Official
Use Only

Thailand

Ex-post Evaluation of Japanese ODA Loan Project
"Regional Road Improvement Project (III)"

External Evaluator: Keishi Miyazaki
(OPMAC Corporation)
Field Survey: June - July 2009

1. Outline of the ODA Loan Assistance

Map of the project site


Project target road
(Don Sak-Sichon section in Surat Thani)

1.1 Background

In Thailand, transport falls into five major areas: road transport, railway transport, maritime transport, inland water transport and air transport. Road transport plays an important role in the Thai transport system. For example, the share of road transport of the total cargo transport volume of all transport systems (ton-km base) in 1998 was 90.9%. Although the main trunk highways in Thailand were well developed and its pavement ratio was 97.9% in 1999, expansion of traffic capacity for existing roads was an important issue as traffic volume increased year by year. Likewise, there was a remarkable increase in traffic volume in regional areas, and the lack of capacity of roads was creating a bottleneck in the smooth transport of domestic cargo. With this background, the First Phase of the Four-Lane Highway Widening Project (target length: 1,891km) was planned in 1993 as a development plan for the main trunk highways. This Four-Lane Highway Widening Project was given the highest priority in road sector development as well as priority budget allocation among road rehabilitation projects. In addition, the Second Phase of the Four-Lane Highway Widening Project (target length: 4,638km) was established in 1995, and the improvement of the major two-lane national highways to four-lane roads was further promoted.

1.2 Objective

The objective of this project was to improve to four-lane national highways 343 km of the two-lane national roads which connect the North-South Corridor and the East-West Corridor in Thailand in order to cope with the increasing traffic volume, improve velocity and reduce traffic accidents, thereby contributing to the regional economic development and the promotion of economic relations with neighboring countries.

1.3 Borrower / Executing Agency

Kingdom of Thailand / Department of Highways (DOH), Ministry of Transport

1.4 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	19,544 Million Yen / 17,069 Million Yen
Exchange of Notes / Loan Agreement	September 19, 2000 / September 22, 2000
Terms and Conditions - Interest Rates - Repayment Period - Grace Period - Conditions of Procurement	 2.2% p.a. (Consultant portion: 0.75 p.a.) 25 years (Consultant portion: 40 years) 7 years (Consultant portion: 10 years) Partial Untied
Final Disbursement Date	January 19, 2007
Main Contractor (Over 1 billion yen)	PRAYOONVISAVA ENGINEERING CO., LTD. (Thailand) / ITALIAN-THAI DEVELOPMENT PUBLIC COMPANY LIMITED (Thailand) / VICHITBHAN CONSTRUCTION CO., LTD. (Thailand) / NIPPON ROAD-BHROM VIVAT JOINT VENTURE (Thailand) / SEE SANG KARN YOTAH (1979) CO., LTD. (South Korea) / CHRISTIANI & NIELSEN (THAI) PUBLIC COMPANY LIMITED (Thailand) / SERMSANGUAN CONSTRUCTION CO., LTD. (Thailand)
Main Consultant (Over 100 million yen)	Joint Venture of NIPPON KOEI (Japan) - TEAM CONSULTING ENGINEERING AND MANAGEMENTCO.,LTD. (Thailand) - THAI ENGINEERING CONSULTANTS CO., LTD. (Thailand)
Feasibility Study, etc. (F/S)	Feasibility study (Thai Government) in 1998 Regional Road Improvement Project (I) in 1994 Regional Road Improvement Project (II) in 1995

2. Evaluation Results (Rating: A)

2.1 Relevance (Rating: a)

This project was highly relevant to Thailand's national policies and development needs at the time of both appraisal and ex-post evaluation; therefore its relevance is high.

2.1.1 Consistency with Thailand's Development Policy and the Mekong Region Development Policy

At the time of appraisal, the 8th National Plan for Economic and Social Development (1997-2001) announced the establishment of a rapid transport system between major cities and a mass transport system between Bangkok and its suburb areas. In line with this policy, the Second Phase of the Four-Lane Highway Widening Project (target length: 4,638km) was planned in January 1995. The objectives of the Second Phase Four Lane Project were (i) to cope with the increasing traffic demand, (ii) to promote regional economic development and economic relations with neighboring countries by linking cities and regions, and (iii) to lessen traffic accidents as a continued project of the First Phase[1] which mainly improved the main trunk highways crossing North to South. This project, i.e. the Regional Road Improvement Project (III) was a part of the components of the Second Phase of the Four-Lane Project.

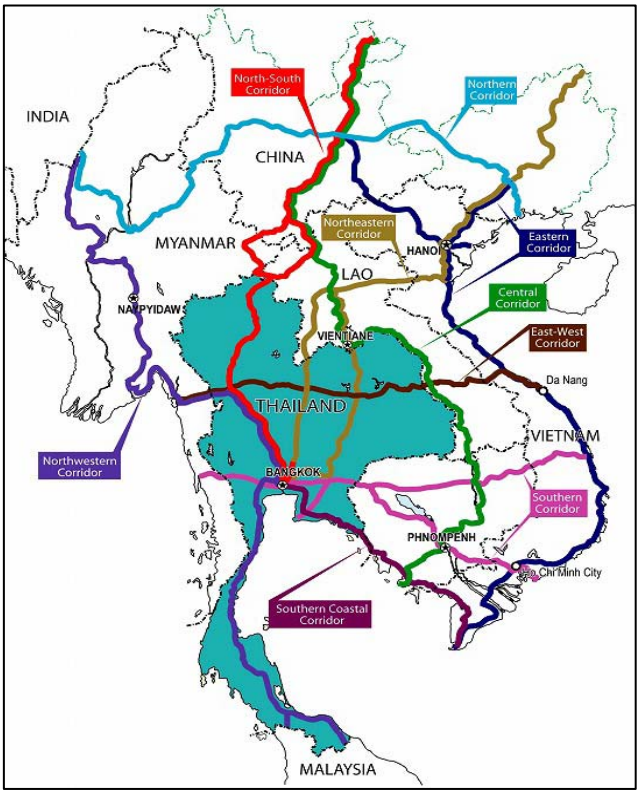


Figure 1: GMS Economic Corridor

At the time of ex-post evaluation, the 10th National Economic and Social Development Plan (2007-2010) set the following missions: (i) human resource development, (ii) regional and social based development, (iii) enhancement

[1] The First Phase of the Four-Lane Highway Widening Project (target length: 1,891km) was established in February 1993 in order to attain the following objectives of the 7th Road Development Plan (1992-1996): (i) construction of inter-city motorways, (ii) widening of the existing major trunk highways between Bangkok and major regional cities and emerging economic regions, (iii) rehabilitation of the existing national highways network for the improvement of transport efficiency, and (iv) increase in road traffic safety. In association with the First Phase Project, JICA financed the two ODA loan projects "Regional Road Improvement Projects (I) and (II)" (project cost: 23,848 million Yen, project period: 1994-2001) and about 630 km of the national highways in the center and south of Thailand were widened through these ODA loan projects.

of economic efficiency, (iv) conservation of natural resources, and (v) development of national administration to achieve good governance. Relating to mission (iii), the plan set a target to reduce the usage of petroleum in the transport sector. In accommodating the increase in traffic and hence relieving congestion along the highway project corridor, the project helped to reduce gasoline consumption.

Presently Thailand and its neighboring countries have been promoting regional economic cooperation through transport infrastructure development, particularly the development of the nine economic corridors: the North-South Corridor, the Northern Corridor, the Eastern Corridor, the East-West Corridor, the Southern Corridor, the Southern Coastal Corridor, the Central Corridor, the Northeastern Corridor, and the Northwestern Corridor, based on "the Greater Mekong Subregion (GMS) Economic Cooperation Program[2]" initiated by the Asian Development Bank (ADB), which considered the spillover effects of the nine corridors on industry and people's livelihood in the regions. Out of the nine corridors, six GMS economic corridors, the North-South Corridor, the East-West Corridor, the Southern Corridor, the Southern Coastal Corridor, the Northeastern Corridor, and the Northwestern Corridor are located in Thailand (see Figure 1). Since the project target section is part of the above mentioned GMS economic corridors, the project objective is in line with the international regional development policy. As of February 2009 the Second Phase of the Four-Lane Highway Widening Project had completed the four-laning of 1,601 km of road which is equal to about 30% of the target road length. The rest of the sections are still ongoing.

