People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

"Hunan Province Road Construction Project"

External Evaluator: Masahiro Oseko, OPMAC Corporation

0. Summary

The objectives of the project were to improve the accessibility to markets and facilitate the regional development, thereby contributing to rise of the quality of life and reduction of poverty in inland areas by newly constructing a highway and improving a local road in Hunan Province in China. The project was highly relevant with the Chinese development plans and regional needs for the improvement of access of local products to markets, and with the Japan's ODA policy which placed a high priority on the development of provincial road network expecting the economic development of inland poor areas. Therefore, its relevance is high. Regarding the objectives of the project i.e., improvement of accessibility to markets and stimulation of regional economy, the project has contributed to rise of the quality of life and reduction of poverty in inland areas through the increase of shipping volume of agricultural products and employment opportunities of road users by realizing the increase of traffic volume and decrease of travel time. Therefore, its effectiveness and impact is considered high. While the project cost was within the plan, the project period was slightly longer than planned. Therefore, efficiency of the project is considered fair. Operation and maintenance of the facilities and equipment developed by the project have been properly done, and no major problems have been observed in terms of institutional, technical and financial aspects of the operation and maintenance system, therefore sustainability of the project effects by the project is high.

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

1. Project Description

Project Location

Shaoyang-Huaihua Highway

1.1 Background

Although Hunan Province has been enjoying a stable economic growth in recent years, its per capita GDP in 2000 was still about 80% (5,639 yuan) of the national average (7,078 yuan). Mid-western part of the province had become a bottleneck for its overall economic growth due to insufficient development of transportation sector challenged by the harsh natural environment and financial constraints. Road improvements, in particular, remained at a low level with only 7% of total lengths of public roads classified as highway, class I and class II roads[1]. In response to this situation, in the "Hunan Province 10th Five-year Plan" and the "Hunan Province 10th Five-year Transportation Construction Plan," the Hunan Province authorities have placed a high priority on the construction of five provincial trunk roads along with the improvement of local roads expecting the reduction of poverty in deprived areas. The project was as one of the major construction projects of these provincial development plans.

Also, the project located in hilly and mountainous areas where the primary industry workers accounted for a large portion of about 80% of total population. While the secondary and tertiary industries such as cement manufacturing and building material processing formulated certain foundations in local economy, infrastructure development has been insufficient and a climate for investment was fragile, thus the level of income remained low. In this situation, the project was implemented to improve the accessibility to markets and facilitate the regional development, thereby contributing to rise of the quality of life and reduction of poverty in inland areas by constructing a highway and improving a local road in Hunan Province in China.

[1] In China, roads are categorized by technical and administrative classifications. According to the technical classification by the traffic volume and geographical conditions, roads are categorized as motorways (highway, class I and class II), local roads (class III and class IV) and unclassified roads. Highways and class I roads, for example, are regulated to have four lanes or more while local roads should have at least two lanes. As for the administrative responsibility, roads are classified as national, provincial, county, township and village roads.

Figure 1: Location of the Project Site[2]

1.2 Project Outline

The objectives of the project were to improve the accessibility to markets and facilitate the regional development, thereby contributing to rise of the quality of life and reduction of poverty in inland areas by newly constructing a highway of 160km between Shaoyang and Huaihua cities and improving a provincial road (class II) of 100km between Dongkou County's Zhushi and Chengbu County in Shaoyang City in Hunan Province in China.

Loan Approved Amount / Disbursed Amount	23,000 million yen / 22,948 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March 2002 / March 2002
Terms and Conditions	Interest Rate: 2.20% Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General untied (Consulting Services: Bilateral tied)
Borrower / Executing Agency	The government of People's Republic of China / Hunan Provincial People's Government
Final Disbursement Date	October 2009

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Main Contractors (over 1 billion yen)	Yueyang Road & Bridge Construction Co. (China), Hunan Changde Road & Bridge Construction Co., Ltd. (China), Hunan Huanda Road & Bridge Corporation (China), Hunan Provincial Road Machinery Engineering Company (China), The 1st Engineering Co., Ltd. of China Tiesiju Civil Engineering (China), Hunan Road & Bridge Construction Group Corporation (China)
Main Consultant (over 100 million yen)	Nippon Koei Co., Ltd. (Japan)
Feasibility Studies, etc.	"Feasibility Study Report: Shanghai-Ruili National Trunk Highway, Hunan Province, Shaoyang-Huaihua Highway," Hunan Provincial Communications Planning, Survey & Design Institute, May 2001
Related Projects	- World Bank (1997) Loan for "China National Highway Project - Guangdong-Hunan Highway Corridor" ($ 400 million) - World Bank (1999) Loan for "National Highway Project (04)" ($ 350 million) - Asian Development Bank (1993) Loan for "Hunan Roads Development Project" ($ 74 million)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masahiro Oseko, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: August 2013 – November 2014

Duration of the Field Study: 19 – 29 November 2013, 23 April 2014

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

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance to the Development Plan of China

Emerging away of the economic growth supremacy from 1970s, the Chinese government's development policy has been changing its purpose to the rise of economic efficiency in the "10th Five-year Plan (2001-2005)" at the time of the appraisal of the project, and to the sustainable development in the "11th Five-year Plan (2006- 2010)" followed by the current "12th Five-year Plan (2011-2015)" aiming at the structural adjustment to the domestic demand-led economy. In this transition of national strategies, improvement of road network has been consistently highlighted as a basic infrastructure to realize harmonious development of urban and rural areas. Also, the "five vertical and seven horizontal highway network plan,"

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

[4] ③: High, ②: Fair, ①: Low

composed of five north-south highways running vertically through the country and seven east-west highways running across the country, formulated in the "Notice of the State Council Concerning Several Policies on the Development of the West Regions (December 2000)" aimed to rectify regional economic disparities is still in progress at the time of this ex-post evaluation in 2014. The Shaoyang-Huaihua highway constructed by the project is a part of the horizontal highways of this plan.

