorganized into a private company, but the evaluator confirmed that there is no such possibility at this stage. Considering the strong push by the central government as seen on the move of upgrading the project section to highway, toll-free policy, this office is likely to maintain current form of management.

3.5.2. Technical Aspects of Operation and Maintenance

Heida Road Administration Office has five tollhouses in the section under its control with 40-45 staff members stationed in each tollhouse, totaling up to 214 members engaged in administration and maintenance works. Even after the toll was made free, this regime is maintained with the number of staff members kept at an appropriate scale. The executing agency that controls a number of road construction projects in Heilongjiang, has enough experience in operation and maintenance, and no problem has so far been seen in its technical and managerial abilities.

Table 12 Stationing of Road Administration Staff Members (December, 2009)

	Section on duty	Number of staff
Heihe Tollhouse	37km	45
Caoji Tollhouse	54km	42
Sunwu Tollhouse	53km	42
Xiaoxingan Tollhouse	44km	40
Nemor Tollhouse	53km	45
Total	241km	214

Source: Heida Road Administration Office

Since the toll was made free in and after June 2009, collection of tolls has been abolished. The main works of staff are the administration of the speed control system and maintenance of the roads.

3.5.3 Financial Aspects of Operation and Maintenance

The operation and maintenance of this project are supported financially by the government. Up until recently, certain autonomous operation was conducted with the income of tolls used for the maintenance and repair of the roads. The table below shows the details of the tolls collected and the expenses incurred for repair and maintenance of the roads in 2003-2009. As will be seen from this, the direct expenses for repair and maintenance of the roads could be covered by the tolls collected[10].

There was an answer from a staff of the Traffic Department, Heilongjiang Government that reasonable financial support will continue to be obtained from the government

[10] The total amount for operation including personnel expenses was not disclosed.

Table 13 Tolls Collected and Road Maintenance Expenses in Each Year

(Unit: Chinese yuan)

Year	2003	2004	2005	2006	2007	2008	2009
Tolls Collected	663	3,762	4,237	5,361	5,563	7,227	2,014
Maintenance Expenses	962	2,227	1,942	2,156	1,946	2,538	2,587

Source: Heida Road Administration Office

According to the above staff of the Traffic Department, the self-supporting operation dependent on the income of tolls is out of the plan from the outset. The construction and maintenance of roads under the national policy have so far been supported financially by the government. As tolls have been made free since 2009, the government is to assume 100 percent financial responsibility. Heida Road Administration Office responded that there is no problem in operation and maintenance with the current budget, and that it is supported appropriately with government finances.

As already mentioned in "3.1 Relevance", the road in the target section was constructed as a series of the road maintenance plan of Heilongjiang, and the upgrade of this section into expressways was carried out for more convenience. The Traffic Department published a comment to emphasize the importance of this section, and this comment is backed up by the policy of upgrading some other roads into expressways additionally. It is considered, therefore, that financial support to this section is continued at an appropriate level.

3.5.4 Current Status of Operation and Maintenance

At the time of the Field Study in April 2010, the evaluator drove the target section, and checked to make sure of the road conditions and the status of the equipment for maintenance. The road conditions were kept good in general, although cracks were found in certain areas. According to the executing agency, there is a frozen soil layer in the stratum in this target section, and in spring when frozen soil begins to melt, cracks are liable to occur. Maintenance works are performed periodically without particular problems[11].

[11] Repair of cracks is conducted by using repair materials or re-paving.

Fig. 13 Bulldozer of Maintenance Office

Fig. 14 Cracks on Road Surface

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to reconstruct the road over a section that is very important for foreign trade and economic development in Heilongjiang, and therefore, it will continue to be important. Efficiency in the process of project implementation is deemed to be high in that appropriate construction methods have been adopted and so on. The traffic volume has displayed steady growth for the past several years, and this project has exerted favorable influence on the regional economy with remarkable increases in cargo and passengers. The support prioritization by the government is high on this project, and it is expected that a pertinent operation and maintenance setup will be secured.
In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to Executing Agency

Now that there are plans to upgrade more and more roads into expressways, a scheme needs to be established to have data useful for predicting traffic volume and demand. Availability of reliable data is very important to verify the needs of the project plan and to determine the scale of the project.

4.2.2 Recommendations to JICA

Nothing in particular.

4.3 Lessons Learned

This project was completed in a shorter period than planned, even though its location in a cold area placed constraints on the works period. This successful achievement is attributable to the factors of having made contracts with the contractors with good experiences in cold areas, having employed proper construction and administration methods with the cooperation of the executing agency and having been able to work with contractors possessing high management abilities in project administration. When carrying out a project in a cold area, steadfast administration by the executing agency is a very important factor for influencing its efficiency.

Concluded

Comparison of the Original and Actual Scope of the project

Item	Original	Actual
1.Project Outputs		
(1) Section	242.1km in total	240.5km in total
First-class road	37.1km	36.9km
Second-class road	204.9km	203.65km
(2) Number of lanes		
First-class road	Both ways 4 lanes (25.5m wide)	As planned
Second-class road	Both ways 2 lanes (12.0m wide)	As planned
(3) Bridges		
Large	12 (27,97m)	14 (3,136m)
Middle	13 (751m)	9 (630.6m)
Small	18 (524m)	22 (788.42m)
(4) Interchange	2	3
(5) Service area	1	As planned
(6) Tollhouse	5	As planned
(7) Maintenance and Administration	wrecker trucks & 4 road rollers	As planned
(8) Consulting service	30M/M (including overseas training 10M/M)	17.5M/M
2.Project Period	March, 2001-October, 2003 (32 months)	July, 2001-October, 2003 (28 months)
3.Project Cost		
Amount paid in Foreign currency	12,608 million yen	12,187 million yen
Amount paid in Local currency	8,281 million yen (637 million yuan)	8,253 million yen (543 million yuan)
Total	20,890 million yen	20,441 million yen
Japanese ODA loan Portion	12,608 million yen	12,187 million yen
Exchange rate*	1 yuan = 13 yen (As of April, 2001)	1 yuan = 15.2 yen (Average July, 2001 - October, 2003)

* The Japanese ODA loan in this project was provided by foreign currency, all in Japanese yen. The above exchange rate was calculated as an average of the rate on the project starting date and the rate on the completion date.

China

Ex-Post Evaluation of Japanese ODA Loan Project

Shuoxian - Huanghua Railway Construction Project (1) - (4)

/ Huanghua Port Construction Project

External Evaluator: Yuko Kishino, IC Net Limited

1. Project Description

Project Site

Shuoxian - Huanghua Railway

(see Figure 1 for more details)

1.1 Background

Coal accounts for 70% of China's total energy consumption. While the major coal producing area is Sanxi[1] Region, which consists of Shanxi province, Shaanxi province and Western Inner Mongolia Autonomous Region[2], the major coal consumption areas are coastal cities in Northeastern China, North China, East China and South China. Therefore, trains and ships play a significant role in transporting coal from inland coal producing areas to consumption areas located in the eastern coastal areas, because they are a low-cost means of large-volume, long-distance transport. At the time of Japanese ODA Loan appraisal, the capacity of these transportation means had reached its limit. Production restrictions in the coal producing areas and stagnating coal supplies were observed.

To enhance coal production in the Sanxi Region as well as transportation capacities, the Chinese Government decided to comprehensively develop Shenfu Dongsheng coalfield[2], which is located on the border of Inner Mongolia Autonomous Region and Shaanxi province, and

[1] Beside Sanxi Region, Shandong, Henan, Anhui, Heilongjiang and Guizhou provinces also produce coal.

[2] Shenfu Dongsheng coalfield spans a total area of 250 million square meters. Coal produced here is of good quality, with low carbon content, high-calorific power and sulfur levels as low as 1 %. The Region is designated as a national energy reserve.

Shenhua Group Corporation Limited [3] (hereinafter Shenhua Group Corp.), which was established based on the approval of the State Council, was assigned to construct and manage operation of coalfields, railways, ports and harbors and electric power plants. Under the Shenfu Dongsheng coalfield development project, also named the Shenhua Project, an electrified double-track railway a total distance of 850km between Shenmu County in Shaanxi province and Huanghua port in Hebei province,[4] as well as a coal shipping port, was to be newly constructed.

1.2 Project Outline

The objective of this project is to increase the amount of transported coal that is produced in Shenfu Dongsheng coalfield and Shanxi province and to contribute to efforts to overcome the shortage of capabilities to supply coal to the eastern coastal areas by constructing electrified tracks from Shenchi south in Shanxi province to Huanghua port in Hebei province, including 599km with 440km of double track and 159km of single track as well as a new berth dedicated for shipping coal at Huanghua port with annual handling capacity of 30 million tons.

[3] Shenhua Energy Company Limited is currently implementing the project.

[4] The first stage, construction of an electrified single-track railway connecting Shenmu County in Shaanxi province and Shuoxian County in Shanxi province was financed with yen loans under the "Shenmu - Shuoxian Railway Construction Project (CXII-CXV-P35)", 1991 to 2000. The work involved in the current project constitutes the second stage.