2.1.2 Consistency with Development Needs

At the time of appraisal, each target section, which had been a two-lane road, already had an average daily traffic volume of over 8,000 vehicles per day. This was taken as a rough indicator for upgrading roads from two-lane to four-lane, where traffic volume was also expected to increase continuously. Also, a mixture of large and small vehicles, including motorcycles, as well as high speed and low speed vehicles had adversely affected the traffic capacity and caused massive traffic jam during peak hours in the morning and evening. Therefore, the necessity for upgrading the existing two-lane roads to four-lane roads was high.

At the time of the ex-post evaluation, each target section functioned as one of the main national highways of each area, and after completion of the project, they have all continued to play an important role in regional economics and logistics. For example, the

[2] The target area of the program includes five nations and two provinces located in the Mekong River basin: Cambodia, Laos, Myanmar, Vietnam, Thailand and Yunnan Province and Guanxi Zhuang Autonomous Region in China.

Mukdahan-Nikhom Kham Soi section (NH212) is crucial for cross border trading between Thailand and Laos and Vietnam. There is also a development plan to make Khon Kaen a logistic center of North-Eastern Thailand (Isan region) in the near future, and the Nong Ruea-Khon Kaen-Yang Talat section (NH12 and NH209) will play an important role as a logistic route. Some of the target sections are part of the GMS Economic Corridors and it is expected that the traffic volume of the corridors will increase along with accelerated economic activities in the regions. Thus it is evaluated that project needs after the time of the ex-post evaluation continue to be high.

2.2 Efficiency (Rating: a)

Both project period and costs were as planned, therefore, efficiency of the project is high.

2.2.1 Outputs

The outputs of the project were the widening of the existing two-lane roads to four-lane roads for the main trunk highways in seven locations in the country, and these were implemented as planned. In addition, the four-laning of the following two sections (total 63.4km): the link to the Phitsanulok-Uttaradit section, the Wang Thong-Sak Lek section (38.1km) (NH11) and the Phitsanulok bypass road (25.3km) were added to the outputs (see Table 1 and Figure 2).

Table 1: Comparison of Planned and Actual Outputs

Planned Outputs (at Appraisal)	Actual Outputs (At Ex-Post Evaluation)
(1) Four-laning of roads and bridges at the following sections: (NH11) Phitsanulok-Uttaradit..... 97.0km (NH12) Khon Kaen-Nong Ruea ..... 36.0km (NH23) Ban Phai-Borabue..... 46.0km (NH209) Khon Kaen-Yang Talat..... 65.0km (NH212) Mukdahan-Nikhom Kham Soi ... 35.0km (NH401) Don Sak-Sichon..... 32.0km (NH403) Nakhon Si Thammarat-NH41 Junction ..... 32.0km (Total).....343.0km	(1) Four-laning of roads and bridges at the following sections: (NH11) Phitsanulok-Uttaradit..... 97.7km (NH12) Khon Kaen-Nong Ruea..... 47.2km (NH23) Ban Phai-Borabue..... 70.0km (NH209) Khon Kaen-Yang Talat ..... 66.8km (NH212) Mukdahan-Nikhom Kham Soi... 37.8km (NH401) Don Sak-Sichon..... 47.6km (NH403) Nakhon Si Thammarat-NH41 Junction ..... 31.8km (Total).....398.9km Additional Outputs (NH11) Wang Thong-Sak Lek..... 38.1km (NH12) Phitsanulok bypass ..... 25.3km (Total)..... 63.4km (Grand total).....462.3km
(2) Consulting services - Foreign consultants: 41 M/M - Local consultants: 112 M/M	(2) Consulting services - Foreign consultants: 62 M/M - Local consultants: 126 M/M

These two additional sections were already in the list of the Second Phase of the Four-Lane Highway Widening Project as roads that needed to improve to four-lane during the period 2007-2011, and since their priority was relatively high, it was decided to conduct construction ahead of schedule. From the point of view of necessity, the distance of the following target sections were extended: 11.2km for the Khon Kaen-Nong Ruea section (NH12), 24km for the Ban Phai-Borabue section (NH23), and 15.6km for the Don Sak-Sichon section (NH401). The additional costs required for the above additional works were allocated from residual funds saved by the results of the competitive tender.

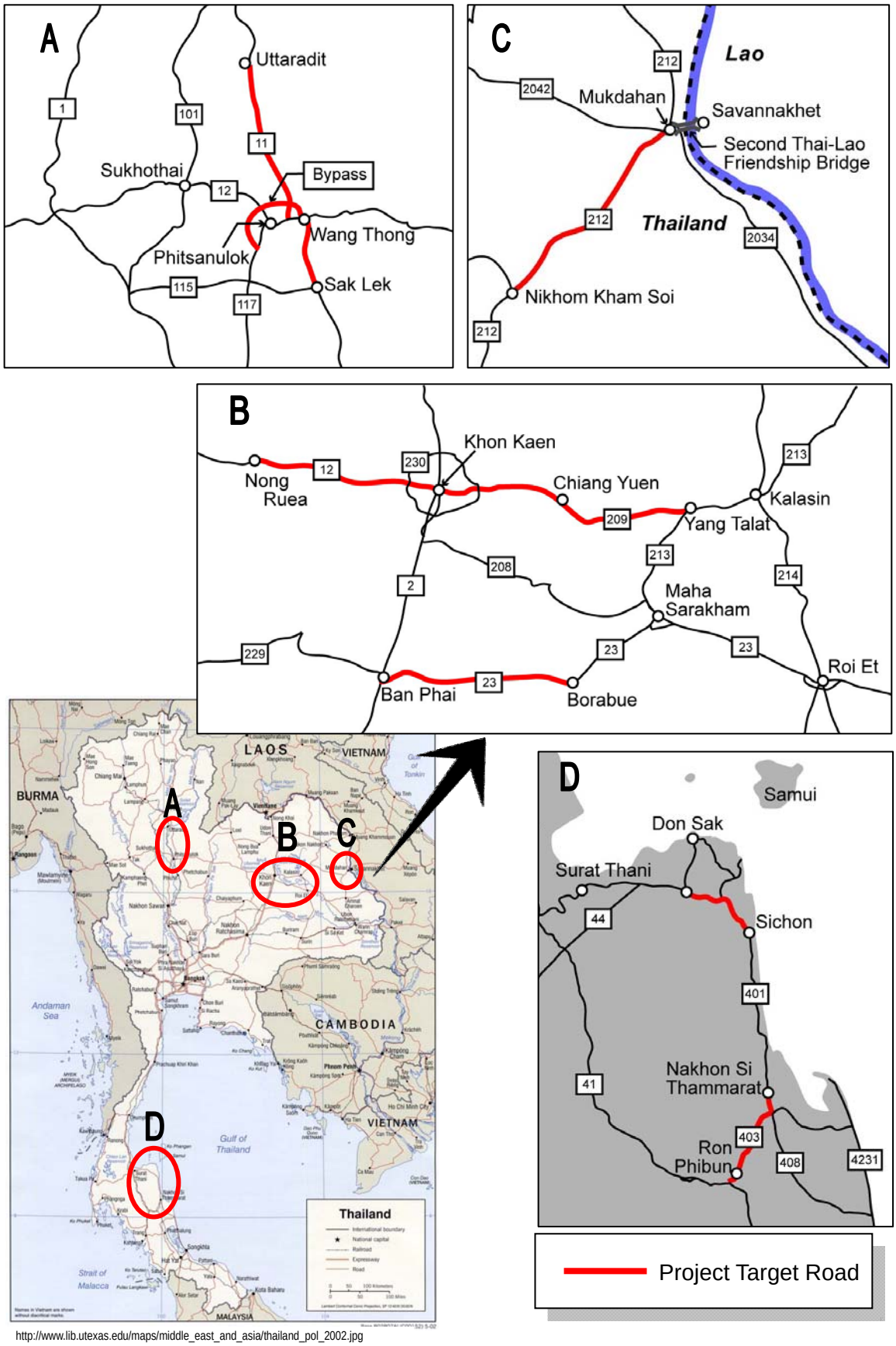
Because of the additional project outputs, additional work volumes of 21 M/M for foreign consultants and 14M/M for local consultants were added. It is considered that the above mentioned additional outputs were appropriate as they were in line with the road development plan, recognized priorities and were consistent with the objectives of this project.

