Thailand

Three Toll Roads Construction Project

Report Date: October, 2002
Field Survey: August, 2001

1. Project Profile and Japan's ODA loan

Site Map: Bangkok Capital Region

Site Photo: ROUTE NO.35

1.1. Background

Road development had been emphasized in the transportation policy of the country since the implementation of the Seven-Year Highway Development Project of 1965. Road transportation was the major mode for freight and passenger transfer in Thailand, carrying 91.8% of freight and 87.8% of passengers in 1984.

This project covered three national highways, National Highway Route 35, National Highway Route 2, and National Highway Route 32. Each highway was characterized as an arterial road, running from metropolitan Bangkok to Southern Thailand (Route 35), Northeast Thailand (Route 2) and Northern Thailand (Route 32). The volume of traffic on the three routes had been increasing yearly; as of 1987, the average volume of traffic was 14,000 cars per day for Route 35, 13,000 cars per day for Route 2, and 9,000 cars per day for Route 32. The project routes were 2-lane roads, designed for a maximum capacity of 8,000 cars per day. Thus, the traffic volume on all three routes far exceeded maximum capacity before implementation. Immediate measures were needed to cope with the situation

The Department of Highways (DOH) conducted tender from June 1986 to December 1987 for the development of the three routes, under a BOT (Build Operate Transfer) scheme that was in accordance with the Sixth Five Year Economic and Social Development Plan (1987-1991). However, an agreement could not be reached under the BOT scheme, mainly due to disagreements regarding toll fares. As a result, the decision was made to implement this project under the Government of Thailand.

1.2. Objectives

To enable the three routes to handle the increasing volume of traffic effectively by widening the existing roads to four-lane roads.

1.3. Project Scope

The project scope was composed of the following items:

1) improvement of existing roads
2) expanding width of existing roads
3) construction of interchange and toll gate

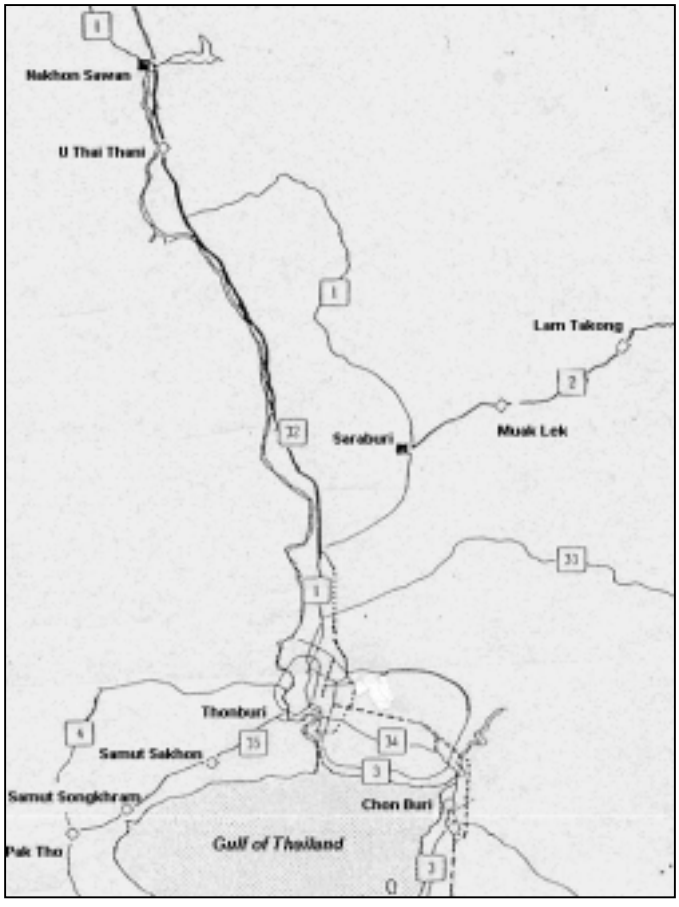
Table 1-1 shows the original scope at the time of appraisal. There was no road section in this project which was newly constructed, and the toll was scheduled to be charged after the project completion. For contractual purpose, two sections of Route No.35 covered by Japan's ODA loan were divided into two subsections respectively at the time of tender, namely 3A, 3B, 4A and 4B as indicated in Table 1-1. Likewise, one section of Route No.2 under Japan's ODA loan had two subsections of 2A and 2B.