Figure 1 Railways starting from Shenfu Dongsheng coalfield and the project

	CXVII-P72	CXVIII-P72	CXIX-P72	CXXII-P72	CXIX-P94
	Railway (1)	Railway (2)	Railway (3)	Railway (4)	Port
Approved Amount/ Disbursed Amount	27,715 million yen / 25,556 million yen	12,245 million yen / 11,105 million yen	20,460 million yen / 12,103 million yen	11,581 million yen / 11,580 million yen	15,400 million yen / 4,853 million yen
	Total 72,001 million yen / 60,343 million yen				
Exchange of Notes Date / Loan Agreement Signing Date	Oct 1995 / Nov 1995	Dec 1996 / Dec 1996	Sept 1997 / Sept 1997	March 2001 / March 2001	Sept 1997 / Sept 1997
Terms and Conditions	Main (except for CXXII-P72): Interest rate: 2.3%, Repayment Period: 30 years (Grace Period: 10 years) General untied				

	Main (CXXII-P72): Interest rate: 1.8%,Repayment Period: 30 years (Grace Period: 10 years), General untied General Untied Consulting Service (CXIX-P94 only): Interest rate: 2.3%, Repayment Period: 30 years (Grace Period: 10 years) General untied				
Borrower / Executing Agency(ies)	Government of People's Republic of China/ China Shenhua Energy Company Limited [5] Specific implementation body[6]: Shouxian Huanghua Railway Development Company Limited (CXVII-CXXII-P72) Shenhua Huanghua Harbor Administration Company Limited (CXIX-P94)				
Final Disbursement Date	December, 2000	July, 2003	January, 2003	July, 2006	April, 2005
Main Contractor (Over 1 billion yen)	1. Shuoxian - Huanghua Railway Construction Project Bright Nation As Ltd., Huaneng Basic Industries Investment Co., Ltd., China Resources Machinery & Equipment Co., Ltd., Paryorient International Co., Ltd. (These are contractors of Hong Kong.) Beijing Golden Fu Li International Trade Center, China Civil Engineering Construction Corp., China International Trust & Investment Corp., China Machine-Building International Corp., China Railway Materials & Supplies Corp., China Railway Construction Corp., Shanghai Industrial Investment (Group) Co., Ltd.,. Shenzen Sunray Development Co., Ltd.., Liaoning Anshan I/E Corp., Minmetals International Enterprises Development Company, Tianjin Machinery Import & Export Corporation, Wuhan International Economic & Trading Corporation, (These are contractors of People's Republic of China.) 2. Huanghua Port Construction Project Krupp Foerdertechnik Gmbh (Germany), Tomen Corporation (Japan)				

[5] While the implementation body was Huaneng Fine Coal Company at appraisal in 1995, it was changed twice to Shenhua Group Corp. in October 1995 and then to Shenhua Energy Company Limited in December 2004 as a result of organizational changes. For details, please refer to the section "Sustainability."

[6] The specific implementation body refers to an organization that operates, maintains and manages the project under the supervision of the executing agency.

Main Consultant	None
Feasibility Studies, etc.	1. Shuoxian - Huanghua Railway Construction Project F/S The Third Survey Designing Institute Of The Ministry Of Railway in 1993 2. Huanghua Port Construction Project F/S CCCC First Harbor Consultants Co., Ltd. China Communications Water Transportation Planning and Design Institute Co.Ltd. in 1993
Related Projects (if any)	Japanese ODA Loan, Shenmu - Shuoxian Railway Construction Project (CXII-CXV-P35), 1991-2000

2. Outline of the Evaluation Study

2.1 External Evaluator

Yuko Kishino, IC Net Limited

2.2 Duration of Evaluation Study

In this ex-post evaluation, the study was conducted as follows.

Duration of the Study: September, 2009 - September, 2010

Duration of the Field Study: February 22 - March 17, May 12 - 13, and May 22 - 27, 2010

2.3 Constraints during the Evaluation Study

Inhibition of environmental deterioration in the coal consumption areas was pointed out as one of the qualitative effects of this project. Under this project, coal is supplied to a large area in the eastern coastal area including East China and South China. Therefore, an environmental impact study of consumption areas in the scope of this survey could not be undertaken. To understand the status of coal consumption and environmental measures taken in these areas, we conducted a hearing at a thermal power plant of a subsidiary of the executing agency. With regard to the promotion of local economic development in the said areas, which was pointed out as another qualitative effect of the project, we couldn't however survey all of the 20 cities and counties spread over the area from Shanxi province to Hebei province. Therefore, we conducted the study at the locations of the specific implementation body that were assumed to receive the most impact from the project.

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

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of China

(1) Development policy at appraisal

The Eighth Five-year Period Plan (1991 through 1995) was implemented by the Chinese government to develop coalfields and establish a coal transportation system connecting eastern and western areas. To strengthen transportation capability of railway networks, it designated construction of new lines, electrification and installation of a double track as priority projects. The Shuoxian - Huanghua Railway Construction Project and the Huanghua Port Construction Project were designated as general priority projects in the energy and transportation fields in the Ninth Five-year Period Plan (1996 through 2000) and in the Long-term Economic Development Targets ending 2010.

(2) Development policy at ex-post evaluation

In the energy policy of the Eleventh Five-year Period Plan (2006 through 2010), the Government aimed to establish a steady, economical, clean and safe domestic energy supply system based on coal resources and to develop coal resources in a comprehensive and orderly fashion. The National Development and Reform Commission selected 13 large coal producing areas including Shenfu Dongsheng coalfield taking into consideration coal resources reserves and transportation conditions. The Commission is promoting the construction of large coalfield bases, the formation of superior coal companies, expansion of coal production capabilities, and improvement of transportation infrastructure.

As mentioned above, the Chinese Government decided to shift focus from the conventional coal production system centered on small coalfields to the intensive, rational and environmentally-conscious coal production system based on large coalfields in order to ensure orderly development, stable production and safety of coal resources. According to Chinese energy policy, the improvement of coal transportation infrastructure that connects large coalfields and shipping ports is a high priority.

3.1.2 Relevance with the Development Needs in China

(1) Demand for coal as primary energy

Demand for primary energy has been increasing at the rate of 6.5% annually since 1995 in

line with rapid growth of the Chinese economy. Energy consumption per capita increased from 1089kgce[7] in 1995 to 2015kgce in 2008. In spite of the fact that it has decreased from the 74.7% high in 1996, coal consumption still accounts for 69.5% of the total consumption of primary energy in 2009, reflecting the heavy dependence of the Chinese economy on coal as a main energy source. Demand for coal has increased substantially mainly for power generation purposes, and coal consumption is expected to reach 3.3 billion tons in 2010. A safe and sustained coal supply system that fulfills demand is a priority for the future.

Table 1 Structure of Primary Energy Consumption

(Unit: %)

year	Breakdown of consumption volume by energy source			
	Coal	Crude oil	Natural gas	Primary electric power
1995	74.6	17.5	1.8	6.1
1996	74.7	18.0	1.8	5.5
1997	71.7	20.4	1.7	6.2
1998	69.6	21.5	2.2	6.7
1999	69.1	22.6	2.1	6.2
2000	67.8	23.2	2.4	6.7
2001	66.7	22.9	2.6	7.9
2002	66.3	23.4	2.6	7.7
2003	68.4	22.2	2.6	6.8
2004	68.0	22.3	2.6	7.1
2005	69.1	21.0	2.8	7.1
2006	69.4	20.4	3.0	7.2
2007	69.5	19.7	3.5	7.3
2008	68.7	18.7	3.8	8.9
2009	69.5	17.5	3.5	9.5

Source: China Energy Statistical Yearbook (1995 - 2009)

(2) Importance of railway transportation of coal

While demand is increasing in Jing - Jin - Ji Area (includes Beijing, Tianjin and Hebei province), Northeastern China, East China and South China, production is concentrated mainly in Sanxi Region. As a result, coal transportation needs continue to be high. Railway networks have a price advantage[8] compared to water or road transportation and they account for more

[7] The unit kg of coal equivalent represents calorific power that corresponds to one ton of coal. This value is lower than the world's average consumption level per capita of 2500kgce tons (Standard Coal Equivalent). http://www.spc.jst.go.jp/hottopics/0905nuclear_e_dev/r0905_wu.html

[8] While railway transportation cost is 0.0975 to 0.12 ton/ton・kg, road transportation cost is 1.2 ton/ton・kg. P.47 of Beijing Zhongyan Zongheng Economic Information Center "Report of coal transportation in China from 2010 to 2013", 2010

than 70% of the coal transportation in China[9]. Due to the high transportation costs, the latter are used mainly for short-distance transportation. Other uses of land transportation include transporting coal from small coalfields for which there is no railway transportation quota. As shown in Table 2, the nation-wide volume of coal transported by railways increased from 720.58 million tons in 1996 to 1 billion 120.31 million tons in 2006, which accounts for about 40% of the total transported freight volume. In North China, coal accounts for more than 50% of total transported freight and railway transportation is particularly important.

Table 2 Coal Transported by Railway (Actual Amounts)

(Unit: ten thousand tons)

	North China			Entire Country		
	Entire cargo	Coal	Share	Entire cargo	Coal	Share
1996	51,335	31,816	62.0	171,024	72,058	42.1
1999	51,961	29,196	56.2	167,554	64,922	38.7
2000	53,659	31,815	59.3	178,581	68,546	38.4
2001	62,729	36,609	58.4	193,189	76,623	39.7
2002	67,157	38,250	57.0	204,956	81,852	39.9
2003	73,687	41,384	56.2	224,248	88,133	39.3
2004	87,590	48,023	54.8	249,017	99,209	39.8
2005	101,556	56,161	55.3	269,296	107,084	39.8
2006	112,086	61,340	54.7	288,224	112,031	38.9

Source: Year Book of China Transportation and Communications (1996, 1999 through 2006)

(3) Coal railway transportation route and the necessity of this project

There are three routes for coal transportation by railway from Sanxi Region: Northern route, Center route, and Southern route. The main route is Northern route. It consists of two sub-routes: one is used for transporting coal to Qinhuangdao Port (the main shipping port), TangShan Port[10], Tianjin Port and Huanghua Port, and this by way of Datong - Qinhuangdao Line (Datong to Qinhuangdao), Shenmu - Shuoxian Line (Shenmu to Shuoxian), Shuoxian - Huanghua Line (Shuoxian to Huanghua Port), Fengtai - Shacheng Line (Datong – Shacheng - Fengtai), Beijing - Yuanping Line (Yuanping to Beijing); and the other is used for transporting

[9] Coal energy center "World Coal Report Vol.1", 2009
http://www.brain-c-jcoal.info/worldcoalreport/S01-03-02.html

[10] Jingtang harbor area and Caofeidian harbor area in TangShan Port are located here. A coal terminal with handling capacity of 50 million tons was completed in Caofeidian harbor area in 2008.

to the northeastern areas by way of Jining - Tongliao Line (Jining to Tongliao Among these routes, Fengtai - Shacheng Line and Beijing - Yuanping Line are used for transporting passengers and freight. Transportation capacity of coal on these lines is close to saturation. There is also a limit for expanding capacity of Datong - Qinhuangdao Line, a dedicated coal transportation line. Since the Beijing - Qinhuangdao Line (between Beijing and Qinhuangdao) is now used for transporting passengers only, the volume of coal transported on the Datong - Qinhuangdao Line has increased, posing serious environmental problems. In summary, it is evident that the Shuoxian - Huanghua Line plays an important role, second only to the Datong - Qinhuangdao Line, as a northern coal transportation line.

