China

Guiyang-Loudi Railway Construction Project (1)(2) (CXVIII-P74, CXIX-P74)

External Evaluator: Mitsue Mishima (OPMAC)

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1. Project Profile and Japan's ODA Loan

Project site location map (Guiyang, Guizhou Province- Loudi, Hunan Province)

Huihua Station (the track on which the freight train is passing is covered by the project)

1.1 Background

In China, passenger and freight transportation largely depends on railways. With the increase in transportation demands, the load on the whole railway system increased to exceed the capacity. Transportation restrictions were imposed on the railway sections whose transportation capacity is insufficient. On trunk lines in the southwestern region including Guizhou, in particular, transportation in all directions—northbound, southbound, and eastbound transportation—was restricted.

The single-track railway between Guiyang in Guizhou Province and Loudi in Hunan Province was mainly used for transporting coal and phosphate ore from Guizhou Province and phosphate ore from Loudi Province, transporting 11.38 million tons of freight per year exceeding the capacity of 8.2 million tons/year (as of 1996). Moreover, as the demand-supply situation of coal produced in Sanxhi region (Shanxi, Shaanxi, and Western Mongolia), which accounted for a large part of the coal produced in China, was getting tighter, the demand for coal produced in Guizhou Province was expected to increase, and the freight traffic volume was predicted to reach 22.1 million tons in 2002 (the freight traffic volume of Japan Railway Freight in 2003 was approximately 37.88 million tons). In order to meet such an increase in the demand for transportation, it was necessary to expand the capacity of this line through electrification and double-tracking of the Guiyang - Loudi section. Also, the line connecting with the Jingguan Line via the Loudi - Zhu Zhou section, which was in the process of being electrified and double–tracked, was expected to play an extremely important role in facilitating freight transportation of mainly coal to Eastern and Southern China, thereby

accelerating economic development in the inland regions.

Under these circumstances, the Ninth 5-Year Plan (1996-2000) set out a plan to improve the inland traffic network by, among other things, removing transportation restrictions in the southwestern region, indicating that particular importance was attached to the improvement of railway transportation.

1.2 Objective

The project's objective was to electrify and double-track the existing railway between Guiyang in Guizhou Province and Loudi in Hunan Province for the purpose of relieving the tight demand-supply situation in transportation and increasing transportation of products, such as coal and phosphate ore produced in Guizhou Province and Yunnan Province, and passengers to Southwestern, Central, Eastern, and Southern China, thereby helping accelerate economic growth in the inland regions.

1.3 Borrower/Executing Agency

Government of the People's Republic of China/Guangzhou Railway Group Corporation and Chengdu Railway Bureau of the Ministry of Railways

1.4 Outline of Loan Agreement

	Guiyang-Loudi Railway Construction Project (1) CXVII-P74	Guiyang-Loudi Railway Construction Project (2) CXIX-P74
Loan Amount / Loan Disbursed Amount	12,932 million yen/ 7,916 million yen	17,028 million yen/ 7,764 million yen
Exchange of Notes / Loan Agreement	December 1996/ December 1996	September 1997/ September 1997
Terms and Conditions - Interest Rate - Repayment Period (Grace Period) - Procurement	 2.3% 30 years (10 years) General untied	 2.3% 30 years (10 years) General untied
Final Disbursement Date	January 2003	April 2003
Contractors	MATISA MATERIEL INDUSTRIEL SA (Switzerland), YARDWAY LTD. (Hong Kong), CHINA NATIONAL HEAVY MACHINERY CORP (China), etc.	

Consultant	—
Feasibility Study (F/S), etc.	1996 Chinese Government

2. Results and Evaluation

2.1 Relevance

The current Tenth 5-Year Plan (2001-2005) of China set a target of expanding the north-south and east-west railway networks.

Transporting coal and phosphate ore produced in Guizhou Province and Yunnan Province to Southwestern and Central China under this project is important for the promotion of economic development in the inland regions. Also, the railway section covered by this project is a part of Shanghai-Kunming Railway, an east-west trunk line, and meets the demand for east-west transportation along with the Loudi-Zhu Zhou section and the Guiyang-Lupanshui section (see the location map in "2.2.1 Output") that were double-tracked and electrified in 2002. Thus, great importance is attached to this project even today. Railway electrification and double-tracking under this project meets the demand of the region and remains of great importance.