Table 1-1: The Targeted Highways

	SECTION	DISTANCE (km)	INTERCHANGE
Route 35	Interchange (Outer Arterial Road)	-	1
	Thonburi ~ Samut Sakhon	15.5	
	Samut Sakhon ~ Samut Songkhram (3A, 3B)	35.1	1
	Samut Songkhram ~ Pak Tho (4A, 4B)	20.9	2
	Total	71.5	4
Route 32	Bang Pa-in ~ Ayuthaya	17.0	1
	Ayuthaya ~ Ang Thong	33.0	1
	Ang Thong ~ Sing Buri	31.6	1
	Sing Buri ~ Chai Nat	38.7	3
	Chai Nat ~ U Thai Thani	31.3	1
	U Thai Thani ~ Nakhon Sawan	31.1	1
	Total	182.7	8
Route2	Saraburi ~ Muak Lek	36.3	2
	Muak Lek ~ Lam Takong (2A, 2B)	61.2	2
	Lam Takong ~ Nakhon Ratchasima	43.1	2
	Total	140.6	6

Note: ：Japan's ODA loan portion (Remaining portions were covered by funds of IBRD, ADB)

Site Map



1.4. Borrower/Executing Agency

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

1.5. Outline of Loan Agreement

	Phase I	Phase II
Loan Amount Loan Disbursed Amount	12,517 million yen 12,466 million yen	10,442 million yen 8,568 million yen
Exchange of Notes Loan Agreement	Sep. 1988 Feb. 1990	Sep. 1991 Sep. 1991
Terms and Conditions Interest Rate Repayment Period (Grace Period)	 2.9 % p.a. 30 years (10 years)	 3.0 % p.a. 25 years (7 years)
Procurement	General Untied (Partially Untied for Consulting Service)	General Untied
Final Disbursement Date	Jun. 1995	Jan. 1997

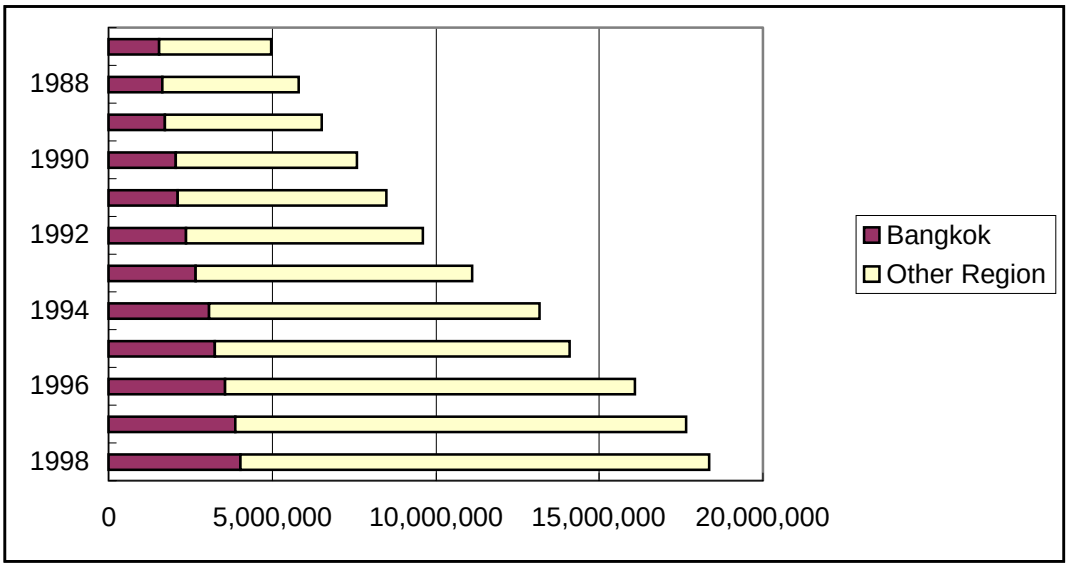
2. Results and Evaluation

2.1. Relevance

The goals of the Three Toll Roads Construction Project matched those stated in the Sixth Five Year Economic and Social Development Plan (1987-1991) of the Government of Thailand and, therefore, the project was relevant at the time of the appraisal. The Eighth National Economic and Social Development Plan (1997-2001), which was issued by the National Economic and Social Development Board, clearly emphasized the goal of "developing land transportation to improve connections with other transportation modes and to assist economic activity in various areas." The goals of the Eighth National Economic and Social Development Plan indicate that the objectives of the project still satisfy the development plan and policy of Thailand today, and therefore the project is still recognized as relevant.