Following these government policies, the Hunan Province authorities targeted the improvement of people's livelihoods through the economic and social infrastructure development in the "Hunan Province's 10th Five-year Plan (2001-2005)," well-balanced regional development in the "11th Five-year Plan (2006-2010)," and sustainable economic development in the "12th Five-year Plan (2011-2015)." An integrated traffic system composed of road, railway and water transportation has been aimed for as a fundamental infrastructure realizing these targets. Along with the transition of strategic targets stipulated in these development plans, the road improvement policy of Hunan Province has shifted its highlights from local roads development for poverty reduction to highway network improvement including connection roads in local areas for overall provincial economic growth. The integrated improvement of a highway and a local road intended by the project was one of the typical examples of these provincial development strategies.

3.1.2 Relevance to the Development Needs of China

The mid-western part of Hunan Province, the region along the road constructed by the project, is situated in hilly and mountainous areas where the primary industry workers account for a large portion of about 80% of total population and their major source of income is agricultural products such as rice, citrus fruits and herbal medicine, while the cultivated acreage has been very limited. Although the secondary industry such as cement manufacturing and building material processing formulated certain foundations in local economy, the level of income of local people has remained low due to the insufficient infrastructure development. The improvement of accessibility of local products to markets was therefore urgently demanded. In addition, at the time of the appraisal of the project, along the roads constructed by the project, there used to be one national level poverty-stricken county designated by the central government (i.e. Longhui County) and two provincial level poverty-stricken counties designated by the provincial government (i.e. Chengbu County and Zhijiang County). While Zhijiang County was later on delisted from the designation, Longhui County and Chengbu County stay on the list at the time of this ex-post evaluation.

On the other hand, Shaoyang and Huaihua Cities have been enjoying the growth of economy higher than the expectation at the time of the appraisal of the project, which expected about 7% to 9% of the growth of annual average GDP. And along with this, the volume of road transport has steadily increased (Table 1). The existing road of National Route 320 was, while it

was a two lanes road for inbound and outbound traffic, a low class and ill-paved that could not accommodate an increasing traffic.

Table 1: Economic Development of Shaoyang City and Huaihua City

Indicators	Fiscal Year	Shaoyang City	Huaihua City
GDP growth rate	1985 – 1999	8.6 %	7.7 %
	2000 – 2012	10.6 %	11.5 %
Road freight growth rate	1985 – 1999	7.04 %	8.69 %
	2000 – 2007	–	–
	2008 – 2012	15.79 %	–
Road passenger growth rate	1985 – 1999	7.80 %	7.70 %
	2000 – 2007	–	–
	2008 – 2012	7.75 %	–

Sources: GDP growth rate: Hunan Province Statistical Yearbook 2013
Road passenger and freight growth rate: 1985-1999: JICA appraisal documents
2008-2012: Hunan Province Statistical Yearbook 2013

3.1.3 Relevance to Japan's ODA Policy

Under the Japan' ODA policies at the time of the appraisal of the project, i.e. "Economic Cooperation Program for China (2001)," "Medium-Term Strategy for Overseas Economic Cooperation Operations (2001)" and "Country Assistance Strategy for China (2001)," the priority of the assistance to China was given to the improvement of people's livelihood and poverty alleviation in inland poor areas through infrastructure development. Regarding the road sector, the particular emphasis was placed on the improvement of provincial road network expecting the economic stimulation effects in inland poverty-stricken areas.

Among these policies, the "Country Assistance Strategy for China (2001)" laid out specific agendas of road traffic improvement in inland areas and provincial road network development anticipating better market access and domestic economic stimulations for rectifying regional economic, thus eventually contribute to improving livelihood of people and alleviating poverty.

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

3.2 Effectiveness[5] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Shaoyang-Huaihua highway

i) Average daily traffic volume

The average daily traffic volume (PCU: Passenger Car Unit) of the Shaoyang-Huaihua highway attained its target set at the time of the appraisal (12,516 PCU per day in 2010, 3 years

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

after the completion of the project) in 2010 (Table 2). The growth rate in 5 years from 2007 to 2012 was 13% per year on average showing the steady increase.

Table 2: Average daily traffic volume

Unit: vehicles/day

Year	2000 (Before the project)	2007 (year of project completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
Actual	4,520	9,162	13,625	15,037
Ratio of Actual to Plan	36%	73%	109%	120%

Source: Shaoyang City Highway Administration Bureau

ii) Average travel time and speed

The average travel time and speed on the Shaoyang-Huaihua highway achieved its target set at the time of appraisal (travel time of 2.1 hours and travel speed of 80 km/h in 2010) in 2010 (Table 3), contributing to the improvement of market accessibility and promotion of regional development.

Table 3: Average travel time and speed

Indicators		2000 (Before the project)	2007 (year of project completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
Average travel time (h)	Actual	6.1	2.0	2.0	2.0
	Ratio of Actual to Plan	290%	95%	95%	95%
Average travel speed (km/h)	Actual	35	81	100	100
	Ratio of Actual to Plan	43%	101%	125%	125%

Source: Shaoyang City Highway Administration Bureau

iii) Traffic accidents

The number of traffic accidents on the Shaoyang-Huaihua highway decreased substantially in spite of increased traffic volume and travel speed (Table 4). This is mainly because of the comparison between existing road (National Route 320) under mixed traffic conditions and the newly constructed highway under the access control. Adding to this, the improvement of road alignments and pavement conditions and traffic officers' patrol for over-speed and overloaded vehicles have significantly contributed to the decline of traffic accidents.

Table 4: Traffic accidents

Unit: cases

	Before the project (National Route 320)		After the completion of the project (Shaoyang-Huaihua highway)	
Year	2000	2006 (1 year before the completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
The number of traffic accidents	224	219	69	70

Source: Shaoyang City Highway Administration Bureau

iv) Employment opportunities at the highway and the local road related facilities for the poor

In order to provide employment opportunities to the poor population, the project planned to hire 9,600 workers for both of the highway and the local road during the construction period and 250 workers for the highway operation facilities such as service areas and tollgates upon the completion of the project. The target has been attained as shown in Tables 5 and 6 respectively. However, the area of poverty here was broadly considered as the Wuling Shan District and workers from this district were regarded as the poorest segment of the population irrespectively of their economic conditions such as annual income. Because of this, it cannot be said in a strict sense that employment opportunities were provided to the poorest segment of the population. But it was nonetheless positive effects of the project for the poor population in the deprived areas. The Wuling Shan District includes Longhui, Dongkou, Chengbu, Zhijiang Counties and Wugang City which were targeted as the directly benefitted areas of the project.