2.2 Efficiency

2.2.1 Output

In this project, railway double-tracking and electrification of the Guiyang-Loudi section covering a total length of 807km (double-tracking of the existing electrified single-track railway between Guiding and Huaihua and electrification and double-tracking of the existing non-electrified railway between Huaihua and Loudi), strengthening of track infrastructure of the existing railway, station expansion, etc. were carried out. As shown in Figure 1, the target railway section makes a part of the east-west railway between Shanghai and Kunming as already mentioned and also is connected to the north-south Chuanqian Line (Guiyang-Chongqing), Qiangui Line (Guiding-Guilin) and Jiaoliu Line (Jiazuo-Huaihua-Liuzhou).

Table 1: Comparison of the Plan and the Result of the Project

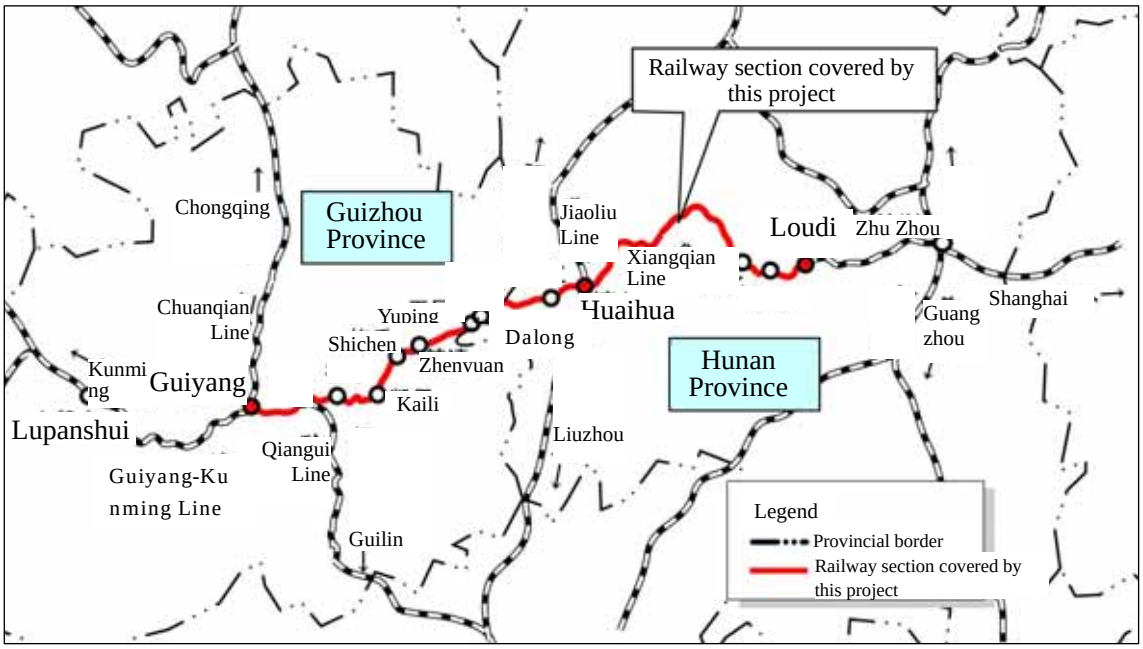
	plan	Result	Variance between Plan and Result
1. Double-tracking of existing electrified and unelectrified sections (Guiding-Huaihua, Huaihua-Loudi, KM)	591	595	+4
2. Electrification of existing unelectrified single-track section (Huaihua-Loudi, KM)	323	323	0
3. Station Expansion (number of stations)	85	68	-17
4. Bridge (number)	342	311	-31
(KM)	48	38	-11
5. Tunnel (number)	293	203	-90
(KM)	138	94	-43
6. Culvert (number)	2,521	1,471	-1,050
(KM)	31	20	-12
7. Substation (number)	23	20	-3

There may be discrepancies between the planned and actual figures and their variance due to rounding off.

As shown in Table 1, double-tracking and electrification were implemented as planned. Although there are substantial differences between the

plan and the actual output concerning some structures such as stations, bridges, etc. because the basic design was established after appraisal, the initially planned achievements have been made.