Figure 2-1 below indicates the number of automobile registrations in Bangkok and other regions. The number of registered automobiles has been increasing rapidly over the last decade, which further indicates the need for road developments in Thailand.

Figure 2-1: Number of Automobile Registration in Bangkok and Other Regions



Source: Statistics of Transportation, Planning Division, Transportation Department Ministry of Communication.

This project was co-financed by two other lending agencies, IBRD and ADB. This implies that the project was considered relevant by other donor agencies as well.

2.2. Efficiency

(2.2.1.) Project Scope

There was no significant change in the project scope from the original plan.

(2.2.2.) Implementation Schedule

The project was originally scheduled for implementation from October 1988 to December 1993, while the actual implementation was from January 1989 to December 1995, approximately two years behind schedule. As stated in (2.2.3) below, the project had to be implemented in two phases due to cost overrun. Therefore, overall implementation of the project was delayed.

(2.2.3.) Project Cost

The originally estimated project cost at the time of appraisal (Phase 1) was 15,620 million yen (foreign portion 8,869 million yen, local portion 1,350 million Baht) and the loan amount was 12,517 million yen covering all foreign portion and part of local portion. At the time of tender after completion of detailed design work, it turned out that cost overrun would be obviously inevitable mainly due to sudden rise of construction material and civil work costs. The reasons for such sudden rise of costs are:

1. increase in material costs such as cement, steel pipe, gravel, attributed to abundant construction demand in the country
2. increase in labor cost
3. remoter places for earth collection due to increase in land price
4. increase in delivery cost due to a rise in the fuel cost

The re-estimated project cost of Phase I and Phase II was 30,612 million yen (foreign portion 16,956 million yen, local portion 2,577 million Baht) and the additional loan amount was calculated to be 10,442 million yen (Phase 2). The actual project cost turned out to be 20,039 million against the estimation of 30,612 million yen, and according to DOH, the difference was attributed to the competition among bidders in the tender.

2.3. Effectiveness

(2.3.1.) Increase of Traffic

The effectiveness of this project can be evaluated by the increase of traffic and changes in required travel time. Tables 2-3 to 2-7 show figures demonstrating the increase of traffic on the three highways.

Tables 2-3 to 2-5 show the average daily traffic on Route No.2 (Section 2B, 2A) and Route No.32. Actual daily traffic is much lower than the estimated figure after 1998 for most types of vehicles. This may be attributed to the Asian economic crisis in 1997.

Note: C=Car LB=Light Bus HB=Heavy Bus LT=Light Truck
MT= Medium Truck HT=Heavy Truck

Table 2-3: Average Daily Traffic on Route No.2 (Section 2B)

		C	LB	HB	LT	MT	HT	TOTAL
1994	Estimated	7,452	1,124	2,126	10,987	1,948	6,991	30,628
	Actual	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1995	Estimated	8,100	1,198	2,267	11,994	2,127	7,632	33,318
(completion)	Actual	6,229	2,626	1,948	3,846	5,213	5,421	25,283
1996	Estimated	8,804	1,278	2,417	13,094	2,322	8,332	36,247
	Actual	9,572	772	1,608	2,160	3,994	6,009	24,115
1997	Estimated	9,508	1,358	2,567	14,194	2,517	9,032	39,176
	Actual	9,202	1,533	1,669	9,491	2,693	6,283	30,871
1998	Estimated	10,221	1,435	2,713	15,301	2,713	9,736	42,119
	Actual	7,657	803	1,462	9,326	2,072	3,990	25,310
1999	Estimated	10,988	1,517	2,868	16,494	2,925	10,495	45,287
	Actual	8,427	355	1,629	10,331	3,098	4,772	28,612

Source: DOH

Table 2-4: Average Daily Traffic on Route No.2 (Section 2A)

		C	LB	HB	LT	MT	HT	TOTAL
1994	Estimated	7,551	2,347	2,274	10,418	2,080	6,936	31,606
	Actual	12,070	207	1,330	1,076	2,490	2,667	19,842
1995	Estimated	8,208	2,502	2,424	11,373	2,271	7,572	34,350
(completion)	Actual	19,254	249	1,700	346	2,360	6,062	29,971
1996	Estimated	8,922	2,667	2,584	12,416	2,479	8,266	37,334
	Actual	11,865	1,348	1,720	8,853	3,015	8,550	35,351
1997	Estimated	9,636	2,832	2,744	13,459	2,687	8,960	40,318
	Actual	13,890	1,946	1,833	12,357	2,966	6,506	39,498
1998	Estimated	10,359	2,993	2,900	14,509	2,897	9,659	43,317
	Actual	11,593	1,568	1,595	10,113	2,348	5,666	32,883
1999	Estimated	11,136	3,164	3,065	15,641	3,123	10,412	46,541
	Actual	8,387	1,094	1,494	15,480	2,104	5,504	34,063