2.2.2 Project period

The actual project period was 4 years and 7 months from July 2000 to January 2005 against a planned period of 4 years 5 months from January 2000 to May 2004, which was equal to 104% of the planned period (the project period was deemed to be from the start of detailed design to the end of consulting services). Considering that this project included the additional construction of extended sections, it can be said that the actual construction period was within its original schedule.

2.2.3 Project cost

The actual project cost was 22,752 million yen (of which the Japanese ODA loan was 17,068 million yen) against the planned cost of 26,058 million yen (of which the Japanese ODA loan was 19,544 million yen), which is equal to 87% of the planned cost and 87% of planned loan amount. This is because of the cost reduction effects of a competitive bidding which resulted in the lowering of actual construction costs. There was a low cost competition among the contractors who foresaw the order entry, as well as a decreased construction unit price due to lower prices for construction materials and wages since the currency crisis in Asia in 1997.



http://www.lib.utexas.edu/maps/middle_east_and_asia/thailand_pol_2002.jpg

Figure 2: Map of Project Target Sections

2.3 Effectiveness (Rating: b)

Although reductions in travel time and increased velocity were observed, the target sections of this project have not achieved their target traffic volume. However, there have been some positive impacts such as smoother and more efficient commodity distribution, the promotion of the local economy and regional development, and the promotion of economic relations with neighboring countries. Therefore, this project has had certain effects, and its effectiveness is moderate.

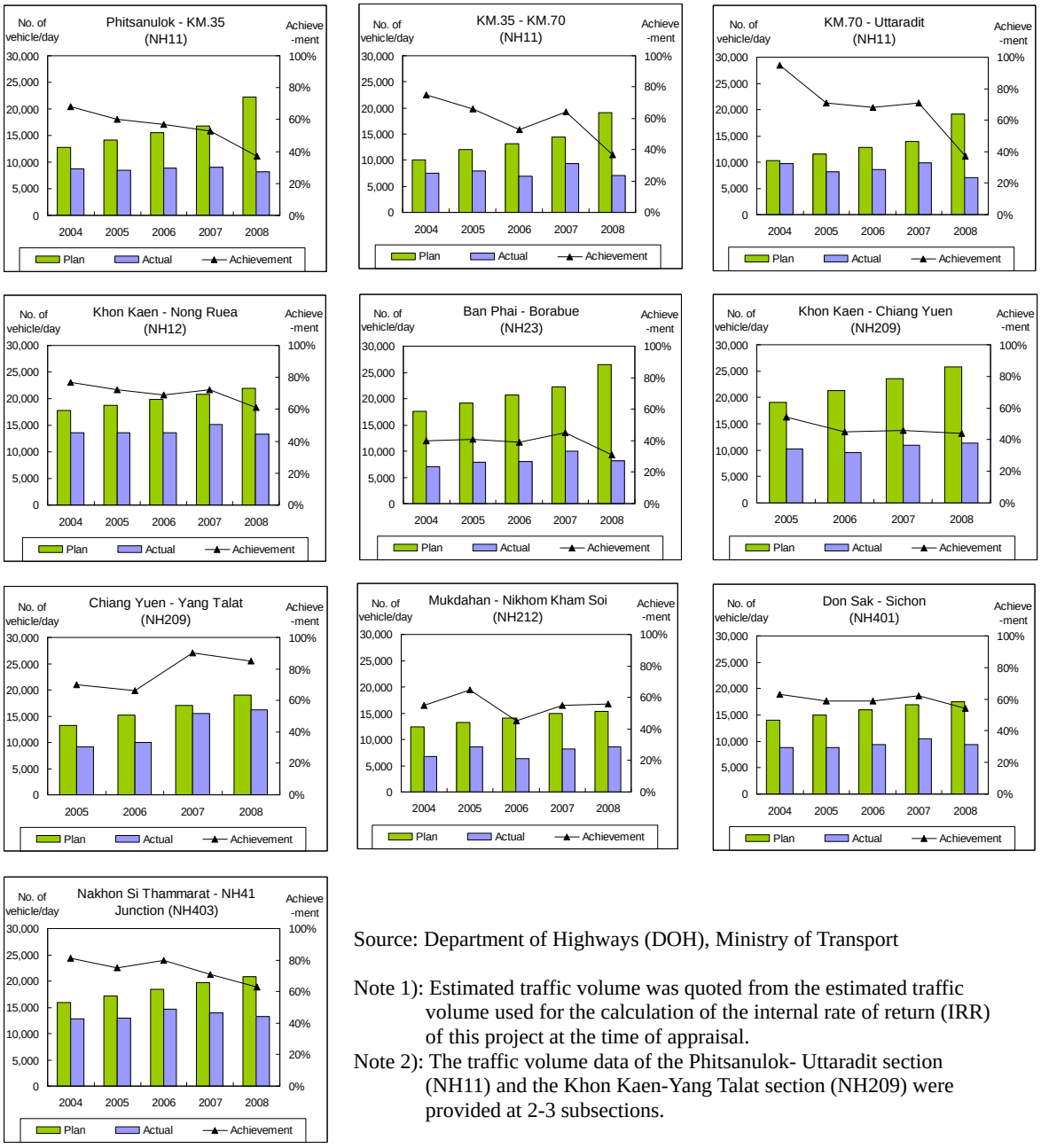
2.3.1 Increase in Traffic Volume

Figure 3 shows the transition of the estimated and actual traffic volumes for the target sections of this project between 2000 and 2008 (for the estimated traffic volume, data between 2004 and 2008 is shown as it was the only available data). Data for the actual traffic volume after 2004 indicates that none of the target sections achieved its target. For example, in 2008, the actual achievement rate for each section was as follows: 37% for the Phitsanulok-Uttaradit section (NH11), 61% for the Khon Kaen-Nong Ruea section (NH12), 31% for the BanPhai-Borabue section (NH23), 44% for the Khon Kaen-Chiang Yuen section (NH209), 85% for the Chian Yuen-Yang Talat section (NH209), 56% for the Mukdahan-Nikhom Kham Soi section (NH212), 54% for the Don Sak-Sichon section (NH401), and 63% for the Nakhon Si Thammarat-NH41 Junction section (NH403). It should be noted that these target achievement rates were relatively high in 2004 and 2005 in many sections[3], and then they started to decrease gradually. Each section has a unique transition in traffic volume when compared to the others, for example, the Khon Kaen-Yang Talat section on NH209 experienced a rapidly increased traffic volume in 2000 and 2001 then another rapid decline afterwards.

The reason for such phenomena is not clear from this ex-post evaluation, however, according to the Department of Highways (DOH), which is the executing agency of this project, they could be due to increased detour traffic to the four lane national highways that are next to the target sections as well as to escalating gasoline prices. Also another reason for such a low target achievement rate in traffic volume could possibly come from a somewhat optimistic estimate of traffic volume at the time of project planning[4].

[3] For example, 68-95% in 2004 for the three sections of Phitsanulok-Uttaradit (NH11), 77% in 2004 for the Khon Kaen-Nong Ruea section (NH12), 41% in 2005 for the BanPhai-Borabue section (NH23), 54% in 2005 for the Khon Kaen-Chiang Yuen section (NH209), 70% in 2005 for the Chian Yuen-Yang Talat section (NH209), 65% in 2005 for the Mukdahan-Nikhom Kham Soi section (NH212), 63% in 2004 for the Don Sak-Sichon section (NH401), and 81% in 2004 for the Nakhon Si Thammarat-NH41 Junction section (NH403).

[4] The annual average growth rates in traffic volume between 2004 and 2008 for each target section, which were quoted from the traffic volume estimates used for the calculation of the internal rate of return (IRR) at appraisal were 14.6-17.4% for the three sections of Phitsanulok-Uttaradit (NH11), 5.5% for the Khon Kaen-Nong Ruea section (NH12), 10.9% for the BanPhai-Borabue section (NH23), 10.6% for the Khon Kaen-Chiang Yuen section



Source: Department of Highways (DOH), Ministry of Transport

Note 1): Estimated traffic volume was quoted from the estimated traffic volume used for the calculation of the internal rate of return (IRR) of this project at the time of appraisal.