Figure 1: Location of the Target Railway Section (Guiyang-Loudi, Xiangqian Line)



2.2.2 Project Period

The project implementation period was 61 months from December 1996 (signing of the loan agreement) to December 2001 against the planned 73 months from December 1996 (signing of the loan agreement) to December 2002, and the project target section opened to service one year earlier than initially planned. This seems to be a result of strict schedule management and the effort to implement works on different parts of the whole section simultaneously.

2.2.3 Project Cost

The project cost was 220,959 million yen, 10.2% over the planned 200,562 million yen. The foreign currency portion (the portion covered by ODA Loan) was reduced from the planned 29,960 million yen to 15,696 million yen due to the reduction in the output and efficient contracting through international competitive bidding. The local currency portion increased because the actual prices were far higher than the prices used as the basis for estimation of the project cost at appraisal due to the shift from control prices to market prices.

The overall evaluation of efficiency is mostly good because, although the output and the project cost were appropriate, there was an increase in the project cost.

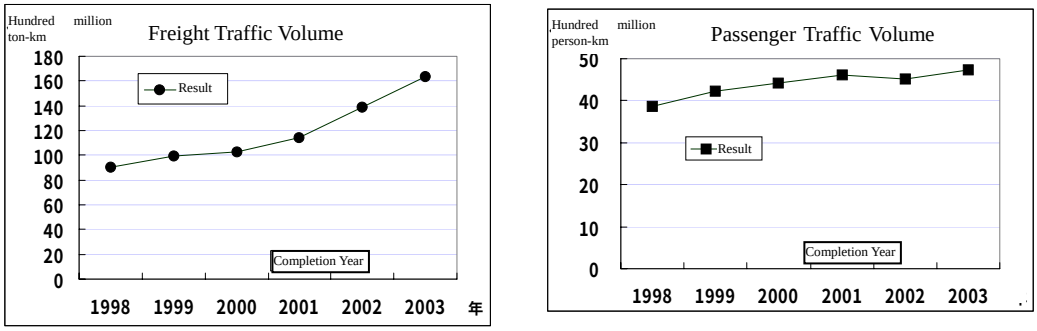
2.3 Effectiveness

2.3.1 Increase in Guiyang - Loudi Traffic Volume

As shown in Figure 2, the traffic volume increased steadily after the completion of the project to achieve a freight traffic volume of 16.35 billion ton-km[1] and a passenger traffic volume of 4.74 billion person-km[2] in 2003 (the freight traffic volume in Japan in 2003 was 22.8 billion ton-km and the passenger traffic volume was 385 billion person-km). This effect was generated earlier than expected because the project progressed faster than planned in response to the extremely high demand for transportation on the railway line covered by this project as well as the double-tracking of other sections connected to this line being completed as scheduled. According to the Ministry of Railways (MOR), each section of the project target line opened for service one after another as they were completed, and therefore the increase in traffic volume as an effect of this project began around 1999.

The average number of train services increased to 64/day (actual result for 2002), marking a 60% increase from 36/day in 1998 before project completion. The traveling time as of 2002 was 9 hours 47 minutes (rapid train), nearly 2 hours shorter than that in 1998, 11 hours 35 minutes. Although a reduction in the traveling time was realized by the nation-wide railway speed-up policy that has been promoted by the Ministry of Railways since 1997 (reducing the number of stations stopped at by trains, renewing train cars, etc.), this project also contributed to the reduction.

Figure 2: Changes in Traffic Volume Between Guiyang-Loudi



Source: Guiyang Branch of Chengdu Railway Bureau and Guangzhou Railway Group Corporation of MOR

Table 1: Planned and Actual Traffic Volume

Item		1994	2001	2003
Passenger (ten thousand persons)	Plan	—	640 (2000)	798 (2005)
	Result	494	633	687
Freight (ten thousand tons)	Plan	—	2,210 (2000)	2,710 (2005)
	Result	1,138	2,148	2,602

Source: Guangzhou Railway Group Corporation of MOR
Note: data for Huaihua-Loudi where the transportation demand is highest in the target line

1 Ton-km: tonnage of freight × kilometers transported

2 Passenger-km: number of passengers × kilometers transported

A comparison between the planned and actual traffic volume on the railway line covered by this project in Table 1 shows that the data for 2003 achieved 86% and 96% of the target for 2005 for passenger traffic volume and freight traffic volume, respectively. According to MOR, the number of passengers increased little in 2003 due to the influence of SARS. However, the number of passengers transported between January and September in 2004 was approximately 3 million more than that in the same period in the previous year. There still seems to be a strong demand for transportation.