Source: DOH

Table 2-5: Average Daily Traffic on Route No.32

		C	LB	HB	LT	MT	HT	TOTAL
1994	Estimated	5,313	159	971	8,222	1,202	3,800	19,667
	Actual	2,857	43	518	4,755	645	2,149	10,976
1995	Estimated	5,775	170	1,035	8,976	1,312	4,148	21,416
(completion)	Actual	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1996	Estimated	6,237	181	1,099	9,730	1,422	4,496	23,165
	Actual	5,244	75	681	8,303	1,337	3,955	19,635
1997	Estimated	6,736	192	1,167	10,547	1,541	4,874	25,057
	Actual	5,566	145	795	9,993	1,338	3,991	21,828
1998	Estimated	7,241	203	1,234	11,370	1,661	5,254	26,963
	Actual	4,569	80	693	9,118	1,123	2,851	18,434
1999	Estimated	7,784	215	1,304	12,257	1,791	5,664	29,015
	Actual	5,566	145	795	9,993	1,338	3,991	21,828

Source: DOH

Tables 2-6 and 2-7 show average daily traffic figures for Route No. 35. Actual daily traffic volume was a little short of the estimated figure. The reason why this route has not shown a significant decrease in traffic since 1998 is that the demand for this route is much higher than for the other two routes. It has been used as a main artery connecting Bangkok with major cities in the southern peninsula, such as Phetchaburi, Surat Thani and Songkhla.

Table 2-6: Average Daily Traffic on Route No.35 (Section 3A, 3B)

		C	LB	HB	LT	MT	HT	TOTAL
1994	Estimated	29,739	598	1,743	1,159	10,664	3,805	47,708
	Actual	24,021	1,189	2,436	2,952	9,902	1,211	41,711
1995	Estimated	32,325	638	1,858	1265	11,642	4,154	51,882
(completion)	Actual	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1996	Estimated	34,911	678	1,973	1,371	12,620	4,503	56,056
	Actual	37,824	475	2,449	2,361	8,725	5,952	57,786
1997	Estimated	37,704	720	2,095	1,486	13,680	4,881	60,566
	Actual	31,563	907	1,940	4,547	5,167	6,939	57,507
1998	Estimated	40,532	761	2,214	1,602	14,747	5,262	65,118
	Actual	42,187	1,160	2,372	4,128	5,055	6,450	61,352
1999	Estimated	43,572	804	2,340	1,727	15,897	5,672	70,012
	Actual	40,786	278	2,433	5,305	5,805	8,025	62,632

Source: DOH

Table 2-7: Average Daily Traffic on Route No.35 (Section 4A, 4B)

		C	LB	HB	LT	MT	HT	TOTAL
1994	Estimated	7,543	545	920	3,420	1,570	5,069	19,067
	Actual	6,330	504	1,216	6,164	1,643	5,689	21,546
1995	Estimated	8,199	581	981	3734	1,714	5,534	20,743
(completion)	Actual	5,770	738	873	3,958	1,694	5,206	18,239
1996	Estimated	8,912	619	1,046	4,076	1,871	6,042	22,566
	Actual	8,912	619	1,046	4,076	1,871	6,042	22,566
1997	Estimated	9,625	657	1,111	4,418	2,028	6,550	24,389
	Actual	7,197	1,055	1,595	6,705	4,357	7,237	28,146
1998	Estimated	10,347	694	1,174	4,763	2,186	7,061	26,225
	Actual	12,372	369	1,156	7,171	2,839	7,138	31,045
1999	Estimated	11,123	734	1,241	5,135	2,357	7,612	28,202
	Actual	11,823	743	1,393	2,204	2,115	5,029	23,307

Source: DOH

(2.3.2.) Decrease in Travel Time

Route 32, Route 35 and Route 2 all show a decrease in travel time, especially Route 32 and Route 2.