Table 5: Local employment during the construction period

Unit: person

Year	2004	2005	2006	2007 (year of project completion)	Total
Highway	2,000	3,200	3,600	1,700	10,500
Provincial Road	100	600	900	200	1,800
Total	2,100	3,800	4,500	1,900	12,300

Sources: Shaoyang City Highway Administration Bureau, Shaoyang City Road Administration Bureau

Table 6: Local employment for operation and maintenance of road related facilities

Unit: person

Year	2000 (before the project)	2007 (year of project completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
Highway	0	225	251	236
Provincial Road	0	5	10	12
Total	0	230	261	248

Sources: Shaoyang City Highway Administration Bureau, Shaoyang City Road Administration Bureau

(2) Zhushi-Chengbu Provincial Road

i) Average daily traffic volume

The average daily traffic volume (PCU: Passenger Car Unit) of the Zhushi-Chengbu provincial road attained its target set at the time of the appraisal (7,030 PCU per day in 2010, 3 years after the completion of the project) in 2010 (Table 7). The growth rate in 5 years from 2007 to 2012 was 14% per year on average showing the steady increase.

Zhushi-Chengbu Provincial Road

Table 7: Average daily traffic volume

Unit: vehicles/day

Year	2000 (before the project)	2007 (year of project completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
Actual	3,232	4,399	8,186	7,588
Ratio of Actual to Plan	46%	63%	116%	108%

Source: Shaoyang City Road Administration Bureau

ii) Average travel time and speed

The average travel time and speed on the Zhushi-Chengbu provincial road achieved its target set at the time of appraisal (travel time of 1.3 hours and travel speed of 78 km/h in 2010) in 2010 (Table 8), contributing to the improvement of convenience of everyday life as a community road, better accessibility to markets and promotion of regional development.

Table 8: Average travel time and speed

Indicators		2000 (before the project)	2007 (year of project completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
Average travel time (h)	Actual	2.4	1.25	1.3	1.3
	Ratio of Actual to Plan	185%	96%	100%	100%
Average travel speed (km/h)	Actual	45	81	78	78
	Ratio of Actual to Plan	58%	104%	100%	100%

Source: Shaoyang City Road Administration Bureau

iii) Traffic accidents

The number of traffic accidents on the Zhushi-Chengbu provincial road decreased substantially in spite of increased traffic volume and travel speed (Table 9). The decline of traffic accidents in 2006 even before the construction completion was due to the partial operation of the road started when the construction completed more than half. In addition to this, the strict execution of construction-related traffic rules and regulations with traffic officers' patrol has significantly contributed to the decline of traffic accidents.

Table 9: Traffic accidents

Unit: cases

	Before the project		After the completion of the project	
Year	2000 (before the project)	2006 (1 year before the completion)	2010 (3 years after the completion)	2012 (5 years after the completion)
The number of traffic accidents	25	5	8	11

Source: Shaoyang City Road Administration Bureau

3.2.2 Qualitative Effects

A field survey visiting ten road passenger enterprises (buses and coaches) and road freight enterprises (trucks and containers) was conducted in this ex-post evaluation, and the effects of the project were confirmed as shown below.

- Transport distance was shortened. Construction of the Xuefeng-shan Tunnel resulted in the change of the route from a roundabout way to a direct way realizing the transport distance to be shortened by half to one-fourth.
- Transport time was shortened. Due to the construction of the Xuefeng-shan Tunnel stated above, the transport time was shortened by half to one-fourth.
- The volume of passengers and freight was increased by 30% to 400%.
- Sales of the business was increased by 10% to 200%.
- Operation cost such as fuel and repair was decreased by 10% to 20%.

3.3 Impact

3.3.1 Intended Impacts

(1) Impact on Economic Development

The consolidated development of the highway and provincial road has significantly improved the accessibility between urban and provincial areas. Economic activities such as agriculture, mining and commerce along the roads have been activated and, as a result, the income of local residents has increased as shown below in Table 10. In Longhui County located along the highway and Dongkou County at the junction of the highway and the provincial road, indexes such as shipping volume of agricultural products, average income, nominal GDP per capita and average income of the poorest segment of the population were on the improvement tendency (Table 10).

Table 10: Impact on local economy

Index	County	Before the project	After the project	
		2000 (before the project)	2007 (year of project completion)	2010 (3 years after the completion)
Shipping volume of agricultural products (1,000 ton/year)	Longhui	183.9	280.0	360.0
	Dongkou	204.5	250.0	290.0
Average income (Yuan/year)	Longhui	1,134	2,676	3,506
	Dongkou	2,210	3,317	4,347
nominal GDP per capita (Yuan/year)	Longhui	2,558	4,715	6,237
	Dongkou	3,643	6,340	8,311
Average income of poverty population[6] (Yuan/year)	Longhui	629	819	1,401
	Dongkou	714	907	1,427

Source: Shaoyang City Highway Administration Bureau

[6] Poverty line defined by the Chinese government was 865 yuan in 2000, 1,067 yuan in 2007 and 1,274 yuan in 2010.

Notable impacts of the project on urban development and eventually on the regional economy have been observed, for example, in Wugang City which positioned roughly in the center of the Zhushi-Chengbu provincial road. Taking the project as an opportunity for economic and social growth, the city has invited a four-star hotel (2007), a private unified school for Grades 1-12 of 9,000 students (2007), a farm product wholesale market with 600 stores (2013), and an agro-industrial distribution center largest in Hunan Province (to be opened in 2014). Also, Chengbu Miao Autonomous County, located at the far end of the Zhushi-Chengbu road, was abundant with tourism resources and started an active tourism development and promotion making a profitable use of the access to urban areas realized by the project. Specifically, the Miao's unique architectural structures were being renovated and preserved, limestone caves were illuminated, hotels and restaurants were constructed, and tourism information such as brochures and DVDs were provided at service areas and roadside stations "Michinoeki" (refer to 3.3.2(3)) constructed by the project.