Note 2): The traffic volume data of the Phitsanulok- Uttaradit section (NH11) and the Khon Kaen-Yang Talat section (NH209) were provided at 2-3 subsections.

Figure 3: AADT of Project Target Sections

For the purpose of reference, this ex-post evaluation survey conducted a 24-hour sampling traffic count at the Khon Kaen-Chiang Yuen section (NH209) and the Don Sak-Sichon section (NH401). The result of the sampling traffic count is shown in Table 2, and it can be seen that there was no significant difference when comparing the traffic volume of the two sections in 2008, as shown in Figure 3.

(NH209), 12.8% for the Chian Yuen-Yang Talat section (NH209), 5.6% for the Mukdahan-Nikhom Kham Soi section (NH212), 5.6% for the Don Sak-Sichon section (NH401), and 7.1% for the Nakhon Si Thammarat-NH41 Junction section (NH403). The above mentioned annual average growth rates seem relatively high.

Table 2: Result of Sample Traffic Count

	Khon Kaen Province (North-East Thai)	Surat Thani Province (South Thai)
1. Date	April 2, 2009 (24 hours)	April 7, 2009 (24 hours)
2. Place	The Khon Kaen-Chiang Yuen section (National Highway 209)	The Dong Sak-Sichon section (National Highway 401)
3. Traffic Volume	9,331 vehicles/day	11,230 vehicles/day
4. Breakdown	Motorcycles: 775 (8.3%) Passenger cars: 6,095 (65.3%) Small/medium/large buses: 172 (1.8%) Small/medium/large trucks: 2,289 (24.5%)	Motorcycles: 2,397 (21.3%) Passenger cars: 5,939 (52.9%) Small/medium/large buses: 718 (6.4%) Small/medium/large truckes: 2,176 (19.4%)

Source: Ex-post evaluation survey team.

2.3.2 Savings in travelling time and improvement in velocity

After completion of the project, the travel time for all target sections was reduced to a quarter or half of what was originally seen. Velocity also improved by three times compared to the time before project implementation (See Table 3). Positive effects are clearly seen in travel time and velocity[5], and this is also proven in the beneficiary survey (For the results of the beneficiary survey, see the "Summary Results of the Beneficiary Survey Conducted in this Ex-Post Evaluation" later in this report).

Table 3: Travelling Time and Velocity

NH	Section	km	Travelling time (minutes)		Velocity (km/hour)	
			Before	After	Before	After
11	Phitsanulok-Uttaradit	93.7	150	57	37.5	99
12	Khon Kaen-Nong Ruea	47.2	120	32	24	89
23	Ban Phai-Borabue	70.0	90	47	47	89
209	Khon Kaen-Chiang Yuen-Yang Talat	66.8	90~120	45	25~34	70
212	Mukdahan-Nikhom Kham Soi	37.8	60	20~28	38	81~113
401	Don Sak-Sichon	47.6	40~60	30~35	48~71	82~95
403	Nakhon Si Thammarat-NH41 Junction	31.8	90	30	21	64

Source: Department of Highways (DOH), Ministry of Transport

Note: The travelling time for each target section after project completion is based upon the results of the survey in 2006/2007 conducted by DOH except the Nakhon Si Thammarat-NH41 Junction section. On the other hand, the travelling time before project implementation is based upon the results of the interview survey for the Bureau of Highways and the Highway Districts of DOH which are in charge of operation and maintenance of each target section. The velocity for each target section before and after project implementation is calculated on the basis of the above motioned travelling time.

2.3.3 Results for the Economic Internal Rate of Return (EIRR)

Table 4 shows a comparison of the Economic Internal Rate of Return (EIRR) for each target section based upon cost-benefit analyses at appraisal and ex-post evaluation. The

[5] According to the Land Transport and Highway Acts of Thailand, the legal speed limit for national highways in non-built up areas is 90 km/h. However, in fact, it is often observed the vehicles exceeding the legal speed limit in the target section due to relatively low traffic volume, wide road width and good road surface condition after project implementation.

results of the EIRR at ex-post evaluation are taken from the results of the recalculation of EIRR conducted by the Department of Highways (DOH), the executing agency of this project, using the same preconditions as at appraisal[6]. One of the main factors for the re-calculated EIRR figure being lower when compared to the appraisal, with the exception of the Khon Kaen- Yang Talat section (NH209), could be that the actual traffic volume growth was rather slower than estimated.

Table 4: Results of the Economic Rate of Return (EIRR)

NH	Section	EIRR	
		Planned (2000)	Actual (2008)
11	Phitsanulok-Uttaradit	31.7%	17.8%
12	Khon Kaen-Nong Ruea	31.3%	26.6%
23	Ban Phai-Borabue	54.9%	39.4%
209	Khon Kaen-Chiang Yuen-Yang Talat	38.9%	44.4%
212	Mukdahan-Nikhom Kham Soi	32.9%	15.1%
401	Don Sak-Sichon	26.7%	13.1%
403	Nakhon Si Thammarat-NH41 Junction	30.2%	19.9%

Source: Project Completion Report (PCR) prepared by the Department of Highways (DOH) in September 2009.

2.3.4 Satisfaction level of the project beneficiaries

In this ex-post evaluation, a beneficiary survey was conducted targeting local residents as well as local transporters and businesses in Khon Kaen Proince in the North-East of Thailand and Surat Thani Province in the South of Thailand. According to the results of a satisfaction survey as shown in Table 5, 54% of respondents (122 respondents) answered that they were “very much satisfied”, 40% of respondents (90 respondents) were “satisfied to some extent”, and 6% of respondents (13 respondents) were “not much satisfied” as seen in Table 6. Overall, more than 90% of respondents were either “very much satisfied” or “satisfied to some extent” and thus it can be said that this project has met the needs of the beneficiaries.

Table 5: Satisfaction Level of Beneficiaries

	Khon Kaen Province (North-East Thai)			Surat Thani Province (South Thai)			Total	%
	Residents	Trans -porters	Businesses	Residents	Trans -porters	Businesses		
Very much satisfied	13	28	10	21	25	25	122	54%
Satisfied to some extent	7	6	28	9	20	20	90	40%
Not much satisfied	1	6	3	1	1	1	13	6%
Not satisfied at all	0	0	0	0	0	0	0	0%
Do not know	0	0	0	0	0	0	0	0%
Total	21	40	41	31	46	46	225	100%

Source: The results of the beneficiary survey conducted by the ex-post evaluation team.

[6] The preconditions of the cost-benefit analysis of this project are: (i) cost: project cost and operation and maintenance cost, (ii) benefit: saving of operation cost for vehicles, time saving cost, and saving of traffic accident cost, and (iii) project life: 20 years after project completion.

The Phitsanulok-Uttaradit section (NH11)

The Khon Kaen-Nong Ruea section (NH12)

The Ban Phai-Borabue section (NH23)

The Mukdahan-Nikhom Kham Soi section (NH212)

The Don Sak-Sichon section (NH401)

The Nakhon Si Thammarat-NH41 Junction section (NH403)

Photographs of the project target sections

2.4 Impact

2.4.1 Impact on smooth and efficient passenger and cargo transport

As already described in *2.3.2 Savings in travelling time and the improvement of velocity*, time reduction and an average speech increase were attained after the completion of the project. As a case study for this ex-post evaluation, a beneficiary survey and interviews with stakeholders were conducted in Khon Kaen Province, Maha Sarakam Province, and Kalasing Province in North-Eastern Thailand (Isan region) where three of the target sections are located: the Khon Kaen-Nong Ruea section (NH12), the Ban Phai-Borabue section (NH23), and the Khon Kaen-Yang Talat section (NH209), as well as in Surat Thani Province and Nakhon Si Thammarat Province in Southern Thailand where two of the target sections are located: the Don Sak-Sichon section (NH401) and the Nakhon Si Thammarat-NH41 Junction section (NH403).

The main industry of the Isan region, which includes Khon Kaen Province, is agriculture, and according to the Khon Kaen Province Road Transport Office, the transportation route between farms and processing plants has become smoother since the completion of the project, and convenience has improved when residents bring their products to market. This is because Khon Kaen city is located at the junction of the East-West Corridor and the Northeastern Corridor that travel to Da Nang in Vietnam from Mawlamyain in Myanmar through Thailand and Laos, and travel to Vientiane in Laos from Bangkok, respectively.