2.3.2 Internal Rate of Return

Calculation of the Financial Internal Rate of Return (FIRR) taking into account the following elements resulted in 6.1% at the time of appraisal whereas the calculation based on the actual data of the same elements resulted in a negative value. One of the reasons is that at present freight charges are kept at a low level (estimated income per unit freight traffic: 0.15 yuan/ton-km→actual result: 0.1 yuan/ton-km), and therefore the income is not enough to cover the investment and operating expenses.

In calculating the Economic Internal Rate of Return (EIRR), savings of the road construction cost, maintenance cost, and time were included in the benefits at appraisal, whereas more realistic indicators of benefits were used this time. As a result, EIRR was calculated at 10.9% based on the elements shown below. Traffic volume was increased not only for coal freight, which occupies 40-50% of the total freight traffic, but also for other types of freight such as fertilizer and phosphate ore. If all were included, the benefits would be even greater.

(Assumptions for the calculation of FIRR)
Benefits: freight charge income and passenger fare income
Costs: project cost, maintenance cost

(Assumptions for the calculation of EIRR)
Benefits: increase in coal production and passengers
Costs: project cost, maintenance cost

To sum up the above, the railway line covered by the project is not profitable because of the low freight charges and passenger fares. However, considering that the traffic volume increased soon after the completion of the project and a further increase in the demand for transportation is expected, this project was highly effective.

2.4 Impact

2.4.1 Acceleration of Economic Growth in the Inland Regions

According to Table 2, which shows freight traffic volume on the target line before and after the completion of the project, the main freight items are coal, chemical fertilizer (including those using phosphate ore) and agricultural chemicals, phosphate ore, and steel. The traffic volume increase rate was particularly high for coal, phosphate ore, and steel. In Guizhou Province, one of the largest production centers of coal and high quality phosphate ore, development was limited due to the transportation restriction. Double-tracking of the railway under this project enabled an increase in the transportation of coal, phosphate ore, etc., and thereby helped increase production, thus contributing to the development of state-owned large and medium scale coal and phosphate development companies and chemical industrial companies. Also, an increase in the transportation of steel led to a production increase at steel factories located along the railway in Hunan Province (see "Box" for details). After the completion of the project, Guizhou Province achieved a real GRDP growth rate of 8.8% in 2001, 9.1% in 2002, and 10.1% in 2003, and Hunan Province achieved a real GRDP growth rate of 9.0% in 2001, 9.0% in 2001 and 9.6% in 2003, all of which were higher than the national average (7.5% in 2001, 8.3% in 2002, 9.1% in 2003). This project seems to have accelerated economic growth in the inland regions.

Table 2: Freight Traffic Volume of Major Items on the Target Railway Section[1)]

Unit: ten thousand tons

Freight Type	2003	1998	Increase Rate
Coal	450	305	48%
Chemical Fertilizer	144	120	20%
Phosphate Ore	118	68	72%
Steel	112	35	220%
Nonmetal Ore	93	67	39%
Construction Ore	51	65	-22%
Cement	44	58	-25%
Timber	20	16	25%
Coke	5	8	-35%
Metal Ore	6	10	-46%
Others	98	46	114%
Total	1,140	798	43%

Source: total of the data by Guiyang Branch of Chengdu Railway Bureau and Guangzhou Railway Group Corporation.

1): Guiding-Loudi section which was double-tracked and electrified under the project

Also, in the Southeastern regions of Guizhou Province （Qiannan Buyizu Miaozu Autonomous Prefecture and Qiandongnan Miaozu Dongzu Autonomous Prefecture）along the railway, where there are many ethnic minority groups residing and sightseeing places with beautiful natural landscape（Wuyanghe River and Chishui Scenic Spot, etc.）, the number of tourists has increased. Behind this increase is the operation of additional rapid train services on Guiyang-Kaili and Guiyang-Yuping sections and irregular sightseeing trains on Guiyang-Shicheng and Guiyang-Zhenyuan sections on holidays, which was enabled by the increase in the transportation capacity as a result of double-tracking under this project. These regions were designated as priority tourism development zones in 2003 under the western development policy of the Government. As for Hunan Province, it is reported that tourists to the famous world natural heritage site Zhangjiajie located along the Jiaoliu Line connected to the railway line covered by the project at Huaihua Station has increased thanks to the increase in train services there via the project target line (including irregular and sightseeing trains) (according to the data provided by Zhangjiajie Station, the number of passengers to the station increased from 130,000 in 1999 to 170,000 during the

January-September period in 2004. Among them, 70-80 % are tourists). Thus, economic development through the development of tourism in regions along the railway was also promoted.