(2) Beneficiary Survey

Face-to-face beneficiary surveys on impacts were conducted by this ex-post evaluation to 30 highway users respectively at the entrance and the exit of the Shaoyang-Huaihua highway (60 respondents in total), and to 10 road users and residents respectively at four points along the Zhushi-Chengbu provincial road (40 respondents in total)[7]. The results of beneficiary surveys are shown below, and it was confirmed that the project was mostly favorably welcomed by road users and local residents.

i) Shaoyang-Huaihua highway

- 83% answered that travel time for respondent's main utilization purpose of the road (travel to farms, sales/purchase, work away from home, commute to school, and as drivers of transport business, etc.) has shortened (average rate of time shortened: approx. 32%).
- 83% answered that travel time to public services (schools, hospitals, markets, etc.) has shortened (average rate of time shortened: approx. 33%).
- 88% answered that travel distance of transport of passengers/freight (buses, trucks and taxis) has increased (average rate of increase: approx. 1.5 times).
- 94% answered that shipping volume of farmers' agricultural products has increased (average rate of increase: approx. 1.4 times).
- 73% answered that employment opportunities have increased (average rate of annual

[7] The breakdown of beneficiary survey respondents is as follows.
Shaoyang-Huaihua highway users: 44 males (73%), 16 females (27%); 3% below 20 years old, 48% in their 20s, 32% in their 30s, 14% in their 40s, 3% in their 50s and 0% in 60s or above.
Zhushi-Chengbu provincial road users and residents living along the road: 23 males (58%), 17 females (42%); 17% below 20 years old, 30% in their 20s, 35% in their 30s, 10% in their 40s, 8% in their 50s and 0% in 60s or above.

income increase: approx. 20%).

- 88% answered that travel expenses (vehicle fuel cost, vehicle repair charge, commutation cost, etc.) are reduced (average reduction rate: approx. 18%).

ii) Zhushi-Chengbu Provincial Road

- 78% answered that travel time for respondent's main utilization purpose of the road (travel to farms, sales/purchase, work away from home, commute to school, and as drivers of transport business, etc.) has shortened (average rate of time shortened: approx. 56%).
- 78% answered that travel time to public services (schools, hospitals, markets, etc.) has shortened (average rate of time shortened: approx. 60%).
- 71% answered that shipping volume of farmers' agricultural products has increased (average rate of increase: approx. 1.6 times).
- 83% answered that employment opportunities have increased (average rate of annual income increase: approx. 22%).
- 75% answered that travel expenses (vehicle fuel cost, vehicle repair charge, commutation cost, etc.) are reduced (average reduction rate: approx. 18%).

3.3.2 Other Impacts

(1) Impacts on the Natural Environment

During preparation stage of the project, an Environmental Impact Assessment (EIA) was prepared by the Road Science Institute of the Ministry of Transport of China according to the national standards such as "EIA Guidelines (1995, 1997)" and "Road Construction EIA Regulations (1996)." The EIA for Shaoyang-Huaihua highway was approved by the State Environmental Protection Administration and the one for Zhushi-Chengbuy provincial road by Hunan Province's Environmental Protection Administration. Environmental considerations were made during the construction period by focusing on the following: 1) air along the roads (CO_2, NO_2, TSP), 2) air in tunnels, 3) groundwater, 4) sewage from service areas, 5) sewage from bridgeworks, 6) soil erosion, 7) noise, 8) preservation of borrow pits and disposal areas and 9) landscape. All of these nine environmental items were monitored and preliminary measures were prepared for them in case of any pollution. No major negative environmental effect was reported during the construction period.

After the opening of the roads, environmental monitoring on a regular basis is being conducted for Shaoyang-Huaihua highway by Hunan Province's Environmental Protection Administration and for Zhushi-Chengbu provincial road by Hunan Province's Traffic Environmental Protection Monitoring Center complying with the standards adopted by the Ministry of Environmental Protection of China. Monitoring items of air (CO_2, NO_2, TSP), water quality (PH、SS, COD, petroleum) and noise (noise level at public facilities such as schools

and hospitals) are measured twice a year for the highway and three times a year for the provincial road. All of these monitoring results have been within the standard values up to the present date.

(2) Land Acquisition and Resettlement

Under the regulations such as the "Land Management Act of the People's Republic of China" and "Hunan Province's Enforced Land Management Act," land acquisition and resettlement were executed only after the agreement of directly affected households was confirmed through questionnaire surveys and hearings. All of the actual values of land acquisition and resettlement in Table 11 are higher than planned values except land acquisition of the Zhushi-Chengbu provincial road. This is because of adopting approximate values estimated in the F/S (feasibility study) as planned values for comparison. During detailed design stage and construction period, in order to keep land acquisition and resettlement to a minimum, a variety of measures were taken such as the adjustment of road alignments and bridge locations and an adoption of steep slope introducing new technologies.

Table 11: Land Acquisition and Resettlement

Roads		Resettlement (person)	Land Acquisition (ha)
Highway	planned	5,000	940
	actual	7,639	989
Provincial Road	planned	2,100	230
	actual	3,447	212

Sources: Shaoyang City Highway Administration Bureau, Shaoyang City Road Administration Bureau

The project provided land cost, moving cost, alternative sites and housings as compensation for resettlement. Infrastructure and social services in relocation sites such as community roads, electricity, water, gas and job introduction have been prepared and provided by local authorities. Among those who relocated to urban areas, by renting out some parts of their new houses for shops and residences or starting their own businesses with the compensation payments, several cases of substantial income increase have been observed.