Khon Kaen Province will take advantage of its convenient location, and aims to be the future commodity distributions center for the Isan region. For this purpose, it is imperative that there is a four-lane road that is more appropriate for large transportation vehicles, and it can be said that this project has played an important role in implementing such a plan.

The Don Sak-Sichon section and the Nakhon Si Thammarat-NH41 Junction section are used as a route for tourism transportation and the transportation of agricultural products in addition to the road's important role as the regional arterial highway connecting Surat Thani and Nakhon Si Thammarat. For example, approximately 1,800 vehicles use ferries from the two ferry ports in Don Sak to go to Samui Island, which is one of the well known beach resorts in Thailand, and some of them use this project road. In Southern Thailand, which includes Surat Thani Province and Nakhon Si Thammarat Province, but in the coastal areas near Nakhon Si Thammarat Province in particular, there are plans for oil refinery plants for the underwater oilfield as part of the Thailand Bay and Port Development Plan, and there is a possibility of regional development promotion. There is also a new beach resort development plan for the coastal areas. These coastal areas of Southern Thailand possess the potential for port, industrial and tourism development and it is most likely that this project will contribute to streamlining local commodity distribution.

2.4.2 Impact on the local economy and regional development

The Gross Regional Domestic Project (GRDP), the agricultural output and the industrial output in the eight provinces where the target sections are located have had marked growth between 2000 and 2007 (see Table 6). Regarding the numbers of registered companies and factories along the target sections in the eight provinces, there has been some growth in all provinces after project implementation except for Kalasin (See Table 7 and 8). Between 2005 to 2008, when the project was completed, the number of registered companies increased by 1958 in Surat Thani, and 588 in Khon Kaen; the number of factories along the target sections increased by 214 in Khon Kaen followed by 107 in Phitsanulok. According to an interview survey with the Provincial Industrial Office in Khon Kaen, which is under the Ministry of Industry, contributing factors in the increase in factories in Khon Kaen were cheaper labor due to large population and its geographical position as a nuclear city located at the junction of the East-West Corridor and the Northeastern Corridor. As described in *2.4.1 Impact on smooth and efficient passenger and cargo transport*, there is the potential for ports, industrial complexes and tourism development in the Southern coastal region of Thailand.

The increase in new business activities and the expansion of business opportunities were also recognized as positive changes in the beneficiary survey in Khon Kaen and Surat Thani.

After project implementation, there were the positive economic effects along the target sections as described above as well as possibilities for local development in the future, thus it is considered that this project plays in important role in supporting the development of its target areas.

Table 6: Major Economic Indicators in the Target Provinces (Constant Price)

(Unit: million Bahts)

Province	GRDP			Investment in Manufacturing			Manufacturing Output			Agricultural Output		
	2000	2007	Growth rate	2000	2007	Growth rate	2000	2007	Growth rate	2000	2007	Growth rate
Phitsanulok	35,175	54,769	6.5%	5,355	8,583	7.0%	5,507	4,862	-1.8%	6,979	13,932	10.4%
Uttaradit	15,545	26,900	8.1%	5,501	7,048	3.6%	1,741	3,577	10.8%	3,161	7,956	14.1%
Khon Kaen	66,375	127,089	9.7%	49,828	73,280	5.7%	18,375	46,262	14.1%	6,778	14,829	11.8%
Kalasin	20,080	38,368	9.7%	2,762	3,698	4.3%	2,604	5,458	11.2%	3,623	9,649	15.0%
Maha Sarakham	19,918	33,983	7.9%	1,320	6,384	25.3%	1,798	3,852	11.5%	3,689	6,749	9.0%
Mukdahan	7,968	12,970	7.2%	3,302	4,719	5.2%	918	1,507	7.3%	1,324	2,953	12.1%
Surat Thani	52,825	120,749	12.5%	18,315	26,875	5.6%	8,616	19,972	12.8%	14,111	43,807	17.6%
Nakhon Si Thammarat	74,743	122,764	7.3%	26,094	31,308	2.6%	9,055	14,690	7.2%	19,444	33,163	7.9%

Source: Thai Statistics Bureau.

Note: The growth rate represents an annual average growth rate of 7 years between 2000 and 2007.

Table 7: Number of Registered Companies in the Target Provinces

Province	Phitsanu -lok	Uttaradig	Khon Kaen	Kalasin	Maha Sarakham	Mukdahan	Surat Thani	Nakhon Si Thammarat
(Population)	(843,000)	(463,000)	(1,756,000)	(978,000)	(937,000)	(336,000)	(984,000)	(1,514,000)
Target section	(1) (8) (9)		(2) (3) (4)			(5)	(6) (7)	
2002	130	n.a.	4,400	n.a.	n.a.	55	9,614	n.a.
2003	184	1,005	4,644	n.a.	n.a.	66	10,959	n.a.
2004	167	1,134	4,872	n.a.	n.a.	47	6,952	n.a.
2005	174	1,067	5,068	n.a.	n.a.	73	8,341	n.a.
2006	169	1,148	5,251	94	88	67	9,549	250
2007	176	1,231	5,444	71	114	67	9,280	229
2008	189	1,229	5,656	79	117	74	10,299	267
Change in 2005~2008	+15	+162	+588	-15	+29	+1	+1,958	+17

Source: Provincial Business Development Office of each province under the Ministry of Commerce.

Note 1): The number of registered companies between 2006 and 2008 is not available for the three provinces of Kalasin, Mahasarakham and NakhonSi Thammarat.

Note 2): (1) the Phitsanulok-Uttaradit section (NH11), (2) the Khon Kaen-Nong Ruea section (NH12), (3) the Ban Phai-Borabue section (NH23), (4) the Khon Kaen-Yang Talat section (NH209), (5) the Mukdahan-Nikhom Kham Soi section (NH212), (6) the Don Sak-Sichon section (NH401), (7) the Nakhon Si Thammarat-NH41 Junction section (NH403), (8) Phitsanulok city road (KM 0-4) and the Wang Thong-Sak Lek section (NH11), and (9) the Phitsanulok bypass (NH12).

Table 8: Number of Factories in the Target Province (Newly registered companies for each year)

Province	Phitsanu -lok	Uttaradig	Khon Kaen	Kalasin	Maha Sarakham	Mukdahan	Surat Thani	Nakhon Si Thammarat
(Population)	(843,000)	(463,000)	(1,756,000)	(978,000)	(937,000)	(336,000)	(984,000)	(1,514,000)
Target section	(1) (8) (9)		(2) (3) (4)			(5)	(6) (7)	
unitl 2000*	588	185	1,690	760	728	177	25	343
2001	29	8	25	17	7	2	2	3
2002	33	9	28	18	15	8	8	10
2003	26	14	19	14	25	11	5	12
2004	31	14	35	9	25	34	7	14
2005	27	12	55	14	6	7	4	21
2006	15	26	55	9	13	18	8	14
2007	24	5	55	19	16	15	9	16
2008	41	15	49	14	19	6	3	18
Total	814	288	2,011	874	854	278	71	451
Change in 2005~2008	+107	+58	+214	+56	+54	+46	+24	+69

Source: Provincial Industrial Office of each province under the Ministry of Industry.

Note 1): The names of the target section (1)-(8) are same as in Table 7.

Note 2): *Accumulated numbers until 2000. After 2001 the number of newly registered factories is provided.

Note 3): The number of registered factories in Table 9 does not represent that of each province as a whole but that of the respective districts where each target section is located. These districts are: (a) Mueang Phitsanulok district, Phrom Phiram district, Wat Bot district and Wang Thong district in Pitsanulok Province, (b) Mueang Uttaradit district, Tron district and Phichai district in Uttaradit Province, (c) Mueang Khon Kaen district, Ban Fang district, Nong Rhuea district, and Ban Phai district in Khon Kaen Province, (d) Mueang Kalasin district and Yang Talat district in Kalasing Province, (e) Mueang Maha Sarakham district, Chiang Yuen district and Borabue district in Maha Sarakham Province, (f) Mueang Mukdahan district and Nikhom Kam Soi district in Mukdahan Province, (g) Don Sak district in Surat Thani Privince, and (h) Mueang Nakhon Si Thammarat district and Ron Phibun district in Nakhon Si Thammarat Province.