3.1.3 Relevance with Japan's ODA Policy

Based on policy discussions between the Chinese government and the Survey Mission on Economic and Technical Cooperation sent by the Japanese government in 2001, the Japanese government decided on a policy supporting China. In order to support a well-balanced development of China, as well as to encourage cooperation conducive to economic infrastructure improvements, it reaffirmed its intention regarding continued cooperation in development initiatives involving large-scale resources. In the area of economic infrastructure, a priority area, the desirability of increases in transportation capacity through construction of transportation and traffic infrastructure as well as implementation of measures against energy supply shortages was indicated. The current project is also falls under the ambit of infrastructure improvements. It was considered to have high relevance with aid policy at appraisal.

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

3.2 Efficiency (Rating: a)

3.2.1 Project Output (See p.2-37 for details of the original and actual.)

(1) Shuoxian - Huanghua Railway Construction Project

Except for some changes in procurement of vehicles and construction of buildings, the construction of an electric railway between Shenchi South and Huanghua port, connected with the Shenmu - Shuoxian railway, has taken place almost as planned.

Locomotive engines and freight cars were leased from Rolling Stock Branch of the executing agency. Some of these were also procured in other projects. As a result, only 41 cars of

locomotive engines (157 in the plan) and 300 freight cars (5616 in the plan) were procured under this project. At the time of appraisal, there was a possibility of transporting passengers on this route. It was decided that a decision on this matter would be made upon project completion. However, passenger transportation services were finally cancelled. This is the reason why the number of procured cars was significantly lower than that foreseen in the plan. Due to the development of road networks, access to other cities was significantly improved for people living in the area and the necessity of passenger transportation by railway decreased. Since the primary purpose of this route was transporting coal, it was judged that cancellation of passenger transportation was reasonable.

Another area of discrepancy with the plan was the total area occupied by buildings (280,000 km^2 compared to the planned 880,000 km^2. As a result of the streamlining of management of the specific implementation bodies, personnel engaged were also significantly lower. In turn, the number of facilities related to welfare programs, etc. was less than the plan. Finally, there was also less stations (33, compared to the plan's 34).

Fig. 2: Freight cars

Fig. 3: Suning North Station

(2) Huanghua Port Construction Project

Except for some changes in the scale of berth and the number of outsourced loading and unloading facilities, the project was implemented almost as planned, and a coal shipping port with handling capacity of 30 million tons per year[11] was completed.

At the time of appraisal, sizes of ships that used the port were estimated to be between 20 and

[11] After that, a berth for ships with 10 thousand DWT was constructed on own fund in 2003 in order to supply coal to Suizhong power plant in Liaoning province, which the executing agency purchased in 1998. The second stage of construction was completed in 2004 with the aim of improving annual handling capacity to 30 million tons. As a result, the handling capacity reached 65 million tons in 2005.

35 thousand DWT and construction of 4 berths for ships with 35 thousand DWT was planned. After that, as the number of larger ships increased due to their cost advantages, three of them were changed to two berths for ships with 50 thousand DWT. Dredging depth was increased from 9.4m to 11.5m. Half of the ships are more than 30 thousand DWT and the largest ship is 80 thousand DWT at the time of ex-post evaluation. It can be said that efficient coal transportation system is established as a result of appropriate changes in the plan according to the changes in environment.

For loading and unloading facilities, the procurement amount was calculated based on coal loaded capacity and transportation amount on coal shipping cars at the time of appraisal. To ensure safe and steady operations, car dumpers[12], stackers[13] and reclaimers[14] were procured additionally for inspection, maintenance and emergency situations.

Fig. 4: Car Dumper

Fig. 5: Stacker/Reclaimer

3.2.2 Project Inputs

3.2.2.1 Project period

(1) Shuoxian - Huanghua Railway Construction Project

Formal operation started in December 2001. The entire period was 74 months from November 1995 to December 2001 as planned[15]. To meet a part of demand, they used leased trains. As they decided to determine the number of trains to be procured based on the actual coal transportation amount after starting formal operations, the period of procurement of vehicles ended up being 37-month longer than that initially planned

[12] Car dumper is a machine used for unloading coal from freight cars.
[13] Stacker is a machine used for spreading coal over a wide area in the coal storage yard.
[14] Reclaimer is a machine used for collecting coal in the coal storage yard and sending it to a conveyer belt.
[15] The definition of completion date is the date of starting formal operation.

(2) Huanghua Port Construction Project

The project period that originally had been planned to be 76 months from September 1997 until December, 2003 was shortened to be 53 months from September, 1997 until January, 2002. In other words, the actual project period was 69.7 percent shorter than planned.[16] This is because we entrusted construction work to a construction company that had an excellent track-record for port and harbor construction and because construction work continued during winter though that was not planned.

3.2.2.2 Project Cost

(1) Shuoxian - Huanghua Railway Construction Project

The total project cost was 235 billion 449 million yen, 94% of the planned initial cost[17] of 249 billion 738 million yen. Of this, 60 billion 347 million yen, 99% of the planned amount and 83% of the approved amount, was in foreign currency, and 175 billion 102 million yen was in local currency. Since part of locomotive engines and freight cars total had been procured from other sources and the procurement of passenger cars had become unnecessary, the cost for procuring cars declined. On the other hand, as Yuan to yen exchange rate increased (1 Yuan = 11.7 yen at the time of appraisal and 1 Yuan = 13.793 yen at the time of ex-post evaluation), the foreign-currency-denominated total project cost didn't decrease substantially.[18]

(2) Huanghua Port Construction Project

According to the plan at the time of appraisal, 15.4 billion yen that accounted for 23% of the total project cost of 66 billion 822 million yen was to be financed with foreign currency and the remaining amount, 51 billion 422 million yen, was to be financed privately and through China Development Bank loans, as well as by Hebei province. The total project cost was 68 billion 325.92 million yen, which accounted for 102% of the planned cost. The amount financed with foreign currency was 4 billion 853 million yen, which accounted for 7.1% of the total cost, and the amount financed with local currency was 63 billion 472.92 yen. The reason why the amount financed with foreign currency was reduced to one third compared to the plan was that part of loading and unloading facilities portion became an amount to be procured with local currency.

[16] The definition of completion date is the date of starting formal operation.
[17] It refers to the time of establishing a plan for "Shuoxian-Huanghua Railway Construction Project (1)" (CXVII-P72).
[18] It was 79% of planned amount in local currency.

Detailed information and documents that served as the basis for this decision could not be obtained. According to the hearings with JICA and the executing agency, this is how it happened: although the Japanese and Chinese sides had discussions many times about the result of evaluation of tender for loading and unloading facilities according to the procurement guidelines of JICA, it took much time and the executing agency proposed that they should be procured with local currency instead of foreign currency to avoid the delay of starting berth operations. As a result, a rebid as a project that was to be procured with local currency was solicited for the project.

No significant impacts on overall construction period, project cost and achievement of the project purpose were observed. However, the procurement cost for loading and unloading facilities was double in the amount of the plan, and accordingly, loan execution rate was lower.

As mentioned above, the total project cost was higher than the Huanghua Port Construction Project plan. However, other costs were within the plan. Therefore, overall efficiency of the project is considered to be high.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Effects

3.3.1.1 Transportation amount of Shouxian - Huanghua Railway

In May 2000, construction of the track between Shenchi South and Suning North was completed and operations commenced. In August 2001, construction of the track between Suning North and Huanghua Port was completed. In December 2001, Huanghua Railway became formally available along the line. The amount of coal transportation exceeded the planned 36.5 million tons in 2003 and increased to 74.7 million tons as a result of converting the track between Suning North and Huanghua Port from single to double using own funds. In 2006, when construction of Huangwan Railway, which connects Tianjin port in north and Huanghua Port South station located just before Huanghua Port station, was completed, the total amount of coal transported exceeded 100 million tons. This accounts for 16.4% of the total coal transportation amount from Sanxi Region and 26.3% of that of the north route. Except for an increase in transported amounts brought about by introducing the double track between Suning North and Huanghua Port as well as by constructing Huangwan Railway, the effect of this project is considered to be about 60 million tons, 200% of the plan.

Table 3 Amount of Coal Transported by Shuoxian - Huanghua Railway

(Unit: ten thousand tons)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Track construction between Shenchi South and Suning North completed	Project completed	Electrified entire line							
planned	500	2,050	3,650	3,650	3,650	3,650	3,650	3,650	3,650	3,650
actual	547	1,639	3,256	5,439	7,470	9,550	11,217	13,318	13,484	14,944

Source: Planned Value--Appraisal Documents, Actual value--Shenhua Energy Company
Note: Values from 2005 include the amounts transported as a result of installing double track between Suning North and Huanghua Port.

Based on the planned amounts to be transported of 20.5 million tons in 2001, 16 services were scheduled daily. To ensure the necessary amounts were transported, the number of daily services was increased every year and it reached 115 in 2009. Assuming that the transported amount of this project only is 60 million tons per year, the number of daily services resulting from this project is calculated to be 40[19]. Since it has reached the maximum daily services for which safe operation can be assured, they are planning to increase the number of train cars per service in stages from current 66 to 108, then to 216, in order to expand transportation capacity. In October 2009, they started trial operation with 108 train cars and have implemented safety measures such as strengthening of bridges in accordance with the rules and regulations set by the State Council.

Fig. 6: Shuoxian - Huanghua Railway and SS4B Locomotive

[19] Load capacity per freight car is 63 tons in 2009.

3.3.1.2 Huanghua Port coal shipping totals

The amount of coal shipped from Huanghua port reached the planned 30 million tons in 2003, the year after starting service. After that, the expansion of construction in the second period was privately funded and the designed handling capacity reached 65 million tons per year by 2005. Since annual coal shipping amounts of Huanghua port in and after 2006 were around 80 million tons, which was 1.2 times larger than the designed capacity, the total effect of this project is considered to be about 36 million tons. Although they planned to ship 6 million tons— 20% of the shipping amount total—per year, in fact 73.27 million tons, or 93% of the total of 78.43 tons (2009) was shipped domestically and the remaining 5.16 million tons were exported to Japan, Korea, Philippines, etc. In the end, most of the shipping was inside China.