A series of local surveys, face-to-face questionnaire survey, in-depth interviews and household interviews with the affected people, was conducted in this ex-post evaluation. Face-to-face questionnaire survey was done with 10 households in Dongkou County, 10 households in Chengbu County and 20 households in Miao Autonomous County. Except for the respondents answered that relocation fees for moving were not enough (2 out of 40 respondents) or job was not available in the relocated site (1 male in his 60s out of 40 respondents), the overall level of satisfaction with prior explanation, compensation and current living conditions was high as 30 out of 40 respondents replied "extremely satisfied" or "satisfied" while 8 respondents answered "neither satisfied nor dissatisfied" and 2 answered "dissatisfied."

Although the reason for the dissatisfaction was “not enough relocation fees,” the amount of fee was based on regulations and agreed upon by these two respondents in advance. The rest of 38 respondents did not express any particular dissatisfaction. Consequently, the land acquisition and resettlement as a whole was executed appropriately as planned, and there was no delay to or effect on the project caused by social impacts.

(3) Roadside Stations “Michinoeki”

Roadside stations “Michinoeki” were constructed by the project in two sites of Chengbu and Wugan along the Zhushi-Chengbu provincial road. Adopting the Japanese concept of Michinoeki, they have being used as public facilities for regional development. In China, there was a case of preceding project constructed Michinoeki which was eventually turned into a material storage space since the concept of Michinoeki was not properly introduced and the facility was constructed along the road but far from communities. In comparison with this, roadside stations introduced by the project can be evaluated as a successful example. But in addition, it is expected for Michinoeki to function not only as a market but also as a facility to provide public services regarding health, hygiene, education and culture to local people. Since Michinoeki introduced by the project do not quite function in this regard, the executing agency is currently examining what services could be provided expecting full-scale use of the facilities.

Interview survey with questionnaires was conducted in these facilities with 10 vendors and 10 visitors accounting 20 respondents in total. Most of the vendors were from nearby farms whose annual household incomes were around 50,000 yuan with average daily sales in Michinoeki of 100 to 200 yuan. Many of them had marketed their agricultural products in vegetable markets earned around 50 yuan per day before the Michinoeki were constructed. It was thus confirmed that the roadside stations contributed to the increase in their sales. As for the visitors, majority of them were non-farmers (truck drivers, office workers, etc.) whose household incomes were between 30,000 and 50,000 yuan. Although the amount they spent in Michinoeki per visit varied from 5 to 300 yuan, most of them spent about 50 yuan or less. Food products were the most popular items to be purchased. While the number of vendors and visitors swelled on local market days several times a month, there were quite a few who set up shops in or visited at Michinoeki several times a week or even every day. Most of vendors and visitors were highly satisfied with the facilities and expect further increase of the variety of market products and functions of facilities.

Column: Roadside Stations "Michinoeki"

Wugan "Michinoeki"

Agricultural products outlets, a vehicle repair yard, a sports facility, a rest house, an information desk and a first aid station can be found at the roadside stations in Chengbu and Wugan Counties. Local farmers bring their products to the spacious outlet premises. There are simple shops just laying their products on the ground, while some farmers bring their items by cars. Most of the products are vegetables and meat of chicken, goose and pork. There also are farmers who sell miscellaneous goods such as handmade clothes and shoes. In the agricultural off-season, mobile food stalls are brought in to serve local dishes made by farmers' wives who are good at cooking. Many of the vendors are happy with the facilities which provide stable and convenient places to sell their products.

While most of the visitors who drop by the facilities are commuters and truck drivers using the provincial road, quite a number of neighbors who take a walk to the outlets almost every day. Shopping is the primary purpose of visitors, there are people who enjoy exercise on the basketball court open to anybody for free or having a nice cup of tea at the rest house.

Chengbu "Michinoeki" is located in the Miao Autonomous County, and Miao's special tea with many ingredients is served in its rest house. A tourist information desk of the Miao Autonomous County is set up and brochures and DVDs for attracting tourists are provided there. Waitresses and receptionists of the rest house and information desk are local Miao women. Roadside Station "Michinoeki" is thus contributing to local economy by providing job opportunities.

Chengbu "Michinoeki"

(4) Construction of Wind Power Station

The construction of the highway and provincial road by the project made it possible to carry construction materials and equipment to rural areas, and as a result of it, "Datang Huayin Nanshan Wind Farm," the largest wind power station in Hunan Province, was built in Nanshan town located along the Zhushi-Chengbu provincial road. The first phase of the construction was completed and partial operation has started since 2011, and the full-scale operation is scheduled to start in 2015. The power generated by this firm is supplied not only to local areas but also to the urban areas of Shaoyang City. Integrated development of a highway and a local road realized the synergistic developmental effects on both of the urban and rural areas.

(5) New Standard for Concrete Pavement

Although China's national standards require the thickness of concrete pavement of public roads to be 24-25cm or above, this thickness is not enough for the long-term years of endurance. It is, however, possible to add some years to the pavement's lifetime by making it 2cm thicker. Therefore, the project accumulated and analyzed the data of the weights of vehicles and

repeated experimental studies to determine that the local roads' pavement thickness to be 26-28cm. These studies and implementations were recognized by the provincial government. Consequently, in 2012, a new standard unique to Hunan Province that required public roads' concrete pavement thickness to be 30cm or more, thicker than the national standards, was authorized.

This project has largely achieved its objectives. Therefore its effectiveness and impact are high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The planned and actual output of the project is shown in Table 12. The total length of the Shaoyang-Huaihua highway is 5% longer than planned, the number of bridges increased by 6%, and the number of tunnels, interchanges/tollgates and service areas are fewer than planned. As for the Zhushi-Chengbu provincial road, the number of bridges is more than planned.