2.4.3 Impact on the promotion of economic relations with neighboring counters

Thailand has been actively expanding international trade with Myanmar, Laos and Vietnam over the years. By 2008, border trade had expanded to 98.3% of total trade (see Table 9). Since the railroad system is undeveloped in Thailand, the primary means of transportation in international trading is the land transportation, and so the East-West Corridor and the South-North Corridor play an important role. The trading that goes through Mukdahan, which is the starting point of the Mukdahan-Nikhom Kham Soi section (NH212), has expanded with exports from Thailand to Laos or to other third countries through Laos following the completion of the Second Mekong International Bridge[7] (See Table 10). For this reason, it is considered that the project has contributed to the promotion of economic relations with neighboring counters.

[7] Constructed by the Japanese ODA loan project “Second Mekong International Bridge Construction Project” with operations starting in December 2006.

Table 9: Trade between Thailand and Laos

(Unit: million Bahts)

	2005	2006		2007		2008	
a) Entire trade			(vs 2005)		(vs 2006)		(vs 2007)
1. Total	40,090	58,473	45.9%	61,480	5.1%	78,828	28.2%
Export	30,965	38,720	25.0%	45,185	16.7%	58,391	29.2%
Import	9,125	19,753	116.5%	16,295	-17.5%	20,437	25.4%
2. Balance	21,840	18,967	-13.2%	28,890	52.3%	37,954	31.4%
b) Border trade							
1.Total	36,611	46,432	26.8%	51,880	11.7%	77,521	49.4%
(b/a)	(91.3%)	(79.4%)		(84.4%)		(98.3%)	
Export	29,844	35,494	18.9%	41,602	17.2%	56,029	34.7%
Import	6,767	10,938	61.6%	10,278	-6.0%	21,492	109.1%
2.Balance	23,077	24,556	6.4%	31,324	27.6%	34,537	10.3%

Source: Thai Customs.

Table 10: Volume of Trade via Mukdahan Customs

(Unit: million Bahts)

	Export	Import	Balance
2004	552.51	4,653.22	4,127.71
2005	854.98	5,721.26	4,821.87
(vs 2004)	(54.7%)	(23.0%)	
2006	2,318.96	6,140.82	3,821.87
(vs 2005)	(171.2%)	(7.3%)	
2007	9,604.94	6,145.04	-3,459.91
(vs 2006)	(314.2%)	(0.07%)	

Source: Thai Customs.

2.4.4 Improvements in the living standards of local residents

According to the results of the beneficiary survey for local businesses and transporters, the expansion of business activities, the increase in business opportunities, the increase in job opportunities and the improvement in access to various services such as medical services, health care and schools were perceived as positive changes after project implementation. Another beneficiary survey for local residents in Khon Kaen revealed that community expansion and prosperity were recognized as major changes. It is considered that to some extent the project has contributed to the improvement of the living standards of local residents.

2.4.5 Impact on traffic accidents

Table 11 shows the number of traffic accidents and fatalities within the target sections during 2000 and 2007. They all shared the same trend of a decreasing number of traffic

accidents and fatalities from 2001 to 2002, which then increased and reached its peak in 2005 before starting to decrease again after 2006. According to the Department of Highways (DOH) of the Ministry of Transport, the intensive traffic safety campaign under the administration of former Prime Minister Taksin was the main cause of the decrease in the number of accidents and fatalities between 2001 and 2002. The reason why the number of traffic accidents and fatalities vary from year to year is because it is common not to report accidents to the police unless they are major fatal accidents, and those involved often organize compensation among themselves. In some cases even the police do not keep records of minor accidents, and the DOH suggests the possibility of a gap between the actual number of accidents and the ones on record. The primary cause of traffic accidents is speeding[8]. Since there is only limited data on the causal correlation between the number of traffic accidents and this project however, it is difficult to make a clear judgment in this ex-post evaluation.

The DOH has been taking measures for traffic accident prevention such as the installation of more traffic lights, street lights and reflective plates and it has also made some changes in road design such as reducing U-turn points as well as the promotion of traffic safety campaigns with local governments and police authorities.

Table 11: Number of Traffic Accidents and Fatalities

NH	Section		2000	2001	2002	2003	2004	2005	2006	2007
11	Phitsanulok-Uttaradit	No. Accidents	37	23	22	15	46	49	33	23
		Fatalities	18	1	4	2	14	4	5	2
12	Khon Kaen-Nong Ruea	No. Accidents	23	11	5	19	49	32	4	9
		Fatalities	8	-	3	5	8	8	-	2
23	Ban Phai-Borabue	No. Accidents	6	5	7	12	17	60	30	20
		Fatalities	-	2	2	2	11	14	6	4
209	Khon Kaen-Yang Talat	No. Accidents	1	2	-	-	7	43	25	20
		Fatalities	-	2	-	-	-	6	10	10
212	Mukdahan-Nikhom Kham Soi	No. Accidents	1	5	3	3	11	14	5	8
		Fatalities	-	1	3	-	8	2	1	2
401	Don Sak-Sichon	No. Accidents	4	3	7	2	8	6	5	6
		Fatalities	1	-	5	3	1	4	-	1
403	Nakhon Si Thammarat - NH41 Junction	No. Accidents	35	33	4	3	7	16	22	14
		Fatalities	1	4	1	-	2	-	1	1

Source: Department of Highways (DOH), Ministry of Transport

[8] According to the statistics, 86% of traffic accidents in Thailand as a whole are caused by speeding (source: Traffic Accidents on National Highways 2007, Bureau of Highway Safety, Department of Highways, Ministry of Transport, Thailand).

2.4.6 Impact on the natural environment

According to the beneficiary survey for local transporters and businesses in the ex-post evaluation survey, 53% of respondents answered that there had been environmental impacts (of which 16% of the respondents replied “very much” and 37% replied “to some extent”). The perceptions of the above respondents of the dimensions of the environmental impact were: “increase in air pollution (72%)”, “increase in noise (79%)” and “increase in vibration 68%)” after project implementation. However, as environmental data was not collected in the project area, an analysis of whether the actual data surpasses environmental standards is not available. Due to the lack of objective data, the beneficiaries’ opinion cannot be verified.

2.4.7 Impact on the social environment associated with the resettlement of residents and land acquisition

Since all the necessary land acquisitions were completed upon the construction of the existing two-lane roads, there was no need for further land acquisition and relocation of residents for this project.

Summary Results of the Beneficiary Survey Conducted in this Ex-Post Evaluation

In the ex-post evaluation of the "Regional Road Improvement Project (III)", a questionnaire survey and group interviews (Focus Group Discussions) with beneficiaries were carried out. A summary of the results of the beneficiary survey is as follows.

<Focus group discussion with local residents living along the project target road>
(1) Place: Khon Kaen and Surat Thani
(2) Time: April 2009
(3) Target group: Local residents living along the target section in Khon Kaen and Surat Thani
(4) No. of samples: 21 (20 male and 1 female) in Khon Kaen
31 (21 male and 10 female) in Surat Thani Total: 52

(5) Top Six "Changes" that Participants Consider Most Important

Response in Khon Kaen (N=21)	No. of Votes
1. Increase in convenience when travelling	26
2. Community expansion and prosperity	10
3. Serious traffic accidents	8
4.Visiting neighbors on both sides of the road became less convenient	8
5. Improvement in safety when travelling	4
6. Improvement in landscape	4
7. Increase in floods in the community	4

Response in Surat Thani (N=31)	No. of Votes
1. Faster travel than before (i.e. increase in convenience when travelling)	21
2. Increase in traffic accidents	17
3. Travelling within the community became less convenient	16
4. Improvement in safety when travelling	11
5. Savings in travelling time and vehicle operation costs	9
6. Difficulty in crossing the road	4

Note : At first, all the participants discussed the key question, "How has the project changed your life?" Major common changes were extracted through group discussion. Then each participant, each having three votes, was asked to allocate their votes to the "changes" that they thought most important.

(6) Results of Analysis
- The results of focus group in Khon Kaen and Surat Thani show a common tendency.
- Positive changes in socio-economic aspects such as the increase in convenience, the improvement of safety when travelling and prosperity were recognized.
- At the same time, negative impacts such as the increase in traffic accidents and serious traffic accidents were also perceived. Also many residents felt that travelling within the community had become less convenient because they were now obliged to go a long way round when visiting neighbors due to the widening of roads and the installation of center dividers and fences by the project.


