Indonesia

Heavy Loaded Road Improvement Project

Report Date ：June, 2002

Field Survey ：July, 2001

1. Project Profile and Japan's ODA Loan

Project Location Map

Cirebon - Cikampek

1.1 Background

Recently, container transport has significantly increased vehicle size and axle load, causing serious damage to road pavements and bridges. The building of a trunk road network that could accommodate heavy vehicles had naturally become an urgent issue.

Based on a 1989 study examining heavy axle weights and the distribution of high volume heavy vehicle traffic, Bina Marga[1)] selected about 9,000 km out of 54,000 km of national and provincial roads for a "Heavy Loaded Road (HLR) Network". Bina Marga had an implementation target of improving 5,000 km by the fiscal year 1997 out of the 9,000 km mentioned above.

The JICA master plan identified the Surabaya Ring Road plan, which would address traffic congestion in Surabaya City, as a high and furthermore, it was considered urgent from the viewpoint of the HLR network.

1.2 Objectives

To encourage the transport of non-oil products for export as well as for internal consumption, by 1) upgrading and improving selected national and provincial heavy-traffic roads, and 2) conducting consulting services for Surabaya city's ring road, as part of the Bina Marga's HLR improvement project. Overall, the aim was to meet the requirements for heavier-vehicle transport, based on a newly established road design standard.

1.3 Project Scope

a. Upgrading and improvement of the following road links:

[1)] Bina Marga : Directorate General of Highways, Ministry of Public Works.

Jakarta	- Cilegon	----------	91km
Cirebon	- Cikampek	----------	156km
Bawen	- Surakarta	----------	55km
Malang	- Gempol	----------	55km
Gempol	- Jember	----------	156km
Palembang	- Muara Enim	----------	170km
Total Length		----------	683km

b. Consulting services for engineering study and supervision of the above work and engineering study on Surabaya Ring Road.

1.4 Borrower/Executing Agency

Republic of Indonesia / Directorate General of Highways, Ministry of Public Works (Bina Marga)

1.5 Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	11,992 million yen 11,882 million yen
Exchange of Note Loan Agreement	September, 1991 September, 1991
Terms and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 2.6% p.a. 30 years (10 years) General Untied (Partially Untied for Consulting Services)
Final Disbursement Date	November, 1996

2. Results and Evaluation

2.1 Relevance

The promotion of non-oil product exports was one of the main issues in the fifth national five-year development plan (REPELITA V, 1989 – 1993), which was in effect at the time of project appraisal. In order to support this policy, the establishment of an appropriate trunk road network for carrying 40-foot containers had become an urgent matter. With the increased use of heavily-loaded vehicles, the damage to trunk roads had expanded remarkably, creating an even more pressing need for higher engineering standards for the HLR Network. This policy continues to be of great importance to the current National Development Program (PROPENAS: Program Pembangunan Nasional 2000 – 2004) in terms of the high priority placed on rehabilitating and upgrading the existing road network.

The project was relevant from the aspect of the infrastructure development policy in REPELITA V, as well as from standpoint of current national development policy in PROPENAS.

2.2 Efficiency

(2.2.1) Scope

There are some discrepancies between the originally planned project scope at the time of project appraisal and the actual scope, though there are no changes in the project sections. The total length originally scheduled for improvement was 683 km, while the length at the time of detailed design completion by the consultant, was reduced to 568.1 km. The change was attributed to decreases in two sections, Gempol - Jember of East Java and Cirebon – Cikampek of West Java, because some sections had already been improved during the project design stage. The total length actually implemented was 599.5 km, an increase from the design by 31.4 km. The reasons for the increase are as follows:

a. For the section between Gempol and Jember, the sub-section Grobogan – Pondok Darem (21.4 km) was added because of insufficient width and pavement conditions.
b. For the section between Bawen and Surakarta, the bypass road section (9.5 km) was also improved.