Table 12: Output (planned and actual)

Road	Plan	Actual
Shaoyang-Huaihua highway	• Total length: Shaoyang-Huaihua 160km • Road class: 4-lane highway • Road width: 24.5m-28.0m • Pavement: asphalt with some sections of concrete • Bridges: 223 bridges • Tunnels: 19 tunnels • Interchanges/tollgates: 9 spots • Service areas: 3 service areas • Connection road: Approx. 13km (Zhutian West-Hecheng District) • Machine and equipment: charge collectors, communication system, monitoring system	• Total length: Shaoyang-Huaihua 168.381km • Road class: as planned • Road width: as planned • Pavement: concrete with some sections of asphalt • Bridges: 236 bridges • Tunnels: 14 tunnels • Interchanges/tollgates: 8 spots • Service areas: 2 service areas • Connection road: 12.8km (Zhutian West-Hecheng District) • Machine and equipment: as planned
Zhushi-Chengbu provincial road	• Total length: Zhushi-Chengbu 100km • Road class: 2-lane provincial road • Road width: 12-15m • Pavement: asphalt • Bridges: 20 bridges • Incidental facilities: 2 Michinoeki	• Total length: as planned • Road class: as planned • Road width: as planned • Pavement: concrete • Bridges: 35 bridges • Incidental facilities: as planned
Consulting Services	• Consulting Services: Environmental measures, assistance in road management • Man month: 36 M/M	• Consulting Services: as planned • Man month: as planned

Sources: JICA appraisal documents, Shaoyang City Highway Administration Bureau, Shaoyang City Road Administration Bureau

The main reasons for the change of pavement from asphalt to concrete were because of the price increase of asphalt due to soaring prices of crude oil. And the project also took into account the contribution to local economy since cement production was one of the major industries of local areas such as Shaoyang, Dongkou and Wugan. Maintenance cost for concrete pavement was estimated to be lower than the asphalt considering lifetime and frequency of repair works.

The number of bridges increased because of the following reasons: 1) the area of earthwork could be minimized by increasing the number of bridges since bridge columns were only required instead of wide-open slopes, 2) the number of bridges to be junction points in future was increased in preparation for future traffic network development and 3) the flood-prevention evaluation conducted after the F/S determined that more bridges should be built to expand the drainage area for flood. Impact on the project was mostly positive by suppressing land acquisition and resettlement and reducing flood damage without making significant increase of the construction cost of the project (refer to the following page for construction cost). Therefore, the change of the number of bridges could be recognized as being appropriate.

Decreasing the number of tunnels was a decision made at the time of detailed design as a result of close examination of land features, geological conditions and construction technologies to be applied. The number of interchanges/tollgates and service areas was also reduced since it was found that the actual traffic volume would be lower than the estimation made during preparation stage of the project. Since these changes were made in order to make the scope of work to be more relevant to the actual situations and resulted in the reduction of volume of work, they could be positively evaluated as suitable decisions.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The originally estimated total project cost at appraisal was 142,924 million yen, and the actual project cost at completion was 126,374 million yen, which is equivalent to 88% of the planned cost, thus the project cost was within the plan. (Table 13)

Table 13: Project Cost (planned and actual)

	Planned (Note 1)			**Actual** (Note 2)	
	Foreign Currency (Mil. Yen)	**Local Currency (Mil. Yen)**	**Total (Mil. Yen)**	**Total (Mil. Yuan)**	**Total (Mil. Yen)**
Civil work: highway	16,762	80,744	97,506	5,946	83,958
Civil work: provincial road	4,315	1,193	5,508	344	4,857
Machine and equipment	0	3,148	3,148	353	4,984
Consulting services	123	1,401	1,524	96	1,356
Price escalation	711	784	1,495	247	3,488
Contingency	1,089	4,294	5,383	0	0

	Planned (Note 1)			Actual (Note 2)	
	Foreign Currency (Mil. Yen)	Local Currency (Mil. Yen)	Total (Mil. Yen)	Total (Mil. Yuan)	Total (Mil. Yen)
Tax and administration	0	20,661	20,661	1,377	19,443
Land acquisition and resettlement	0	7,699	7,699	587	8,288
Total	23,000	119,924	142,924	8,950	126,374

Note 1: Exchange rate: 1 yuan = 15 yen (Source: JICA appraisal documents)
Note 2: Exchange rate: 1 yuan = 14.12 yen (average between 2003-2007) (Source: Principal Global Indicators)

In spite of longer total length of road and increased number of bridges, the cost of civil works was lower than the budget. This was because of the cost-saving efforts made by the executing agency as the change of pavement material from asphalt to concrete, reduction of the volume of earthwork by making slopes steeper, reuse of waste soil, and adoption of the minimum price system upon contractors' selection. Cost for land acquisition and resettlement exceeded by 8% of the estimation by reflecting the increase of the volume of land acquisition and resettlement. Cost for machine and equipment went over the budget since the input of equipment of higher quality was increased in order to secure higher safety and to meet environmental conservation demands. Tax and administration cost did not exceed the budget as a result of the reduction of the administration cost by introducing minimum price system for the selection of contractors for investigation and design. Consulting service fees also did not go over the budget since local consultants' works for the highway covered by the local currency was significantly reduced. Because of these cost-cutting efforts, the total project cost was within the plan despite the increase of road length and the number of bridges.

The breakdown of civil work cost for the highway is shown below in Table 14. It can be confirmed that the change from asphalt to concrete pavement has significantly contributed to the reduction of the total cost of the project.

Table 14: Breakdown of civil work cost for Shaoyang-Huaihua highway (planned and actual)

	Planned (Note 1)			Actual (Note 2)	
	Foreign Currency (Mil. Yen)	Local Currency (Mil. Yen)	Total (Mil. Yen)	Total (Mil. Yuan)	Total (Mil. Yen)
Pavement (including roadbed)	11,781	37,793	49,574	2,272	32,085
Bridges	4,981	15,983	20,964	1,934	27,315
Tunnels	0	19,253	19,253	1,093	15,435
Tollgates	—	—	—	241	3,405
Service areas	—	—	—	53	750
Others	—	7,715	7,715	352	4,968
Total	16,762	80,744	97,506	5,946	83,958

Note 1: Exchange rate: 1 yuan = 15 yen (Source: JICA appraisal documents)
Note 2: Exchange rate: 1 yuan = 14.12 yen (average between 2003-2007) (Source: Principal Global Indicators)

3.4.2.2 Project Period

The original project period planned at appraisal was from March 2002 (signing of the Loan Agreement) to December 2006 (official opening to traffic) with a total period of 58 months. The actual project period was from March 2002 (signing of the Loan Agreement) to November 2007 (official opening to traffic) with a total period of 69 months, or equivalent to 119% of the plan.