Table 2-8: Travel Time before and after project completion (unit: minutes)

Name of Project	C	LB	HB	LT	MT	HT
Route35 (Thonburi-Pak Tho)						
1988	68	71	74	71	74	74
1996	45	51	60	54	60	61
Route32 (Bang Pa-in-Nakhon Sawan)						
1988	159	167	170	167	175	175
1996	95	104	122	110	137	137
Route2 (Saraburi-Nakhon Ratchasima)						
1988	141	144	153	147	153	153
1996	57	63	70	63	84	84

Source: DOH

(2.3.3.) EIRR

EIRR has been recalculated using new figures that were obtained from DOH. Table 2-9 shows the result of the recalculation and the figures that were presented in the appraisal report. The EIRR at the time of appraisal was 23.2% for Route 35 (Section 3A, 3B)、13.2% for Route 35 (Section 4A,4B), 41.2% for Route 2, and 20.3% for Route 32. The recalculations of the EIRR for above routes are 37.97%, 12.02%, 32.04% and 25.33%, respectively. The figure increased by more than 60% for Route 35, however, the EIRR of the other routes decreased. The reason that the EIRR of Route 35 superseded the previous figure and has the highest

EIRR of all the routes is because it has the most traffic. It is also the shortest route between Metropolitan Bangkok and cities in the southern peninsula, which makes this highway quite useful.

(Preconditions) Project Cycle: 20 years
Benefit: VOC (Vehicle Operational Cost) Savings
Time Cost Savings
Cost: Detail Design Cost
Construction Cost
Supervision Cost
Maintenance Cost

Table 2-9: Result of recalculation of EIRR

	Recalculated EIRR (%)	EIRR at Appraisal (%)
No.35 Section 3A, 3B	37.97	23.2
No.35 Section 4A, 4B	12.02	13.2
No.2 Section 2A, 2B	32.04	41.2
No.32	25.33	20.3

Source: DOH

2.4. Impact

(2.4.1.) Increase in Number of Traffic Accidents

Table 2-10 shows the number of traffic accidents that occurred on each route between 1989 and 1999. Since the completion of the project, the number of accidents has increased on all of the roads. Due to time constraint for this survey, no data has been available so far to show the reason for such increase.

Table 2-10: Number of Traffic Accidents

	1989	1990	1991	1992	1993	1994	1995 (completion)	1996	1997	1998	1999
Route 35	42	61	56	53	36	46	92	104	77	110	127
Route 32	8	10	11	16	13	9	19	24	25	19	40
Route 2	76	82	81	96	84	168	91	93	147	142	138

Source: DOH

(2.4.2.) Environmental Impact

It is reported that the project caused neither negative nor positive environmental impact.

(2.4.3.) Relocation Impact

There was a problem with relocating residents along Route 2 and providing housing based on an incomplete land survey conducted before construction. There was no adverse influence reported on residents' lives after project completion.

2.5. Sustainability

(2.5.1.) Operation and Maintenance

According to DOH, the road surface of Route 32 is damaged, which has been accelerated by illegal, over-weighted trucks. Route 35 has a problem with subsidence, which creates gaps where pavement abuts a

bridge. In order to cope with such existing problems as well as future ones, it is desirable that DOH be operated under appropriate allocation of budget by the Government of Thailand.

(2.5.2.) Technical Capacity

The operation and maintenance of the project does not require the use of high tech equipment, and there are enough employees to execute the work. DOH takes care of the operations and maintenance with 7,900 officials and 15,500 permanent employees. It has been executing its work responsibly, without any notable problems as far as the workforce is concerned.

As stated in (2.5.3) below, the biggest issue limiting sustainability is the current toll-free policy, which has been in place since 1995. A system for collecting tariffs based on cargo weight should be considered in order to prevent further damage and to improve situation of operation and maintenance budget in DOH.

(2.5.3.) Financial Status

With respect to the financial sustainability of DOH, there are many uncertainties. The implementation of the toll-free policy introduced in 1995 has contributed to insufficient funds for operations and maintenance. This decision has caused the financial status of this project to decline. However, it seems difficult to make drastic change, such as to nullify or suspend the decision, under the present situation in Thailand. It is necessary to alter the current conditions through certain measures and invigorate DOH operation and maintenance activities in order to make the project more sustainable.

3. Recommendations

It should be noted that the number of traffic accidents has increased even after project completion. Appropriate measures to reduce traffic accidents must be applied from such viewpoints as comprehensive traffic control or traffic safety education to the public.

In the meantime, it is advisable to introduce certain countermeasures to enhance project sustainability, such as an appropriate allocation of O&M budget by the government.