Fig. 7: Final destination of Shuoxian - Huanghua Railway
Coal transported by Shuoxian - Huanghua Railway was unloaded from freight cars with car dumper and carried to the coal storage yard using belt conveyer.

Fig. 8: Coal Storage Yard (Capacity: 2 million tons)

Berth occupancy rate[20] has remained at more than 80% and less than 90% since 2004. Since high berth occupancy has a potential to affect average waiting time, according to the implementation body, this is the most efficient berth level. Average waiting time is on an increasing trend because loading takes more time with bigger ships. However, since there were no ships anchored for purposes other than loading, no problems with efficiency were observed as average waiting time was 1.81 hours in 2009.

The privately funded third stage construction of berths with a designed handling capacity of

[20] Berth occupancy rage is an index for evaluating whether berth is utilized effectively. It is calculated by dividing occupancy time by operation time of berth.

15 million tons per year is now under way, and is expected to be completed in 2010. In addition, a new berth with designed handling capacity of 50 million tons per year by 2013 will be built. Huanghua port will become a coal shipping port with annual handling capacity of 130 million tons.

Table 4 Operation and Performance of Huanghua Port

(Unit: ten thousand tons)

		2002	2003	2004	2005	2006	2007	2008	2009
		Project completed							
Amount of coal shipped	Planned	—	3,000	3,800	6,500	7,500	8,000	8,500	8,100
	Actual	1,653	3,116	4,543	6,709	8,050	8,161	7,803	7,843
	Shipped domesticall	N/A	N/A	N/A	N/A	N/A	6,825	6,133	7,327
Berth occupancy rate	Actual	60%	74%	83%	83%	83%	87%	85%	85%

Source: Shenhua Energy Company Limited

Fig. 9: 50,000DWT - class berth

Fig. 10: The first stage berth (current project) (left)

3.3.1.3 Results of Calculations of Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

1) Shuoxian - Huanghua Railway Construction Project

When re-calculating FIRR for this project only, assuming a base year 2009 and project life of 25 years, the result was 6.9%, which was lower than the result of 12.6% at the time of appraisal. Project construction costs, operation and maintenance costs and taxes were used to calculate the

expenses. Including income for coal transportation in the equation, the benefit calculation is the difference between income with the project and income without the project. The main reason why the calculated value was lower than that at the time of appraisal is that operation and maintenance costs increased substantially compared to the plan. As the current opportunity cost of capital[21] in China is 5.3%, lower than the above stated 6.9%, this project is considered profitable.

2) Huanghua Port Construction Project

When re-calculating FIRR for this project, assuming base year 2009 and a project life of 20 years[22], the result was minus, lower than the 8.27% calculated at the time of appraisal. Project construction costs, operation and maintenance costs and taxes were used to calculate the expenses. Income from port loading handling fees was used for the benefit calculation. The reasons why the result was lower than that of appraisal were that port fees for export were overestimated and unit price of loading handling was low.

(2) Economic Internal Rate of Return (EIRR)

The EIRR for the both Shuoxian - Huanghua Railway Construction Project and the Huanghua Port Construction Project was 34.4%[23]. The reason for this high rate was mainly that the construction cost of Shenmu - Shuoxian Railway was excluded as a sunk cost. Although EIRR was calculated as 15.8% at the time of appraisal, it is not appropriate to compare these two values as the benefit calculation method is different from that used at the appraisal. At the time of appraisal, costs included the project construction cost and the operation and maintenance cost. The benefit was calculated as the difference in cost and time-saving effect compared to the substitute plan to expand existing roads. However, at the time of ex-post evaluation, the value of increased coal production amounts with the project and the cost for addressing issues related to increased sulfur dioxide were used as the benefit. All of the coal produced in Shenfu Dongsheng coalfield is transported by railway, none by roads. In other words, the railway transportation capacity determines the coal production amount. Taking such special circumstances into consideration, it is more practical to use increases in coal production amounts for calculating benefits with the projects rather than the effect of reductions in running costs and transportation

[21] Capital opportunity cost used a base rate of short-term loan amended at the end of 2008.
[22] The project life was 25 years at the time of appraisal, but was corrected to 20 years at the time of ex-post evaluation.
[23] This value was calculated based on the assumption that the project life was 20 years.

time brought about by railway transportation. This calculation does not factor in the cost for addressing environmental impacts of increased production and coal incineration, namely increased carbon dioxide.

3.3.2 Qualitative Effects

3.3.2.1 Controlling environmental deterioration in the coal consumption areas

Environmental deterioration control as a result of the use of low-sulfur coal (Shenfu Dongsheng coal) had been pointed out as one of the qualitative effects of this project. In this evaluation, we couldn't obtain data regarding sulfur oxides[24], (SOx), nitrogen oxides[25] (NOx) or smoke emissions volumes so it was impossible to analyze the effects of the project. However, assuming that low-quality coal was substituted for high-quality coal with sulfur contents of 0.31 to 0.86%, this project theoretically succeeded in reducing sulfur oxide emissions. However, reduction of environmental burden depends largely not only on fuel conversion but also on measures for preventing environmental pollution such as energy-saving measures, installation of smoke elimination/ desulphurization/ denitrification equipment, etc. Shenhua Hebei Gouhua Candong Power Generation Company Limited, an affiliate of Shenhua Energy Company Limited, which we inspected in this survey, had installed adequate environmental protection facilities such as smoke elimination/desulphurization equipment, electrostatic precipitators, etc. Heat efficiency was as high as 43% and coal consumption per 1kw was 315g, which was lower than the national requirements of 349g. In other words, sufficient measures for preventing environmental pollution were being taken.

[24] SOx are oxidation products that can cause air pollution and acid rain. SOx are generated as a result of burning of fossil fuel such as petroleum and coal that have sulfur content.
[25] NOx is oxidation products that can cause photochemical smog and acid rain.

Fig. 11: Shenhua Hebei Gouhua Candong Power Generation Company Limited

Fig. 12: Smoke elimination/desulphurization equipment

Meanwhile, carbon dioxide emissions have steadily increased due to more coal incineration, which in turn is partly a result of increased coal production. It is said that about 2.4 tons of carbon dioxide are emitted as a result of the incineration of 1 ton of coal[26]. Assuming that about 90% of coal supplied through this project in China had been incinerated, we calculated that the resulting carbon dioxide emissions per year were about 322.79 million tons (2009 figures). In conclusion, while this project in some ways succeeded in reducing the burden on the environment, we cannot say with any certainty that environmental deterioration has in fact been prevented.

3.3.2.2 Development of local economies of communities in proximity to railroads

The acceleration of local economic development along railways was an expected qualitative effect. Shuoxian - Huanghua Railway runs through two provinces, Shanxi and Hebei, and through 20 cities and counties, and 22% of transported coal is consumed in the areas close to railways. We conducted a survey on the effects of this project on local economies. Two areas were selected from among cities along railways, namely Suning xian, Hebei province, the headquarters of the implementation body of this project, and Huanghua, Hebei province, where Huanghua port is located. In Suning Xian, Suning North station, one of the four biggest stations[27] along the railway, Wangzuo station, where the railway line crosses with Jingjiu

[26] Ministry of Environment (2008) http://www.env.go.jp/policy/chie-no-wa/download/0502/0502d-2.pdf

[27] Shenmu South station, Suning North station, Huanghua Port station and Shengang station are the four biggest stations along Shenshuo Line, Shuoxian-Huanghua Line and Huangwan line.

Railway, and Suning South station have been constructed. In Huanghua, Huanghua port station, which is also one of the four biggest stations along the railway and Huanghua South station, which connects with the Huangwan Railway, have been constructed.

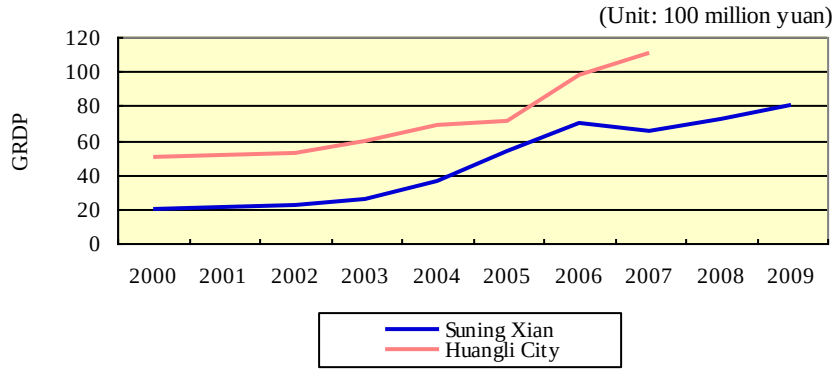

Figure 13 Gross Regional Domestic Products (GRDP) of Suning Xian and Huanghua City

Source: Hebei Economy Yearbook (2000 - 2007), Government of Suning Xian (2008 - 2009)

In Suning Xian, located in the westernmost area of Cangzhou city, Hebei province, 95% of the populations subsist on agriculture, making it one of the poorest counties with a Gross Regional Domestic Product (GRDP) of 920 million Yuan. Its economy has grown rapidly since 2003 when coal transportation started increasing substantially. In 2009, its agricultural population was 79% and its GRDP was 8 billion 20 million Yuan. Its average GDRP growth rate between 2003 and 2008 was 24%, which was higher than the average of 18% in Hebei province. Income per capita increased from 5,145 Yuan in 2001 to 15,496 Yuan in 2009 and income per farmer increased from 2,404 Yuan to 5,216 Yuan. According to the local government, new employment increased not only due to increased job opportunities resulting from establishment of the specific implementation body, but also thanks to coal-related business such as loading and unloading and the transportation business. For example, hundreds of tons of coal needed to be transported annually from Suning Xian to surrounding areas by truck. About 60% of the revenue of Suning Xian was tax paid by the implementation body in 2009. It is evident, therefore, that the project has positive effects on local economic development.