The main reason for delay was the prolonged detailed design in which elaborated investigations and designs were conducted expecting thorough considerations for environment, economy and safety. While it is difficult to make a quantitative comparison with the change of the scope of work, accounting small environmental impacts, suppressed project cost and reduced traffic accidents affirmatively, the extension of project period could be positively evaluated as an adequate result.

3.4.3 Results of Calculations of Internal Rates of Return (Reference only)

Based on the cost and benefit items used at appraisal, recalculations of Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) were conducted in this ex-post evaluation by using the actual cost for the construction, five-year actual cost for operation and maintenance, five-year actual revenue from toll fare, and those values estimated for the subsequent project life period. FIRR and EIRR were recalculated based on the following assumptions. The recalculation results are shown below in Table 15.

Recalculation Assumptions

FIRR Cost: project cost, operation & maintenance cost
Revenue: toll revenue
Project life: 20 years

EIRR Economic Cost: highway: 87% of project cost, provincial road: 89% of project cost
operation & maintenance cost
Economic Benefit: transportation cost savings, congestion reduction savings, travel distance savings, travel time savings, traffic accident reduction savings
Project life: 20 years

Table 15: IRR

		Appraisal	Ex-post Evaluation
Shaoyang-Huaihua highway	FIRR	3.7%	5.3%
	EIRR	14.9%	14.9%
Zhushi-Chengbu provincial road	EIRR	16.5%	14.1%

Recalculated FIRR of the Shaoyang-Huaihua highway was 5.3% exceeding the FIRR of 3.7% at the time of appraisal. This was because of the profitable results of the project, while it was only slight, as shown that the actual project cost was 93%, revenue was 110% and administration cost was 98% respectively compared to the estimations at appraisal. As for EIRR, due to difficulties in collecting the necessary information and data about the calculation at the time of appraisal, recalculation was done with the economic benefits assumed as stated above and resulted in 14.9%, which was incidentally the same as the EIRR at appraisal. Since this figure exceeded 12% of EIRR, which is extensively used as a target for highways by international authorities, EIRR of the highway could be evaluated to be high.

Recalculated EIRR of the Zhushi-Chengbu provincial road was 14.1% which was lower than the value of 16.5% at appraisal. A simple comparison of these figures was not appropriate since the information and data about the calculation at appraisal were not fully available. Main reasons could be the difference of travel time savings, while 12% of annual increase of travel time savings was estimated at the time of appraisal, the assumed annual increase at the time of ex-post evaluation was 6% estimated from the result values of 5 years operation. Since the figure of 14.1% exceeded 10 to 12%, which is widely used as a target of EIRR for public roads, EIRR of the provincial road could be evaluated to be high.

Although the project cost was within the plan, the project period exceeded the plan. Therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

"Shaoyang City Highway Administration Bureau" has been responsible for operation and maintenance (O&M) of the Shaoyang-Huaihua highway, while "Shaoyang City Road Administration Bureau" has been responsible for O&M of the Zhushi-Chengbu provincial road. The Shaoyang City Highway Administration Bureau is a state-owned company evolved from the Shaoyang-Huaihua Highway Construction Development Co., Ltd., the company undertook the construction work of the project, by shifting its functions from construction to O&M. Since it is a company but identified as a government agency affiliated with the Hunan Province's Transportation Office, all of its revenue earned from the Shaoyang-Huaihua highway goes to the provincial government and its annual budget is provided from the provincial government. The Shaoyang City Road Management Administration is one of the departments of the Shaoyang City government.

Shaoyang City Highway Administration Bureau is comprised of one director, 4 deputy directors, 5 engineers, 10 technicians and 56 clerical staffs, while the Shaoyang City Road Management Administration consists of 3 directors, 9 deputy directors, 18 engineers, 22 technicians and 32 clerical staffs as of the end of November 2013. The institutional structures of

these organizations are expected to be stable for future since their employees are relatively young; the directors and deputy directors are in their early 40s and the engineers and technicians are in their late 20s to early 30s. Personnel transfer has never taken place in the Shaoyang City Highway Administration Bureau since its establishment in 2007 and there is no particular plan of transfer in personnel in near future. Personnel relocation in Shaoyang City Road Management Administration takes place almost every five years. From these, no major institutional problem are expected regarding O&M of the roads constructed by the project.

3.5.2 Technical Aspects of Operation and Maintenance

Employees higher than technicians of both of Shaoyang City Highway Administration Bureau and Shaoyang City Road Administration Bureau are all bachelor or master degree holders in the field of technology or business administration.

Regarding staff training, the Shaoyang City Highway Administration Bureau conducts 4 types and the Shaoyang City Road Administration Bureau offers 7 types of training on regular basis dealing with topics of road surface control, bridge maintenance, facility management and safety control. Besides these regular training programs, some other topics of training are offered on an ad-hoc basis. Staffs receiving the training have improved their competencies and the number of qualified and/or promoted personnel including Senior Administrative Officers, Senior Engineers[8] and accountants is steadily increasing.

Shaoyang City Highway Administration Bureau provides seven kinds of handy-size manuals that are convenient to carry around which deals with subjects of facility maintenance, electronic equipment operation, general affairs and financial affairs. Shaoyang City Road Administration Bureau prepares a comprehensive manual titled “Summary of Regulatory Documentation Regarding Public Road Management” which includes from regulations to specific work instructions exhaustively, and it is available at respective workplace. Compliance with manuals is overseen daily at the workplaces by superiors. O&M of the highway are subject to internal and external audits once a year respectively. The external audit is done by the National Audit Office[9]. No major issue has been pointed out by these audits so far. Since steady efforts have been made to maintain and improve skills of staffs through recruitment and training, and no major technical problem has taken place so far, technical level of these two organizations for O&M can be judged to be high.

[8] Job classes of administrative officers certified by provincial governments. A qualified Administrative Officer is allowed to engage in the Communist Party’s political activities. The highest-class administrative officer is the Senior Administrative Officer. An Engineer is a job class of an engineer and the highest-class engineer is the Senior Engineer.