With regard to the rest of the target length of 5,000 km, some sections have been improved using funds from IBRD and ADB, though which could not cover all the remaining length. However, the review of the project priority is currently undertaken through the master plan studies such as Java Arterial Roads Network Study by IBRD, Transport Sector Study by ADB etc.

The engineering study on the Surabaya Ring Road had been included in the original scope, however it was excluded from the actual scope because it had been undertaken using other financial resources from the responsible ministries.

(2.2.2) Implementation Schedule

The civil work, originally scheduled to take place from October 1992 to September 1994, did not start until April 1993, and required 1.5 years more than estimated. The schedule delay was linked to delays in land acquisition, which in turn was due to budget constraints. The following are highlighted as reasons for the extension of construction work:

a. Section for Cirebon– Cikampek
   - The number of lanes was changed from two to four during the engineering study stage, in order to take into account the rapidly increasing heavy-traffic flow.
   - As a result, the amount of civil work expanded by as much as 2.5 times the original plan design.

b. Section for Palembang – Muara Enim
   - The widening affected water pipelines and telecommunication lines; therefore the realignment was unavoidable.

- It was found during intermediate inspections that some curves and corners were not wide enough to accommodate large trucks, indicating that additional construction was required.

(2.2.3) Project Cost

The project cost, originally estimated to be 14,109 million yen at the time of project appraisal, actually turned out to be 14,026 million yen. The project, as a whole, was completed within the original budgetary cost estimates. Civil works, as an aggregate, resulted in a slight overrun of about 3,000 million yen. According to the Construction Completion Report by the consultant, a cost overrun for the construction work occurred because of the following reasons:

a. The improvement plan of the Pamanukan – Cirebon section was changed from 2 lanes to 4, so construction costs increased to 322% of the original cost estimate
b. The improvement plan of the Pamanukan – Cikampek section was also changed in order to accommodate a widening by a total of 3 additional meters on both sides of the road where it was adjacent to urban areas, and on one side where it was adjacent to non-urban areas. As a result, construction costs increased to 205% of the original cost.

2.3 Effectiveness

The improvement of the trunk road network, intended to cope with the increasing axle load of heavy vehicles, was expected to create a more effective road transport system. Consequently, changes in traffic volume, including that of heavy vehicles, and travel speed are examined as indicators of effectiveness of the project.

(2.3.1) Travel speed on project roads

It was found that the average travel speed on the project roads increased from around 40 km/hr to more than 60 km/hr owing to the impact of the project. In the case of the Cirebon – Cikampek section, the average speed has become even higher for the section widened from 2 lanes to 4.

Table 1: Average Travel Speed on the Project Roads

Project Road Section	1995 (Before the Project)	1997 (After the Project)
Jakarta – Cilegon	40 km/hr	60 km/hr
Cirebon – Cikampek	40 – 50 km/hr	60 – 80 km/hr
Palembang – Muara Enim	40 – 50 km/hr	60 – 70 km/hr

Source: Dinas Bina Marga of corresponding provinces

(2.3.2) Traffic Volume on the Project Roads

Table 2 shows the past growth of traffic volume on the project roads, which is based on information from the Dinas Bina Marga of the Regional Government and from the IRMS

(Integrated Road Management System) of the Directorate General of Regional Infrastructure. These figures were obtained by calculating the weighted average of several sub-sections, since traffic volume differs by sub-section.

Table 2: Traffic Volume on the Project Roads

(Unit: veh/day)

Road Section	Traffic Volume				
	1995	1996	1997	1998	1999
Palembang – Muara Enim (South Sumatra)	22,254	15,995	8,587	6,190	10,334
Jakarta – Cilegon (West Java)	19,120	26,790	44,793	27,338	27,545
Cikampek - Loh Bener (West Java)	19,931	24,352	28,550	14,391	14,764
Bawen – Kartosuro (Central Java)	14,281	14,203	16,558	14,988	12,801
Malang – Gempol (East Java)	20,227	20,227	18,998	19,765	27,923
Pasuruan – Jember (East Java)	5,883	5,802	7,580	9,534	10,058