Huanghua city is located about 55km east of Cangzhou city, Hebei province and Huanghua port is located about 45km east of Huanghua city, on the coast of Bo Hai. In 2001, Huanghua city established the Port Hebei Development Area to develop the port area local economy. In the period after termination of Huanghua port construction (2003), the local economy showed signs of growth, though it didn't lead to substantial development. It would appear that all coal

transported on the Shuoxian - Huanghua Railway was transported out of Huanghua city except for that consumed by the thermal power plant situated close to the port. In 2004, a comprehensive Huanghua port area construction plan was initiated by Hebei province with the aim of local economic development. In addition, after the New Cangzhou - Bo Hai Zone[28] was established in 2007, the economy showed rapid growth. The comprehensive development of Huanghua port and the development of the chemical industry area were set into motion by this project (completed by that time). It was as if one big step toward local economic development had been made.

This project has largely achieved its objectives; therefore its effectiveness is high.

3.4 Impact

3.4.1 Intended Impacts (Resolution of coal supply shortages)

3.4.1.1 Increase in coal production at Shenfu Dongsheng coalfield

In 2009, the amount of coal production at Shenfu Dongsheng coalfield increased through implementation of this project to about thirty times the amount at the time of appraisal in 1995. It now accounts for 5.38%[29] of the total coal production in China, having increased substantially from 0.41%.

At the time of appraisal, there was only one route for transporting coal east from Shenfu Dongsheng coalfield: a route to Qinhuangdao Port via Datong and Baotou - Shenchi Line, which connected Shenmu and Baotou situated about 171km north of Shenmu. Since transportation capacity was limited to 10 million tons per year, the amount of coal production in Shenfu Dongsheng coalfield was also restricted. In order to steadily supply coal produced in Shenfu Dongsheng coalfield, which boasted about 230 billion tons of coal reserves, Shenmu - Shuoxian Railway Construction Project (financed by Japanese ODA loans) and the current project were implemented. As a result, the capabilities to transport coal to the northern coal shipping ports increased substantially. As shown in Figure 14, coal production in Shenfu Dongsheng coalfield spiked as a result of the following measures to increase transportation capacity: installing a double track in 2003 and 2004; expanding handling capacity at Huanghua

[28] The New Cangzhou-Bo Hai Area includes six xian-level administrative districts, Huanghua city located east of Cangzhou city,Hai Heng xian, Huanghua Port Development Zone, Liang Economic and Technological Development Zone, Nandagang Management Zone and Liang Chemical Industrial District. They are in the strategic route for transporting coal produced in the west to the eastern cities. They are aiming to become bases for heavy and chemical industry, manufacturing industry and electric power energy.

[29] China Energy Yearbook and Shenhua Energy Company Limited

port in 2004; opening of the Huangwan Railway (between Huanghua Port South and Tianjin) in 2006; completing construction of Tianjin Shenhua coal terminal berth with handling capacity of 45 million tons per year; and increasing the number of daily services. As there are also plans to increase transportation capacity of existing railways and ports, coal production is expected to reach 192 million tons in 2010.

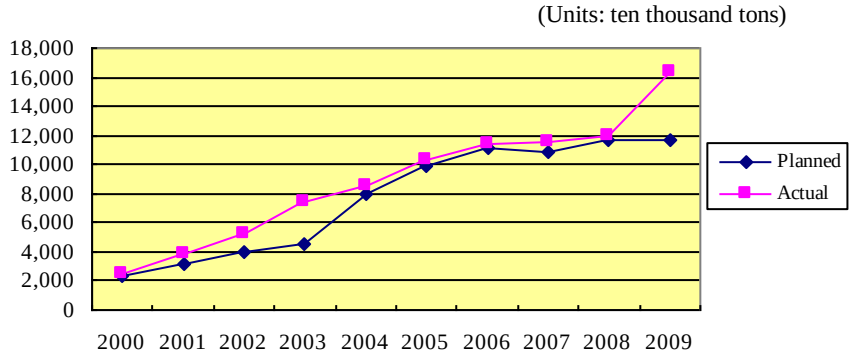

Figure 14 Coal Production Totals in Shenfu Dongsheng Coalfield

Source: Shenhua Energy Company Limited

3.4.1.2 Resolution of coal supply shortages in the eastern coastal areas

(1) Destinations of coal transported by Shuoxian - Huanghua Railway and consumption areas.

Coal transported by Shuoxian - Huanghua Railway is shipped from Huanghua Port, consumed in the areas adjoining the railway, transported to Beijing, Tianjin, Hebei province and Shandong province via national railway, the Beijing - Jiujiang Line (between Beijing and Jiujiang), or shipped from Tianjin Port via Huangwan Railway. As shown in Table 5 below, more than 50% of coal transported by Shuoxian - Huanghua Railway is shipped from Huanghua Port, and more than 90% of this amount is destined for domestic China.

Table 5 Destinations of coal transported by Shuoxian - Huanghua Railway and coal consumption areas

(Unit: ten thousand tons)

	2007		2008		2009	
Shipped from Huanghua Port	8,161	61%	7,803	58%	7,843	52%
Shipped from Tianjian Port	1,890	14%	2,324	17%	2,110	14%
Consumed at power plant adjoining railroad	609	5%	616	5%	1,043	7%
Consumed in proximity to railroad (excluding power plant)	1,012	8%	996	58%	2,266	15%
Transported by national railway (Beijing-Jiujiang Line)	1,647	12%	1,743	13%	1,682	11%
Total	13,318	100%	13,482	100%	14,944	100%

Source: Shenhua Energy Company Limited

(2) Destinations within China of coal shipped from Huanghua Port

The amount of coal shipped from Huanghua Port and its destinations in China are shown in Table 6. About 70% of the total amount is shipped to the eastern coastal areas, and the remaining 30% to South China. Main destinations are the Yangtze River Delta[30] and the Pearl River Delta[31], also known as the engines of China's economic growth. Total coal consumption in 2007 was 1 billion 15.44 million tons in the Yangtze River Delta and 512.29 million tons in the Pearl River Delta, out of which 4.6% and 3.6% were shipped from Huanghua Port, respectively.

Table 6 Amount of Coal Shipped domestically from Huanghua Port and Breakdown by Destination

(Unit: ten thousand tons)

	Destination	Coal transportation amount					
		2007		2008		2009	
Eastern area	Eastern area	341	5.0%	254	4.1%	182	2.5%
East China	East China	4,624	67.7%	4,384	71.5%	5,267	71.9%
South China	South China	1,861	27.3%	1,495	24.4%	1,878	25.6%
Total	Total	6,825	100%	6,133	100%	7,327	100%

Source: Shenhua Energy Company Limited
Note: East China includes Hubei province.

[30] Yangtze River Delta includes 16 cities: Shanghai, Nanjing, Zhenjiang, Yangzhou, Taizhou, Nantong, Jiang Yin, Changzhou, Wuxi, Suzhou, Jiaxing, Huzhou, Hangzhou, Shaozhou, Ningbo, and Zhoushan. The increase in handling capacities of new ports and harbors in Yangtze River Delta was of more than 700 million tons between 2004 and 2010.

[31] Pearl River Delta includes 9 cities: Guangzhou, Shenzhen, Zhuhai, Dongguan, Zhongshan, Jiangmen, Zhaoqing, Foshan, and Huizhou. The increase in handling capacities of new ports and harbors in the Pearl River Delta was of more than 400 million tons between 2004 and 2010.

Table 7 Amount of Consumption by area and Shenfu Dongsheng total coal consumption in 2007

(Unit: ten thousand tons)

	North China	Eastern area	East China	South China
Coal consumption totals	79,195	32,924	101,544	51,229
Shuoxian-Huanghua Railway	1,949	748	4,624	1,861
Share	2.5%	2.3%	4.6%	3.6%

Source: China Energy Statistics Yearbook, Shenhua Energy Company Limited
Note: The amount Shenfu Dongsheng coal consumed is the total amount of coal transported by Shuoxian - Huanghua Railway or from Huanghua Port.
Note: East China includes Hubei province.

(3) Changes in the amount of coal transported to major ports in the north

As already noted, this project has contributed to resolving coal supply shortages in the eastern coastal areas. Related to this is the positioning of Huanghua Port among major ports in the north.

Through the coal supply railway route from Sanxi Region to the eastern coastal areas, coal is transported to the 7 major northern coal shipping ports in the Bo – Hai - rim port and harbor area and in the Yangtze River Delta[32], then shipped via sea transport and river transport to high coal demand areas. In 2008, Qinhuangdao Port, which had an annual coal handling capacity of 250 million tons, shipped the largest amount of coal among the mentioned 7 ports, accounting for 44% of the total shipping amount, followed by Tianjin Port (20%), Huanghua Port (16%), TangShan Port (8%), Lianyugang Port (6%), Rizhao Port (4%) and Quingdao Port (3%).

[32] According to "Nation-wide Port and Harbor Development Project" by China's Ministry of Communication, ports and harbors on the coast all across China are classified into 5 groups according to their location: Bo Hai rim, Yangtze River Delta, Southeastern coast, Pearl River Delta and Southwestern coast. Bo Hai rim area ports and harbors include those in Liaoning (Dalian Port, Gangfeng Port, etc.), in Tianjin Hebei (Qinhuangdao Port, Tianjin Port, Huanghua Port and TangShan Port), and in Shandong province (Quingdao Port, Yantai Port and Rizhao Port). Lianyungang is considered part of the Yangtze River Delta area.