[9] An administrative agency that conducts audit of government agencies and state owned companies. Comparable to the Board of Audit of Japan.

3.5.3 Financial Aspects of Operation and Maintenance

Revenue from toll fares of the Shaoyang-Huaihua highway is increasing year by year and is substantially higher than the expenditure including salaries (Table 16). Profits have been mainly allocated to payback of investment.

O&M cost for Zhushi-Chengbu provincial road is provided from the city budget and has been fixed since the completion of the project. In case a large-scale renovation becomes necessary, funds are to be covered by the Hunan Province government, while such a case has not yet occurred. Financial aspects of O&M of the provincial road thus seem to be stable, and no major financial problem is expected to take place.

Table 16: Revenue and expenditure

Shaoyang-Huaihua highway Unit: million yuan

Year	2008	2009	2010	2011	2012
Revenue (toll fare)	232	297	407	553	679
Expenditure	78	93	96	84	99
O&M Cost	9	8	8	8	9

Source: Shaoyang City Highway Administration Bureau

Zhushi-Chengbu provincial road Unit: million yuan

	2008	2009	2010	2011	2012
O&M Budget	1	1	1	1	1
O&M Cost	1	1	1	1	1

Source: Shaoyang City Road Administration Bureau

3.5.4 Current Status of Operation and Maintenance

Both of these two O&M organizations have developed and executed their maintenance plans of 6 maintenance items on site works and 11 items on indoor works. Should execution be unsatisfactory, it is subject to get points taken off in the internal/external audits (point-deduction scoring system is applied.). No major issue has been pointed out in any audit so far.

Visual inspection was conducted in the field on the entire length of the roads in November 2013 in this ex-post evaluation and confirmed current status of O&M of the roads. Pavement surface, slope surface, road shoulders, bridges, tunnels, service areas, traffic signs and trees planted looked very well maintained and few trash and litter was found. No cracks, breaks, bumps were observed on both of the highway and provincial road, and no sense of discomfort was felt during the drive.

No major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objectives of the project were to improve the accessibility to markets and facilitate the regional development, thereby contributing to rise of the quality of life and reduction of poverty in inland areas by newly constructing a highway and improving a local road in Hunan Province in China. The project was highly relevant with the Chinese development plans and regional needs for the improvement of access of local products to markets, and with the Japan's ODA policy which placed a high priority on the development of provincial road network expecting the economic development of inland poor areas. Therefore, its relevance is high. Regarding the objectives of the project i.e., improvement of accessibility to markets and stimulation of regional economy, the project has contributed to rise of the quality of life and reduction of poverty in inland areas through the increase of shipping volume of agricultural products and employment opportunities of road users by realizing the increase of traffic volume and decrease of travel time. Therefore, its effectiveness and impact is considered high. While the project cost was within the plan, the project period was slightly longer than planned. Therefore, efficiency of the project is considered fair. Operation and maintenance of the facilities and equipment developed by the project have been properly done, and no major problems have been observed in terms of institutional, technical and financial aspects of the operation and maintenance system, therefore sustainability of the project effects by the project is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Roadside stations constructed by the project, adopting the Japanese concept of Michinoeki, are used as public facilities for regional development. In comparison with the precedence of roadside station turned into a material storage space, "Michinoeki" introduced by the project can be evaluated as a successful example. It is recommended to the executing agency to make a full-scale use of the facilities by adding functions to provide information about health, hygiene, education and culture, and to promote public relations for realizing the extensive publicity in China as a successful case of "Michinoeki."

4.2.2 Recommendations to JICA

It is recommended to JICA to extend an assistance for the executing agency to promote public relations activities aiming at the realization of the recommendation stated above.

4.3 Lessons Learned

Integrated construction of highway and local road

The project has realized a significant development effect by connecting local areas with a

highway network and constructing a highway and a local road in an integrated manner. The improvement of a local road connecting with a highway has enabled local cities and towns to transport their agricultural products and mineral resources to urban areas, and to attract tourists from urban centers to their places. On the other hand, the extension and expansion of a local road made it possible to carry construction materials and equipment to rural areas, and as a result, a large-scale wind power station was constructed in rural area. The power generated by this firm is supplied to local and urban areas and benefits both of them. Integrated development of a highway and a local road thus realized the synergistic developmental effects on both of the urban and rural areas. As for future highway construction project, it would be preferable to include local roads constructions as much as possible anticipating the synergetic developmental effects on both of the urban and rural areas, if a single executing agency is responsible for the entire project or if it is possible to realize a close communication and coordination between the implementation agencies of highway and local road.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs i) Shaoyang-Huaihua highway	• Total length: 160km • Road class: 4-lane highway • Road width: 24.5m-28.0m • Pavement: asphalt with some sections of concrete • Bridges: 223 bridges • Tunnels: 19 tunnels • Tollgates: 9 tollgates • Service areas: 3 service areas • Connection road: 13km (Zhutian West-Hecheng District) • Machine and equipment: charge collectors, communication system, monitoring system	• Total length: 168km • Road class: as planned • Road width: as planned • Pavement: concrete with some sections of asphalt • Bridges: 236 bridges • Tunnels: 14 tunnels • Tollgates: 8 tollgates • Service areas: 2 service areas • Connection road: as planned • Machine and equipment: as planned
ii) Zhushi-Chengbu provincial road	• Total length: 100km • Road class: 2-lane provincial road • Road width: 12m-15m • Pavement: asphalt • Bridges: 20 bridges • Incidental facilities: 2 Michinoeki	• Total length: as planned • Road class: as planned • Road width: as planned • Pavement: concrete • Bridges: 35 bridges • Incidental facilities: as planned
iii) Consulting Services	• Construction supervision: 36 M/M	• As planned
2. Project Period	March 2002 – December 2006 (58 months)	March 2002 – November 2007 (69 month)
3.Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 23,000 million yen 119,924 million yen 142,924 million yen 23,000 million yen 1 yuan = 15 yen (as of September 2001)	 22,948 million yen 103,426 million yen (7,325 million yuan) 126,374 million yen 22,948 million yen 1 yuan = 14.12 yen (average between 2003 and 2007)