FG in Khon Kaen


FG in Surat Thani


Voting

<Questionnaire survey for local businesses and transporters >
(1) Place: Khon Kaen and Surat Thani
(2) Time: April 2009
(3) Target group: Local businesses and transporters
(4) No. of samples: 64 transporters (Khon Kaen: 40, Surat Thani: 24)
87 businesses (Khon Kaen: 41, Surat Thani: 46) Total: 151

(5) Results of Analysis

- 97.6% of businesses in Khon Kaen and 97.8% of businesses in Surat Thani perceived an increase in the convenience of traffic after project implementation. Major reasons for this answer were: increase in comfort (75.6% in Khon Kaen, 78.3% in Surat Thani), savings in travelling time (41.5% in Khon Kaen, 41.5% in Surat Thani), decrease in traffic accidents (31.7% in Khon Kaen, 31.7% in Surat Thani) and so on.
- 95.1% of businesses in Khon Kaen and 93.5% of businesses in Surat Thani recognized the socio-economic impacts of the project. In Khon Kaen these were: increase in population (82.9%), change in land use (61.0%), increase in new business activities (48.8%), increase in accessibility to a variety of services (43.9%) and so on. In Surat Thani, positive impacts that were perceived were: increase in new business activities (58.7%), increase in accessibility to a variety of services (56.5%), increase in business opportunities (54.3%), increase in land price (54.3%), increase in population (54.3%), change in land use (54.3%), increase in job opportunities (52.2%) and so on. (*population means a population in the community of the respondent)
- 97.5% of transporters in Khon Kaen and 95.8% of transporters in Surat Thani recognized an increase in traffic volume after project implementation.
- 65% of transporters in Khon Kaen and 54.1% of transporters in Surat Thani perceived a saving in travelling time after project implementation
- 67.5% of transporters in Khon Kaen and 66.7% of transporters in Surat Thani replied that there was no change in the frequency of transport services, but 75% of transporters in Khon Kaen and 75% of transporters in Surat Thani answered that the number of passengers had decreased after project implementation. It is assumed that an increase in the use of private cars led to the decrease in the use of public transport services.
- 77.5% of transporters in Khon Kaen thought that the number of traffic accidents had increased. They analyzed the causes of traffic accidents as: ignorance of traffic rules on the part of road users (57.5%), carelessness of road users (20%), increase in traffic volume (2.5%) and so on. On the other hand, 41.7% of transporters in Surat Thani answered that the number of traffic accidents had increased, but 41.7% of transporters in Surat Thani replied that the number of traffic accidents had declined. There was a difference between Khon Kane and Surat Thani in their perception of the impact of traffic accidents. This difference may be linked with the difference in the conditions of the two provinces such as size of population, degree of development along the target sections, and the level of road network development.
- As for the effects of development along the target sections, 40% of Khon Kaen transporters and 29.2% of Surat Thani transporters pointed out commercial development, 20.8% of Khon Kaen transporters and 15% of Surat Thani transpoters mentioned the expansion of the community.

<Opinions and recommendation for the project from beneficiaries>

- A major opinion commonly expressed by local residents, businesses, and transporters was the necessity for the installation of fly-overs, traffic lights, and street lights along the project target road for the prevention of traffic accidents. Also, the necessity for better periodic maintenance of roads and bridges was suggested.

Interview survey with a local transporter in Khon Kaen.

Interview survey with a local business in Khon Kaen.

Interview survey with a local business in Surat Thani.

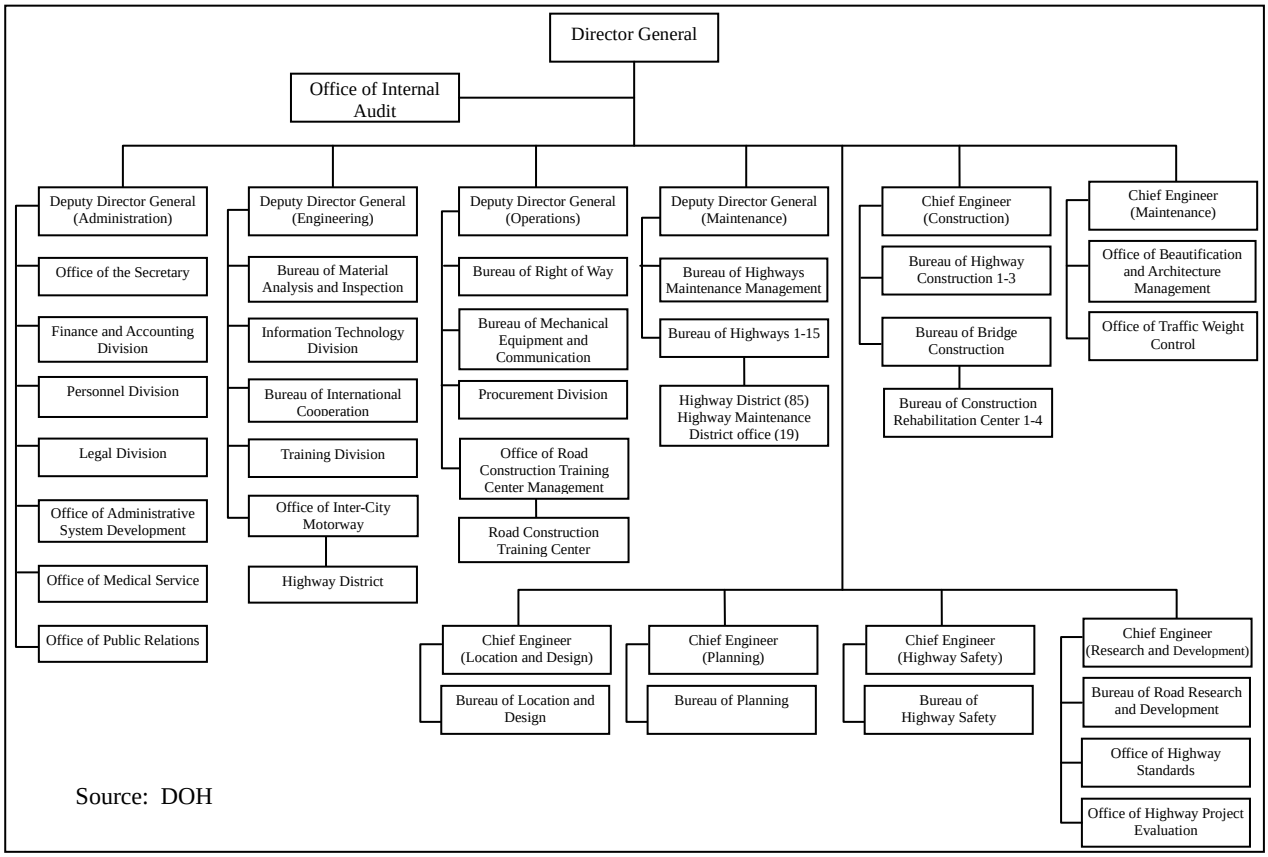
2.5 Sustainability (Rating: a)

No major problem has been observed in the capacity of the executing agency nor its operation and maintenance (O&M) systems; therefore, the sustainability of the project is high.

2.5.1 Executing Agency

2.5.1.1 Structural Aspects of Operation and Maintenance (O&M)

The executing agency for operation and maintenance (O&M) of the project is the Department of Highways (DOH), Ministry of Transport. DOH is responsible for the planning, construction, and O&M of all national roads and some motorways in Thailand. The total length of roads under the management of DOH is 51,537km, which is 27% of the entire total length of domestic roads. DOH possessed 31,000 employees as of December 2008. In addition to the operation and maintenance of roads, DOH is also responsible for collecting tolls and these duties are carried out by the DOH Bureau of Highways (15 branches nationwide) and the Highway Districts and Highway Maintenance District Offices (104 branches nationwide). In general, approximately 20 government employees and 200 staff are assigned to each local Highway District. Figure 4 shows the organizational chart of DOH. It can be concluded that there is no problem in O&M systems because managerial responsibilities for O&M are clear.