Beneficiaries of this project in terms of passengers are about 2.5 million persons (as of 2003). In terms of the population of the regions around the railway line covered by the project (Guiyangin City in Guizhou Province, Qiandongnan Miaozu Dongzu Autonomous Prefecture, Huaihua City and Loudi City in Hunan Province), the number of beneficiaries exceeds 16 million persons.

Box: Development of companies located along Guiyang-Loudi railway line

Along the railway line covered by this project, there are state-owned resource companies and companies producing products using resources generated by such company including Guizhou Hongu Industry & Commerce Development Co. Ltd.（note: a company developing phosphate ore and producing fertilizer, etc. using phosphorus. It owns the Wengfu Fertilizer Plant constructed with an ODA Loan） in the field of phosphate ore development. This project eliminated the transportation bottleneck for these companies.

Guizhou Hongu Industry & Commerce Development Co. Ltd. located in Fuquan County in Guizhou Province ships its products from Fuquan Station (see the photo) and Kaili Station. From 1998 to 2003, the volume of freight handled at these two stations increased by about 94%. Most of the freight handled at Fuquan Station is related to the company. In the interview, Guizhou Hongu Industry & Commerce Development Co. Ltd. said that the production of phosphate ore and fertilizer increased threefold and the sales income increased more than twofold in the past 3 years owing to the impact of the increase in transportation capacity realized by the double-tracking of railways. Some of its products such as phosphate ore and phosphatic fertilizer are exported (from Beihai and Zhangjiang Ports after being transported by railway) and sold in Japan and other Asian countries. With the development of the companies, employees have increased by about 1,400 in the past 3 years. If the transportation capacity had not been increased by this project, production would have been less than 50% of the current production due to the limited transportation capacity. (The above is the comment made by Finance Division in Guizhou Hongu Industry & Commerce Development Co. Ltd. in November 2004. See the photo of the transportation railway).

Freight Platform of Fuquan Station

Conveyor Railway in Wengfu

Also in the case of steel plants in Hunan Province, increase in transportation capacity contributed to the development of companies. At the Lianyuan Steel Plant, the amount of raw materials carried in and out using Loudi Station increased by approximately 68% and 58% respectively from 1998 to 2003, and thus achieved a production increase thanks to the increase in transportation capacity (based on the interview by Huai-hua Railway Parent Company.).

2.4.2 Changes in the living environment of the residents along the railway (including poverty reduction and environmental impact)

The railway line covered by the project runs through poverty areas in the inland regions that lack traffic facilities, and economic development is inhibited. According to MOR, development of the regional economy promoted by the increase in transportation capacity as a result of the project had a poverty reduction impact on the residents along the railway. In the examples of Xinhuang, Xinhua, and Zhijiang counties, which are known as poverty-stricken counties in Hunan Province, the route to sell the local products outside the counties was secured, and it became easier to work away from home. As a result, the residents' income has increased and the living standard of each household has improved[3], according to the report by Huai-hua Railway Parent Company.

In the aspect of environment, abolition of diesel locomotives following the electrification of the railway led to a reduction in air pollutants (dust, NOx, etc.). According to MOR, an environmental report is now being prepared. They say drainage measures and noise control measures are being

[3] According to the report by MOR, the average annual net income per farmer in Xinhua City is 1,276 yuan (about 20,000 yen), 20% more than that in 1998.

taken and the domestic environmental standards are satisfied.

Thus, the positive impact of this project was confirmed and is expected to continue for the future.

2.5 Sustainability

2.5.1 Executing Agency

2.5.1.1 Technical Capacity

The training program for employees of regional bureaus is budgeted and implemented in accordance with the unified standard within MOR. After the double-tracking and electrification of the railway line covered by the project, technical training and technical assessment of the persons in charge of operation and maintenance were conducted and continued efforts have been made to enhance their technical level. Therefore, there is no concern over the technical capacity.