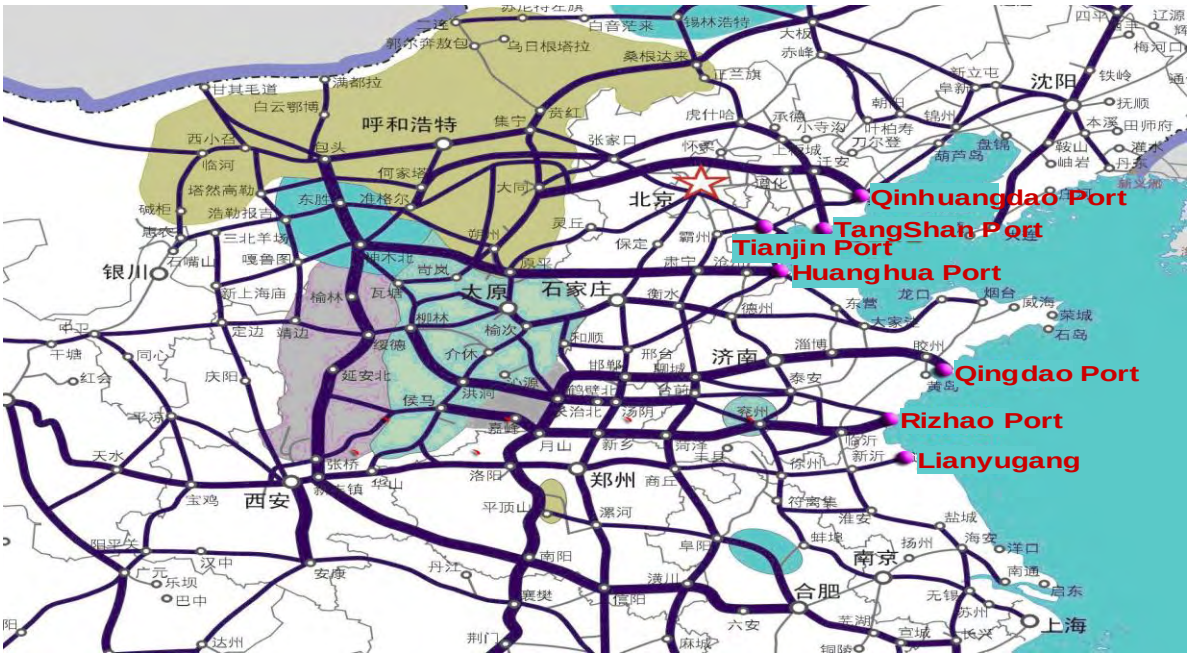

Figure 15: Seven Major Northern Coal Shipping Ports and the Medium- to Long-term Railway Coal Transportation Plan

Source: Based on the Medium- to Long-term Railway Coal Transportation System Plan issued by the State Council in 2008

The amount of coal shipment from each shipping port is as shown in Figure 16. Qinhuangdao Port, Tianjin Port and Huanghua Port, where construction for expansion of railways and berths dedicated for coal transportation/shipment is ongoing, observed remarkable increases. On the other hand, significant changes in transportation amounts weren't seen with Lianyugang Port and Quingdao Port, where there is no railway network dedicated for coal transportation or ongoing berth construction. Future growth is expected for TangShan Port. In 2008, a coal berth with annual handling capacity of 50 million tons was completed in Caofeidian Port area in TangShan Port. In addition, the National Development and Reform Commission has decided to construct the third railway (after Datong - Qinhuangdao Line and shenshuo/Shuoxian - Huanghua Line) dedicated to coal transportation with 2 hundred million tons/year capacity between Zhunge'er in Inner Mongolia Autonomous Region and TangShan Port There are several factors that could help increase the shipping out of Huanghua Port: (1) there is a plan to increase the transportation capacity of Shuoxian - Huanghua Railway to 350 million tons per year and the shipping capacity of Huanghua Port to 130 million tons per year; (2) it is very competitive in terms of transportation costs[33]; (3) construction of Kantan - Huanghua Port

[33] Transportation cost per one ton of coal from Shenfu Dongsheng coalfield to the coal shipping port is 80 Yuan cheaper than that to Qinhuangdao Port by way of Baotou-Shenchi Line and Datong-Qinhuangdao Line and that to Qinhuangdao Port by way of Shenchi-Shuoxian Line and Datong Line, and 40 Yuan cheaper than that to Tianjin Port

Railway, which connects Kantan, Hebei province and Huanghua Port, with designed annual capacity of 40 million tons, is scheduled to start in 2010; and finally (4) there is a plan to construct Huanghua - Dajiawa Railway connecting Huanghua Port South and Dajiawa, Shandong province with designed annual capacity of 50 million tons. Since competition among top ports is expected in the future, it is desirable to establish a collaborative framework ensuring the stable supply of coal in greater China.

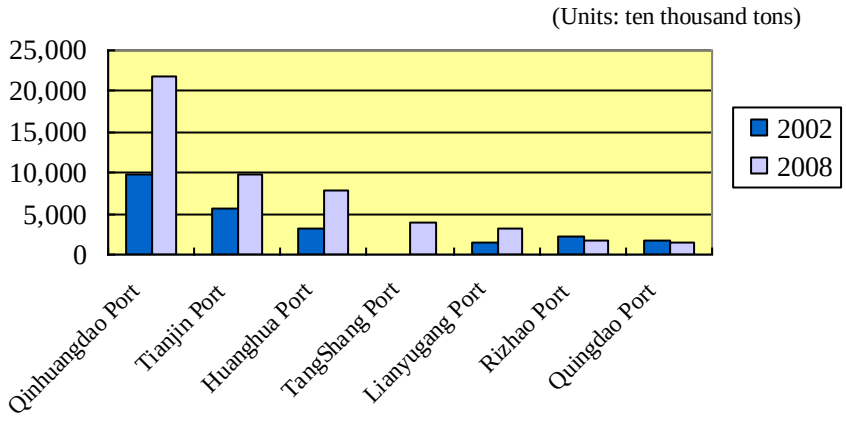

Figure 17 Coal Handling Volumes of the Major Northern Coal Shipping Ports

Source: China Ports Yearbook, 2009
Note: TangShan Port data is not available for 2002.

3.4.1.4 Increase in the Amount of Thermal Power Generation (Increase in Power Generation - Related Coal Consumption)

Behind coal consumption surges resulting from coal transportation capabilities expansion, there is an active demand for electric power reflecting fundamental economic growth and improvements in the standard of living. As shown in Figure 17, coal consumption for power generation, which currently accounts for about 50% of total coal consumption, tripled from 444.4 million tons in 1995 to 1 billion 305.49 tons in 2007. In 2005, new thermal power generation facilities with a total capacity of about 70 million kW were constructed across China[34].

In East China and South China, which are main supply destinations of this project, 91.5% and 67.3%, respectively, of total power generation was generated by coal-fired generators in 2009. The amount of thermal power generation in these two areas more than tripled from 266.7 billion

by way of Shuoxian-Huanghua Line, Suning North, Wangzuo and Jinba.

[34] P.110 of Beijing Zhongyan Zongheng Economic Information Center "Report of coal transportation in China from 2010 to 2013", 2010

kWh and 158.3 billion kWh in 1995 to 1019.3 billion kWh and 553.6 billion kWh in 2008, respectively[35]. More than 90% of coal transported through this project is consumed at thermal power generation plants. It can be said that resolution of coal supply shortages through transportation capabilities expansion has led to increases in thermal power generation.

(Unit: thousand tons)

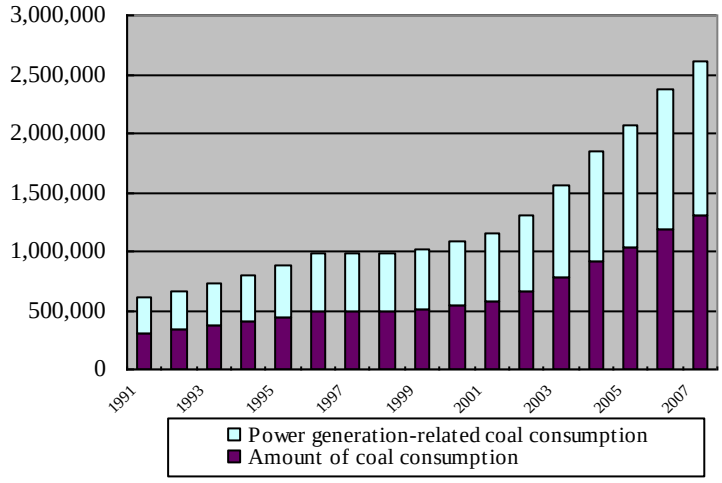

Figure 17 Coal Consumption Amounts and Power Generation-Related Coal Consumption

Source: China Energy Statistics Yearbook (1991 - 1999), China Statistics Yearbook (2000 - 2004)

3.4.2 Other Impacts

3.4.2.1 Impact on Environment in the Areas surrounding the Project Site

In the Shuoxian - Huanghua Railway Construction Project, environmental mitigation measures were taken by installing dust precipitators and desulfurization equipment in large stations, acceptance/repair facilities and a sound insulating wall along the railway. After the project was completed, the executing agency, the specific implementation body and stations have been engaged in environmental monitoring. According to monitoring by Shouxian Huanghua Railway Development Company Limited, the specific implementation body of this project, main indicators have been within the national emission standards and that it has not had significant negative environmental impacts.

Main environmental mitigation measures taken under the Shuoxian - Huanghua Railway Construction Project are prevention of coal dust litter and treatment of water leachate in the coal storage yard. They have installed dust precipitators and dustproof covers on coal transportation

[35] China Energy Yearbook

equipment such as car dumpers and belt conveyers. They have also installed a wind-shielding fence in the coal storage yard to prevent coal dust litter and they sprinkle water twice a day. Water that leaches in the coal storage yard is discharged into the sea after effluent treatment. In the monitoring process, the environment department of the specific implementation body inspects treated water once a day and checks soot and dust once a month, and the Environmental Protection Agency of Cangzhou city that oversees this project monitors discharged water, sea water, soot and dust, ballast water of ships and boiler exhaust gas once a year. They have purchased noise measurement equipment in February 2010 for future monitoring. According to the 2009 monitoring results, this project had no significant adverse effects on the environment.

3.4.2.2 Land Acquisition and Resettlement

In the context of the Shuoxian - Huanghua Railway Construction Project, 2732-ha of land was acquired for Shanxi province and Hebei province. The site acquisition cost was 409.92 million Yuan. We couldn't obtain detailed information about resettlement of residents, such as the number of relocation cases and whether there was a resident resettlement plan or not. According to the specific implementation body, resettlement of residents was relatively successful. A land management department of each local government carried out a land examination and residents took on resettlement operations by themselves. The total amount of compensation granted to residents was 128 million Yuan.

Under the Huanghua Port Construction Project, 333-ha of land was acquired. The site acquisition cost was 20 million Yuan and the compensation granted to fishermen totaled 40 million Yuan. No resettlement of residents has occurred.