Comparison of Original and Actual Scope

Item	Plan	Actual
I. Project Scope		
1. 4-lane Highway Construction for the following sections	Grand Total 147 km	Grand Total 148.84 km
1) National Highway Route 35 (Samutsakorn - Paktho) Including 3 Interchanges	56 km	53.95 km
2) National Highway Route 2 (Muak Lek – Lamthakhong) Including 2 Interchanges	62 km	63.19 km
3) National Highway Route 32 (Uthaithani – Nakhonsawan) Including 1 Interchange	29 km	31.70 km
2. Consulting Service	(a) Review of Detailed Design Supervision of the above highway construction	(a) Review of Detailed Design Supervision of the above highway construction
II. Implementation Schedule		
Detailed Design Engineering Supervision Construction	Oct. 1988-May. 1991 Jul. 1990-Dec. 1993 Aug. 1990-Dec. 1993	Jan. 1989-May. 1990 Aug. 1990-Dec. 1995 Oct. 1990-Dec. 1995
III. Project Cost		
Foreign currency Local currency Total ODA Loan portion Exchange Rate	16,956 million yen 2,577 million bahts 30,612 million yen 22,959 million yen Phase 1 1 Baht = 5.0 yen (base year used: Jun.1988) Phase 2 1 Baht = 5.3 yen (base year used: Jan. 1991)	15,708 million yen 817 million bahts 20,039 million yen 21,034 million yen 1 Baht = 5.3 yen (1998)

Independent Evaluator's Opinion on "Three Toll Roads Construction Project"

Yongyuth Chalamwong
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Relevance

The actual implementation period of the Three Toll Roads Construction Project was from January 1989 to December 1995. The Project was carried out in the period of the 6th (1987-1991) and the 7th (1992-1996) National Economic and Social Development Plans. During the 6th Plan the strategy featured four key elements: 1) cost sharing, 2) cost recovery, 3) revenue-enhancement, and 4) privatization. The original plan was to develop the three routes under a BOT scheme. This, in view of private investors, was not commercially viable, given the allowable toll fee. The Project had thus opted to implement under the Thai Government Budget. The objectives had deviated from the cost sharing and privatization in the 6th Plan to sustaining economic growth, distributing wealth to the rural areas and environmental protection emphasized in the 7th Plan. This Project aims to enable the three routes to handle the increasing traffic volume effectively is thus relevant to the strategy emphasized in the 7th Plan.

Effectiveness and Efficiency

In terms of costs, the Project was efficient, as the actual cost of 20,034 million yen was much lower than 30,612 million yen as originally estimated. Noted that the Table on page 10 reported a total cost of 20,039 million yen, which was less than ODA Loan portion of 21,034 million yen.

There were fluctuation in values of traffic estimated and actual. This is quite common in practice due to dynamic nature of traffic as well as network effect of transport infrastructure. For this Project, estimated traffics in most categories were higher than the actual ones. The paper reported that this was partly due to the economic crisis in 1997. This line of argument is reasonably valid. As transport is derived demand, its volume is contingent upon other type of activities which, in turn, depend on economic situation of the country. This project, as mentioned in the background, covered three routes, which were utilized over and above their economic capacities. The benefits derived from this project can be viewed from the standpoint of congestion costs stem from the doing-nothing alternative compared with the saving in travel time and hence fuel consumption as well as air-pollution. Table 2-8 of this Report supports the above notion. In this respect, the Project can be deemed as being effective.

Impact and Sustainability

Table 2-10 reported that number of accidents had increased on all roads. The reason is quite apparent, as the number of traffic increases and hence the chances of engaging in an accident. The more appropriate approach is to compare between a ratio of number of traffic-induced accidents and total traffic volume of the three routes for the before- and the after-project completion.

Overweighed truck is a classical factor cited as an archrival for long-lived road surface and stringent enforcement as its panacea. A more technical aspect is due to subsidence of the pavement abutting on a bridge. This problem should be handled with a higher design standard for instance use a concrete apron slab supported with micro-pile under pavement approaching bridge deck.

Positive impact derived from the Project can be sustained only if there is a proper financed maintenance program. This is hardly the case for Thailand. Loan Agency should have considered maintenance budget throughout the project life as part of the Loan agreement. This is to ensure that the benefits derived from the project will not be jeopardized by insufficient funds on operation and maintenance of the road system in the Project supported by the Loan Agency.