2.5.1.2 Operation and Maintenance System

As described in Figure 2, the 377.4km section of the railway line between Guiyang and Dailong covered by the project is operated and maintained by the Guiyang Branch of Chengdu Railway Bureau, one of the regional bureaus of MOR (China National Railways), and the 429.2km section between Dailong and Loudi is operated and maintained by Huai-hua Railway Parent Company of Gungzhou Railway Group Corporation[4], a subsidiary of MOR. Employees of MOR perform all the operation and maintenance activities without outsourcing. According to MOR, MOR is now considering the way of reforming the entire structure and organization, but there is no plan of major change in the operation and maintenance system of the line covered by this project for a while. Under the overall policy of improving productivity, saving time and workforce, and saving space, they are proceeding with the closing down and integration of repair shops and introduction of mechanical equipment. In connection with this project, additional technical professionals were employed for each station and section with facility expansion and construction (about 300 additional employees were employed in an increase by less than 10%). Employees were increased where necessary and the number of employees is maintained at a relatively low level.

[4] Former Ghuangzhou Railway Bureau, one of regional bureaus of MOR. Incorporated as a state-owned company wholly invested by MOR in February 1993. Gungzhou Railway Group Corporation has 8 companies (equivalent to branches) for each railway under its control, one of which is Huai-hua Railway Parent Company.

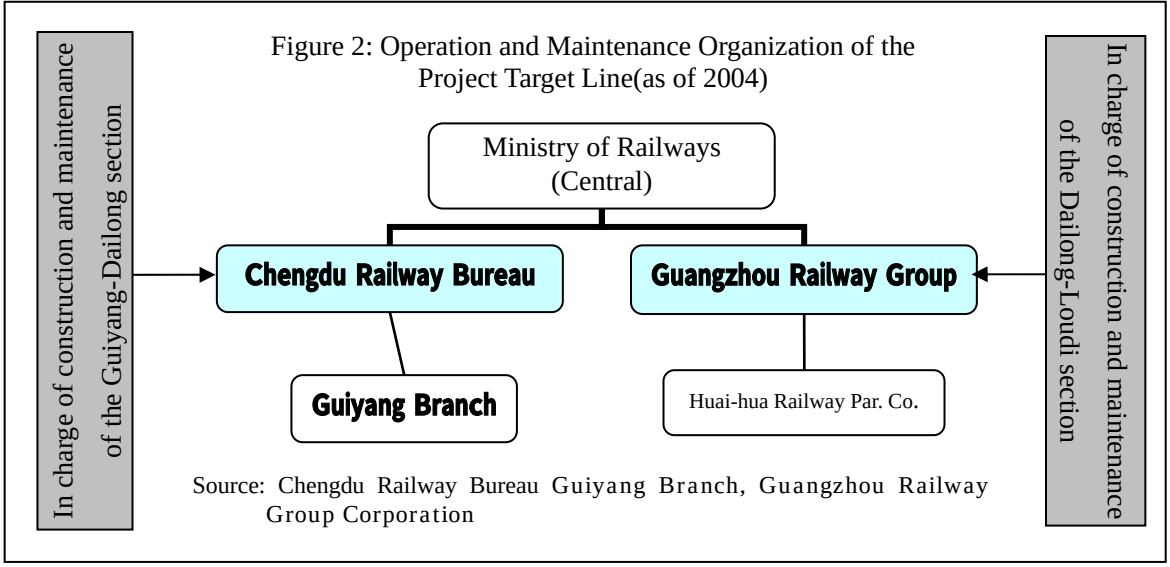


Figure 2: Operation and Maintenance Organization of the Project Target Line(as of 2004)

Source: Chengdu Railway Bureau Guiyang Branch, Guangzhou Railway Group Corporation

2.5.1.3 Financial Status

MOR prepares financial statements for each bureau, not each railway line. For this evaluation, analysis is made on the status of revenue and expenditure of Guiyang Branch and Huai-hua Railway Parent Company that operate and maintain the railway line covered by this project, although data on other railway lines are included. As for the financial status of Guiyang Branch shown in Table 3, income from the main business steadily increased from 2000 to 2003. As for revenue and expenditure of Huai-hua Railway Parent Company relating to the main business shown in Table 4, the traffic volume increased every year, whereas business income decreased from 2002 to 2003. Thus, expenses exceeded income, and the profit was a negative figure. According to the report by Huai-hua Railway Parent Company, there is no problem in securing the operation and maintenance budget under the present circumstances. Huai-hua Railway Parent Company is one of 8 subsidiaries of Gungzhou Railway Group Corporation that operate and maintain railway lines managed by the Group Corporation. It is difficult to judge the actual status by analyzing only the financial statements of Huai-hua Railway Parent Company.