This project has contributed to the economic development of East China and South China through expansion of coal transportation and shipment capabilities as well as coal and electric power supply. The number of beneficiaries of this project is estimated to be 65.39 million people[36].

[36] This figure was estimated based on the following data: the amount of coal consumption in China was 3 billion 50 million tons in 2009: population of China was 1 billion 334.74 million in 2009; and coal transportation totals under this project were 149.44 million tons in 2009.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

(1) Executing Agency

The executing agency at the time of appraisal was Huaneng Fine Coal Company, a subsidiary organization of China Huaneng Group established in 1985[37]. Immediately after the appraisal, in October 1995, it established, based on Chinese corporate law, the Shenhua Group Corp., a 100 percent nationally owned company, in order to modernize management procedures. At the same time, it withdrew from the China Huaneng Group and started serving as the executing agency body for this project. In December 2004, Shenhua Energy Company Limited (hereinafter Shenhua Energy Co.) was established with the aim of listing its stock[38]. Shenhua Energy Co, consisted of 57 branches and subsidiaries and the most profitable concerns, including coal, railway, port and harbor and electric power projects were transferred. With this, the executing agency changed its name from Shenhua Group Corp. to Shenhua Energy Co. (See Figure 18.) In 2008, Shenhua Group Corp. owned 73.86%, shareholders based in Hong Kong owned 17.09% and shareholders based in Shanghai owned 9.05% of shares of Shenhua Energy Co. The latter was the largest coal company in China and the second largest coal company in the world as of 2008 with 59,543 employees and total assets of 275 billion 540 million Yuan.

(2) Specific Implementation Body

Two subsidiaries of Shenhua Energy Co., Shouxian Huanghua Railway Development Company Limited (hereinafter Shouxian Huanghua Railway Co.) and Shenhua Huanghua Harbor Administration Company Limited (hereinafter Shenhua Harbor Administration Co.), are engaged in operation and maintenance as the implementation bodies of each sub project. Shenhua Energy Co. has the right of control over both companies and they are operated based on independent management and independent account settlement principles and are responsible for their own profits and losses.

[37] State-owned company group that was established with approval of the State Council.

[38] Shenhua Energy Company Limited was listed on the stock exchanges in Hong Kong on May 18, 2005, and in Shanghai on October 9, 2007.

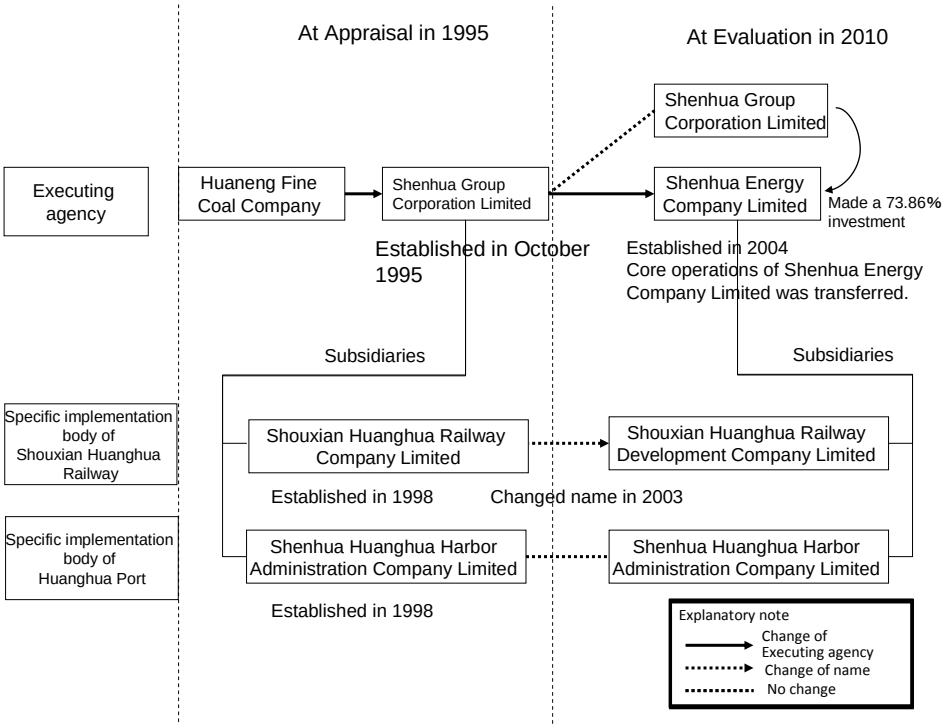

Figure 18 Executing Agency and Specific Implementation Body of This Project

1) Shuoxian - Huanghua Railway Construction Project

Shouxian Huanghua Railway Company Limited was established in February 1998 to operate, maintain and manage this project. Its name was changed to Shouxian Huanghua Railway Development Company Limited in April 2003. Shenhua Energy Co. owned 52.72%, the Ministry of Railways owned 41.16%, and the government of Hebei province owned 6.12% of the company's shares in 2009. It consists of 9 departments, 2 offices, 2 centers, 3 branches, 1 subsidiary and 1 business center and has 4138 employees. The total number of personnel is 9750 including those in the companies to which it leases locomotive engines and freight cars. Of these 9750 people, 9278 are engaged in operation and maintenance. They are spread through one department and three branches, i.e. in the transportation department, Yuanping branch, Suning branch and Locomotive engines and freight cars branch. As transportation volume increases, they hire new personnel every year to ensure the necessary number of personnel for operation and maintenance.

Maintenance and management of tracks includes medium-scale repair, large-scale repair and regular maintenance. Medium- and large-scale repairs are conducted according to the service conditions. Regular maintenance is conducted every year for inbound lines and in- and outbound lines at technical stations where maintenance is conducted for locomotive engines and

freight cars; every other year for outbound lines; and once per three years for in- and outbound lines at other stations based on the manual. Spare parts such as rails, parts for railroad crossing and pads are being procured in flawless fashion based on the annual plan.

No major problems have been observed in the operation and maintenance management system.

2) Huanghua Port Construction Project

Shenhua Harbor Administration Co. was established in March 1998. Shenhua Energy Co. owned 70%, and the government of Hebei province owned 30% of its shares in 2009. Shenhua Energy Co. has a high shareholding ratio and has authority over management and personnel issues as it makes decisions on unit prices for handling loading and unloading, which is its main source of income, as well as on labor costs. Shenhua Harbor Administration Co. consists of 15 departments, 1 room and 3 centers and has 653 employees. The maintenance management department has 425 staff members in total: 36 in the facility department, 178 in the loading department, 176 in the unloading department, 22 in the ship control center and 13 in the production service team of the logistics center. The facility department plays a central role: they conduct maintenance of and manage berths and loading and unloading facilities according to the manual. Large-scale repair is outsourced. Regular weekly and monthly inspections are conducted on days when they won't significantly impact the amount of railway transportation. They have introduced the EAM (Enterprise Asset Management) system for parts procurement to enable appropriate procurement and prevention of failures. It is safe to say that they have an adequate maintenance management system.

Huanghua Port is situated in an alluvial plain and the sea bottom is covered with sludge. In addition, there is often strong wind there. As a result, earth and sand tend to flow into the Port and sea roads are easily buried. Appropriate maintenance and dredging up of external sea roads are required to ensure safety and smooth operation of ships. While maintenance and dredging up are conducted without problems at present, it has been pointed out that the maintenance and operation cost is expensive. Efforts to prevent burying of sea roads and reduce the maintenance and operation costs are a priority for the future.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Shuoxian - Huanghua Railway Construction Project

Technical personnel are classified into high-level personnel (0.42%), high-ranking personnel (16.9%), medium-level personnel (34%) and entry-level personnel (48.7%) according to the job grade. Furthermore, they are classified into engineer (1.3%), high-ranking worker (20.5%), medium-level worker (44.5%) and entry-level worker (33.7%) according to their proficiency rating. Personnel classified into equal to or higher than high-ranking personnel or high-ranking worker account for about 20%. With regard to personnel training, headquarters, branches and work teams and dispatched specialists conduct in-company training based on a plan-do-check cycle every year. They focus especially on training locomotive crews, and trainees are required to pass the national examination after coursework entailing classroom lectures, OJT and simulated operation training. A human resources bank including visiting lecturers is established within the company and trainers are dispatched from it. Not only trainees but also trainers and contents of trainings are subject to evaluation. This system provides a framework for constant improvement of the entire training program. In light of the above, the skill level of personnel is high and the training system is well organized. No major technical problems have been observed.

(2) Huanghua Port Construction Project

Personnel who have 10-years or more of experience in port and harbor operations account for 5.18% of the entire staff. When classifying personnel in the maintenance management department according to the in-company standards for technical levels, high-level personnel, medium level personnel and entry-level personnel account for 1.17%, 14.59% and 84.24%, respectively. Entry-level personnel make up the vast majority. While no special problem has occurred, they are in the process of enhancing in-company training and external training as they recognize the need for high level personnel.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Shuoxian - Huanghua Railway Construction Project

The capital-to-asset ratio of Shouxian Huanghua Railway Co. was 58%, 49%, and 62% in 2006, 2007 and 2008, respectively and it has secured middle- and long-term stability. While its long-term repayment capacity is low – current ratio was 31%, 16% and 35%, respectively -- most of the current assets are negotiable and most trade is conducted among subsidiaries of Shenhua Energy Co. Therefore, it can be said that safety is assured. Annual operating revenues were 7 billion 575.01 million Yuan in 2006, 7 billion 960.1 million Yuan in 2007 and 8 billion

220.16 million Yuan in 2008, which shows a pattern of steady increase. Annual net income was 2 billion 699.29 million Yuan in 2006, 3 billion 384.96 million Yuan in 2007 and 3 billion 624.1 million Yuan in 2008. Although there was a slight decrease in 2008, profitability was high as ratio of gross profit to sales was 67% and net income to net sales was 37%. Cash flow was also positive. Therefore, the sustainability of the project is high.

Table 8 Financial Index of Shouxian Huanghua Railway Co.