Source: DOH

Figure 4: Organizational Chart of the Department of Highways (DOH), Ministry of Transport

2.5.1.2 Technical Aspects of Operation and Maintenance

The DOH conducts routine maintenance, periodical maintenance, special maintenance and emergency maintenance using the DOH manual which is based on the American Association of State Highway and Transportation Officials (AASHTO) [9]. The DOH training department (under the technical department) provides 50 training courses (in various areas) annually, including operation and maintenance training in order to improve the skills of employees. The DOH has been using Highway Development & Management-4 (HDM-4) [10] developed by the World Bank, however, it is now planning to introduce the Pavement Management System (PMS), an original system developed by DOH based upon the current HDM-4, to all Bureau of Highways, Highway Districts and Highway Maintenance Districts by 2009. No problems are observed in the technical capacity for operation and maintenance.

2.5.1.3 Financial Aspects of Operation and Maintenance

The O&M cost for the project target sections is allocated from the central government's general budget[11]. Table 12 shows the O&M budget of the project target sections which account for approximately 30% of the entire DOH budget[12]. Interviews with the Bureau of Highways and Highway Districts have revealed that some feel that the O&M budget is not sufficient. However, on the other hand, others state that the DOH headquarters preferentially distributes its limited budget to O&M for all main arterial roads including the target sections of the project[13]. Based upon the evaluator's impression after driving approximately 2,000km on the national trunk highways in Thailand, including the project target sections, during the ex-post evaluation survey, the overall O&M condition of the national highways in Thailand were satisfactory, and standards were relatively high when compared to other Asian countries. Therefore it is concluded that there is no problem observed in the financial status for operation and maintenance for the project.

---

[9] The main activities of routine maintenance are the cleaning of roads, hard shoulders and drainage, the repair of minor damage such as pot holes, the checking of traffic lights, and the conservation of plants. The main activities of periodic maintenance are the re-sealing of the road surface 3 years after completion and over-lay 7 years after completion. Emergency maintenance includes large-scale maintenance activity such as disaster rehabilitation which is not covered by routine and periodic maintenance.

[10] HDM-4 (Highway Development & Management-4) is a pavement maintenance support software developed by the World Bank, which is currently used in about 100 countries in the world. At present DOH has purchased four licenses of this software, and the operation of HDM-4 is only available in the DOH headquarters.

[11] Toll fees collected from national highways and motorways under the management of DOH go directly to the Treasury. The O&M budget for DOH is allocated from the central government as a part of general budget for DOH every year.

[12] A breakdown of the O&M budget consists of routine maintenance (40%), periodic maintenance and special maintenance (50%) and emergency maintenance (10%).

[13] Priority of budget allocation is determined by three criteria; (i) road condition, (ii) length of road and (iii) population along the road section.

Table 12: Operation and Maintenance Budget

(Unit; 1,000 Bahts)

	2007	2008	2009
Project target sections			
1) Routine maintenance	40,437	44,624	44,965
2) Periodic and special maintenance	50,877	23,025	45,050
Total	91,316	67,649	90,015
Total O&M budget in DOH	12,292,470	12,292,470	13,617,880
Total DOH Budget	40,164,870	34,883,460	40,546,760

Source: Department of Highways (DOH), Ministry of Transport

Note: The O&M budgets in 2007-2008 are actual and that in 2009 is estimates.

2.5.2 Current Status of Operation and Maintenance

Currently, O&M remains relatively simple with such routine measures as grass cutting, painting or cleaning of hard shoulders as it has been only few years since the completion of this project and the pavement condition is still good. Table 13 shows the International Roughness Index (IRI) which measures the flatness of the road. DOH sets an IRI figure of 3.5 as the indicator for pavement repair. The IRI figures for all of the target sections are below 3.5 and therefore it is clear that they are all maintained in optimal condition.

Table 13: International Roughness Index (IRI)

NH	Section	**IRI**	
		2000	2008
11	Phitsanulok-Uttaradit	2.22	1.94
12	Khon Kaen-Nong Ruea	2.58	2.25
23	Ban Phai-Borabue	2.70	1.99
209	Khon Kaen-Chiang Yuen-Yang Talat	2.57	2.48
212	Mukdahan-Nikhom Kham Soi	2.55	2.16
401	Don Sak-Sichon	2.35	2.01
403	Nakhon Si Thammarat-NH41 Junction	2.50	2.42

Source: Department of Highways (DOH), Ministry of Transport.

In general, damage to the pavement caused by overloaded vehicles is one of the main causes of road damage, and therefore DOH has set up weighting stations throughout the main national highways to control overloaded vehicles[14]. There are weighting stations in the project target sections at Uttaradit (NH11) and Yang Talat (NH209). At present, there is no problem reported on the operation and maintenance status.

Weighting Stations installed near Don Sak Junction on NH401

[14] Overloaded vehicles which violate laws and regulations are fined and required to unload excess loads.

3. Conclusion, Lessons Learned and Recommendations

3.1 Conclusion

The relevance of the project is high due to the high consistency between the project objective and Thailand's and the Mekong region's development policy and needs, and the efficiency of the project is also judged to be high as the project outputs, project period and project costs materialized as planned. On the other hand, although expected project effects such as savings in travelling time and an increase in velocity were observed after project implementation, the increase in traffic volume has not reached its target so far. The impacts on smooth and efficient passenger and cargo transport, on the local economy and regional development, and on the promotion of economic relations with neighboring countries were recognized. The sustainability of this project is high in terms of the O&M system, technology, and finance by the executing agency as the roads improved by the project are maintained in good condition. In light of the above, this project is evaluated to be highly satisfactory.

3.2 Lessons learned

None

3.3 Recommendations

In order to maintain the sustainability of this project, it is recommended that DOH utilize their own PMS as planned to be introduced in 2009, and establish and implement a more effective operation and maintenance system including the efficient distribution of the O&M budget.

Comparison of Original and Actual Scope

Item	Original	Actual
(1) Outputs a) Four-laning of the roads and bridges in the following sections:	(NH11) Phitsanulok-Uttaradit: 97.0km (NH12) Khon Kaen-Nong Ruea: 36.0km (NH23) Ban Phai-Borabue: 46.0km (NH209) Khon Kaen-Yang Talat: 65.0km (NH212) Mukdahan-Nikhom Kham Soi: 35.0km (NH401) Don Sak-Sichon: 32.0km (NH403) Nakhon Si Thammarat -NH41Junction: 32.0km (Total) 343.0km	(NH11) Phitsanulok-Uttaradit: 97.7km (NH12) Khon Kaen-Nong Ruea: 47.2km (NH23) Ban Phai-Borabue: 70.0km (NH209) Khon Kaen-Yang Talat: 66.8km (NH212) Mukdahan-Nikhom Kham Soi: 37.8km (NH401) Don Sak-Sichon: 47.6km (NH403) Nakhon Si Thammarat -NH41 Junction : 31.8km (Total) 398.9km Additional Outputs (NH11) Wang Thong-Sak Lek: 38.1km (NH12) Phitsanulok bypass: 25.3km (Total) 63.4km (Grand total) 462.3km
b) Consulting services	Foreign consultants: 41 M/M Local consultants: 112 M/M (Main Scope of Works) • Review of detailed designs • Construction supervision • Advisory for environmental monitoring during the constriction stage and technology transfer relating to environmental monitoring	Foreign consultants: 62 M/M Local consultants: 126 M/M (Main Scope of Works) Same as planned
(2) Project period ・ Signing of L/A ・ Detailed design ・ Selection of consultants ・ Selection of contractors ・ Civil works ・ Consulting services	September 2000 Jan. 2001-June 2000 (6 months) Sep. 2000-Feb. 2001 (6 months) Sep. 2000-Dec. 2000 (4 months) Mar. 2001-Feb. 2004 (36 months) Mar. 2001-May 2004 (39 months)	September 2000 July 2000-Jan. 2002 (19 months) Sep. 2000-Jan. 2002 (17 months) Oct. 2000-Apr. 2001 (7 months) Jan. 2002-Jan. 2005 (37 months) Jan. 2002-Sep. 2004 (33 months) *(Note) project period is deemed to be from the start of detailed design to the end of the consulting services*
(3) Project cost Foreign currency Local currency Total ODA loan portion Exchange rate	19,050 Million Yen 7,008 Million Yen 26,058 Million Yen 19,544 Million Yen 1 Baht = 2.86 Yen (2000)	17,068 Million Yen 5,684 Million Yen 22,752 Million Yen 17,068 Million Yen 1 Baht = 2.55 Yen (Average between Sep. and Dec. 2000)