Table 3: Major Items of Revenue and Expenditure of Guiyang Branch

(unit: ten thousand yuan)

Item	2001	2002	2003
(1)Income from main business	342,214	394,488	419,745
(2)Operating expenses	282,792	329,301	344,577
(3)Operating tax and other expenses	11,088	12,791	13,600
(4)Profit from main business	48,334	52,406	61,569
(5)Management expenses	28,266	29,415	32,639
(6)Financial expenses	5,252	3,928	4,072
(7)Operating profit	14,817	19,062	24,971
(8) Net Profit	2,243	3,366	11,002

Source: Guiyang Branch of Chengdu Railway Bureau, Ministry of Railways

Table 4: Major Items of Revenue and Expenditure of Huai-hua Railway Parent Company

(unit: ten thousand yuan)

Item	2001	2002	2003
(1)Income from main business	15,712	24,593	13,433
(2)Operating expenses	15,227	23,973	13,526
(4)Profit from main business	485	619	-92
(5)Management expenses	296	356	377
(6)Financial expenses	-17	148	138
(7)Operating profit	206	115	-607
(8) Net Profit	0	-313	-982

Source: Gungzhou Railway Group Corporation Huai-hua Railway Parent Company

2.5.2 Operation and Maintenance Status

Since the completion of the project, operation and maintenance activities have been performed smoothly without any breakdown or incident reported to date.

In summary, the operation and maintenance status is good, technical capacity and the organization are generally appropriate, and there is no serious problem with the financial status at

present. Therefore, there is almost no problem with sustainability in general.

3. Feedback

3.1 Lessons Learned

None

3.2 Recommendations

None

Comparison of Original and Actual Scope

Item	Plan (Phase II)	Actual
①Output		
1)Double-tracking of existing railway	1) 701 km	1) As planned
2)Electrification of existing railway	2) Huaihua-Loudi 323km	2) As planned
3)Station expansion	3) 85 stations	3) 68 stations
4)Bridges	4) 342 (48km)	4) 311 (38km)
5)Culvert	5) 2,521 (31km)	5) 1,471 (20km)
6)Tunnels	6) 293 (138km)	6) 203 (94km)
7)Substations	7) 23	7) 20
8)Others	8) Communication and signal equipment	8) As planned
②Project Period		
1)Land expropriation	Jun. 1996 – Dec. 1997	May 1998 – De. 2001
2)Preparatory work	Apr. 1996 – Dec. 1997	May 1998 – De. 1998
3)Roadbed base	Apr. 1996 – Dec. 2001	Jun. 1998 – Nov. 2001
4)Bridges and culverts	Apr. 1996 – Mar. 2001	Jun. 1998 – Dec. 2001
5)Tunnels	Apr. 1996 – Mar. 2001	Jun. 1998 – Dec. 2001
6)Tracks	Apr. 1996 – Jun. 2002	Dec. 1998 – Dec. 2001
7)Communication and signal	Oct. 1996 – Dec. 2002	Dec. 1998 – Jan. 2002
8)Electric power and electrification	Apr. 1996 – Dec. 2002	Oct. 1998 – Dec. 2001
9)Buildings, etc.	Oct. 1998 – Dec. 1998	Oct. 1998 – Apr. 2002
10)Completion of the whole line and start of operation	Dec. 2002	Dec. 2001
③Project Cost		
Foreign Currency	29,960million yen	15,696million yen
Local Currency	170,602million yen (12,544million yuan)	205,262million yen (14,334million yuan)
Total	200,562million yen	220,959million yen
ODA Loan Portion	29,960million yen	15,696million yen
Exchange Rate	1 yuan＝12.0 yen (for 1996) 1 yuan ＝13.6 yen (for 1997) (As of February 1996 and 1997)	1 yuan ＝14.3 yen (1998 – 2001 average rate)