	2006	2007	2008
Return on capital(%)	15%	18%	16%
Gross profit to sales ratio(%)	61%	70%	67%
Net income to net sales ratio(%)	36%	43%	37%
Total assets turnover(times)	0.41	0.43	0.44
Current ratio(%)	31%	16%	35%
Capital-to-assets ratio(%)	58%	49%	62%
Cash flow(Yuan)	340,950,883	387,259,020	413,052,123

Source: Shouxian Huanghua Railway Development Company Limited

(2) Huanghua Port Construction Project

While the capital-to-asset ratio of Shenhua Harbor Administration Co. had been around 20% from 2003 to 2007, it increased to 50% in 2008 after large-scale capital infusion by Shenhua Energy Co. and Hebei province. As a result, the fixed ratio dropped from 300% ~ 500% in and before 2008 to 166% in 2009. Its investment in fixed assets is too high compared to its sales, and such assets with long-term restriction of expenses have become a burden. The current ratio is 48% and inventory assets, make up a large percentage of current assets. The short-term paying capacity is low. However, since Shenhua Harbor Administration Co., like Shouxian Huanghua Railway Co., is a subsidiary of Shenhua Energy Co., a certain degree of stability is ensured.

Table 9 Financial Index of Shenhua Harbor Administration Co.

	2003	2004	2005	2006	2007	2008	2009
Return on capital(%)	-5%	-2%	4%	2%	2%	0%	1%
Gross profit to sales ratio(%)	-12%	9%	36%	33%	37%	38%	35%
Net income to net sales ratio(%)	-47%	-15%	21%	9%	9%	0%	5%
Total assets turnover(times)	11	13	20	21	22	21	22
Current ratio(%)	43%	26%	10%	16%	15%	48%	48%
Capital-to-assets ratio(%)	23%	16%	20%	22%	24%	47%	50%
Cash flow(Yuan)	N/A	72,048,795	-9,890,526	75,335,613	-126,771,131	13,939,386	N/A

Source: Shenhua Huanghua Harbor Administration Company Limited

Although the amount of coal shipment was as planned, operating income and net income had both been negative until 2004. This is mainly because maintenance and management costs of dredging to ensure sufficient depth of external sea roads was extremely high and the unit price for handling loading and unloading was so low compared to other ports even though it was the company's main source of income. After the amount of coal shipment had increased by 50% with construction of a new berth in 2004, operating revenue reached 1 billion 487.69 million Yuan, a 59% increase year-on-year, and operating income reached 178.42 million Yuan in 2005. They increased non-operating income by selling aging belt conveyers and through other measures and managed to eliminate accumulated deficits in 2009. Thanks partly to a shareholders decision to increase the unit price for handling loading and unloading from 18 Yuan/ton to 21.6 Yuan/ton, a current profit of about 410 million Yuan is expected in the first half of fiscal year 2010, which shows a trend toward improvement in profitability. Although the financial situation is somewhat tough, it can be said that there are no major problems with sustainability, because an increase in operating revenue is expected with expansion of the amount of shipment. Financial support from Shenhua Energy Co. is also expected in the medium- and long-term.

Table 10 Operating Revenue and Unappropriated Retained Net Earnings for the Period of Huanghua Harbor Administration Company Limited

(Unit: thousand yuan)

	Operating revenue	Operating income	Unappropriated net income at end of term
2003	651,513	-255,749	-524,590
2004	938,597	-140,315	-664,928
2005	1,487,686	178,421	-358,810
2006	1,528,514	62,629	-218,186
2007	1,599,332	105,986	-70,685
2008	1,516,121	26,047	-72,382
2009	1,607,623	126,777	7,298

Source: Shenhua Huanghua Harbor Administration Company Limited

Operating revenue of Shenhua Energy Co., a parent company of Shenhua Harbor Administration Co., was 65 billion 186 million Yuan in 2006, 82 billion 107 million Yuan in 2007 and 107 billion 133 million Yuan in 2008, and unappropriated net income at end of term was 16 billion 843 million Yuan, 19 billion 867 million Yuan and 26 billion 641 million Yuan, respectively. In 2008, the Company had 275 billion 540 million Yuan of capital and the capital-to-asset ratio was 62%. Shenhua Energy Co. is one of the best companies in China.

Considering the above from an overall perspective, sustainability of the project is high in terms of financial aspects.

3.5.4 Current Status of Operation and Maintenance

This evaluation confirmed that facilities have been maintained and managed appropriately under both of the Shuoxian - Huanghua Railway Construction Project and the Huanghua Port Construction Project. The executing agency and the specific implementation body have not pointed out any problems with operation and maintenance management, either.

No major problems have been observed in the operation and maintenance system in structural, technical, and financial aspects; therefore sustainability of the project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project is a nationally significant project that was implemented in order to establish a steady coal supply system in China in the 20th and 21st centuries. Shuoxian - Huanghua Railway and Huanghua Port started operations without delay as major players in the Sanxi Region - eastern coastal areas transportation infrastructure. Thanks partly to the self-funded expansion construction, the amount of coal transportation exceeded the plan substantially and Shuoxian - Huanghua Railway and Huanghua Port today play important roles in the national economy and national energy security. Shenhua Energy Co, which is the executing agency of this project, is the largest coal company in China. The Company is expected to ensure an appropriate operation and maintenance system through its subsidiaries, Shenhua Harbor Administration Co. and Shouxian Huanghua Railway Co.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Huanghua Port has some geological and geomorphological problems: the sea bottom of the Port is covered with sludge and there is often strong wind there. As a result, sea roads are easily buried. To ensure safety and smooth operation of ships in the Port, dredging up of sea roads is required, but the maintenance costs are very high. While no major problems have been observed

in operation and maintenance so far, it is advisable to adequately finance the maintenance cost for dredging while reducing the cost itself and to make efforts to further improve profitability.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Amid growing demand for coal transportation by railway and sea, this project was implemented as an integrated coal transportation infrastructure project that covered two different sectors, the railway and the port and harbor, and one which spanned a broad area from the Sanxi Region to the eastern coastal areas. As a result of effective supervision with close monitoring of the two projects that formed part of the larger project, great results were achieved without a significant difference in the timing of operation start between the two projects. As proved in this case, we can expect greater development effects by planning and supervising multiple projects with common objectives as one integrated Japanese ODA Loan project.

Concluded

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs (1) Shuoxian - Huanghua Railway	1) Subgrade/Civil engineering 7,316,740m^3 2) Bridges/Culvert 110.54km 3) Tunnel 67.66km 4) Track 599km Double track: Between Shenchi and Suning 440km Single track: Between Suning and Huanghua Port 159km 5) Building 881,600m^2 6) Communication/Electric facility 1428.51km 7) Cars 157 locomotive engines, 5616 freight cars, 122 passenger coaches	1) Subgrade/Civil engineering 6,752,00m^3 2) Bridges/Culvert 109.17km 3) Tunnel 66.34km 4) Track 585.421km Double track: Between Shenchi South and Suning North 419.7km Single track: Between Suning North and Huanghua Port 165.64km 5) Building 280,600 m^2 6) Communication/Electric facility As planned 7) Cars 41 locomotive engines, 3000 freight cars, 0 passenger coaches, 45 maintenance inspection cars, 17 command trains
(2) Huanghua Port	1) Coal berth 35,000 DWT class x 4 2) Extension of access bank About 3.5km, Width: 87m 3) Coal loading and unloading site and coal storage bed 329,800 m^2 4) Pier length 100m x width 23m 5) Breakwater total length 12580m 6) Dredging of sea roads length 24.8km (depth -9.4m x width 140m) 7) Dredging of anchorage area in port length 860m x width (210 - 310m) x depth -9.4m 8) Loading equipment 2 car dumpers, 2 stackers, 2 reclaimers, 3 ship loaders 9) Building Shed and control center, Utilities, Education/sanitary facility, etc.	1) Coal berth 35,000 DWT class x 1 50,000 DWT class x 2 2) Extension of access bank About 4 km, width: 140m 3) Coal loading and unloading site and coal storage bed 380,000m^2 4) Pier As planned 5) Breakwater total length 9214m 6) Dredging of sea roads length 35km (depth -11.5m x width 140m) 7) Dredging of anchorage area in port length 860m x width (210-310m) x depth -12m 8) Loading equipment 3 car dumpers, 4 stackers, 4 reclaimers, 1 stacker & reclaimer, 3 ship loaders 9) Building As planned
2. Project Period (1) Shuoxian - Huanghua Railway (2) Huanghua Port	November 1995 - December 2001 (74 months) September 1997 - December 2003 (76 months)	November 1995 - December 2001 (74 months) September 1997 - January 2002 (53 months)
3. Project Cost (1) Shuoxian -		

Huanghua Railway		
Amount paid in Foreign currency	60,806 million yen	60,348 million yen
Amount paid in Local currency	(In local currency:16,148 million Yuan) 188,932 million yen	(In local currency:12,695 million Yuan) 175,102 million yen
Total	249,738 million yen	235,449 million yen
Japanese ODA loan portion	72,001 million yen[40]	60,348 million yen
Exchange rate[39]	1 Yuan=11.7yen (As of October 1995)	1Yuan=13.793yen (Average between 1995 and 2001 and between 2003 and 2004)
(2) Huanghua Port		
Foreign currency	15,400 million yen	4,853 million yen
Local currency	(In local currency: 3,781 million Yuan) 51,422 million yen	(In local currency: 4,363 million Yuan) 63,472 million yen
Total	66,822 million yen	68,325 million yen
Japanese ODA loan portion	15,400 million yen	4,853 million yen
Exchange rate	1Yuan=13.6yen (As of February 1997)	1Yuan=14.548yen (Average between 1997 and 2003)

[39] In both projects, Japanese ODA Loan portion was only amount paid in foreign currency and all were paid out in yen. To convert amount paid in local currency to yen, we used the average of annual average exchange rates for the years when there was spending in local currency.

[40] In this project, amount paid in foreign currency was fully covered by Japanese ODA loan. Therefore, figures listed as amount paid in foreign currency and Japanese ODA loan portion on this table should be the same. However, since this project was divided into 4 contracts (L/A) and each loan was screened separately, the original amount paid in foreign currency and actual amount are different. For credit commitment amount of each contract, please refer to a table on pages 2 and 3.