Source: Dinas Bina Marga and the IRMS

The most recent figures for traffic volume range from 10,000 to 28,000 vehicles/day. The construction, completed either in 1995 or 1996, was followed by marked increases in traffic volume, particularly in the areas where the project had been implemented. Those areas, comprising three sections -- Jakarta – Cilegon, Malang – Gempol and Pasuruan – Jember -- experienced an average growth rate of 8% to 14% per annum during the period from 1995 to 1999. Alternately, in the other sections -- Palembang – Muara Enim, Cikampek – Loh Bener and Bawen – Kartosuro -- traffic volume decreased. The following reasons are possible explanations of this outcome:

a. In the case of the Palembang – Muara Enim section, a new road leading to Lampung (the East Coastal Road) was constructed in 1995, thereby diverting some of the traffic.
b. In the case of the Cikampek – Loh Bener section, the counting station of the traffic volume might have been changed since 1998 owing to construction work for a four-lane carriageway.
c. In the case of the Bawen – Kartosuro section, traffic growth had been rather stagnant since an alternative route connecting Semarang with Solo Via Purwowadi was improved.

One of the selection criteria of the project roads was that they should have a traffic volume of heavy vehicles at a level of over 3,000 per day, either at the time of the project appraisal or in 1997. The heavy-vehicle traffic volume was compared only for the sections where data sorted by

type of vehicle was available. The actual traffic seems to be exceeding the projected traffic volume in the sections, with more than 3,000 vehicles/day, as shown in Table 3. It is also noteworthy that the composition rate of heavy vehicles, as a ratio of total traffic, is very high, reaching about 50% of the total traffic or more for the sections Cirebon – Cikampek and Palembang – Muara Enim.

Table 3: Heavy Vehicle Traffic Volume

Road Section	Heavy Vehicles in 1997 (vehicles/day)		Heavy Vehicles in 2000 (vehicles/day) (Actual)	Composition Rate of Heavy Vehicles
	Projection	Actual		
Jakarta – Cilegon	7,521	10,219	n.a.	23%
Cirebon – Cikampek	9,080	14,157	n.a.	50%
Palembang – Muara Enim	3,361	n.a.	4,442	61%

Source: Dinas Bina Marga

Note: Projection refers to the estimate at the time of project appraisal.
The composition rates of heavy vehicles for the sections Jakarta – Cilegon and Cirebon – Cikampek are those for the year 1997 and the one for the section Palembang – Muara Enim is the ratio to the total traffic volume of 7,332 vehicles/day for the year 2000.

(2.3.3) Economic Internal Rate of Return

The Economic Internal Rate of Return (EIRR) was re-estimated using the actual project cost and the traffic volume. As for the cost, the project cost by section and the annual maintenance cost were taken into account. For the benefit, only the VOC (vehicle operating cost) savings were accounted, as assumed at the time of project appraisal. As shown in Table 4, the re-estimated EIRRs are still sufficiently high for all the project roads, though values have decreased somewhat when compared to the original estimates. The differences may be attributed to the decrease of traffic growth owing to traffic diversion to other routes or to the 1997 economic recession as well as the substantial construction cost increase, since actual implementation length has decreased in spite of the facts that almost same amount of cost was spent for the project and there was a devaluation of the local currency during the construction period.

Table 4: Economic Internal Rate of Return of the Project Roads

Project Road Section	EIRR Original estimates	EIRR Re-estimated
Palembang – Muara Enim	160.3 %	33.4 %
Jakarta – Cilegon	175.8 %	37.5 %
Cikampek - Loh Bener	268.5 %	19.3 %
Bawen – Kartosuro	117.8 %	37.0 %
Malang – Gempol	187.8 %	32.9 %
Pasuruan – Jember	57.6 %	28.2 %

Note: The above figures are the weighted average of the sub-sections

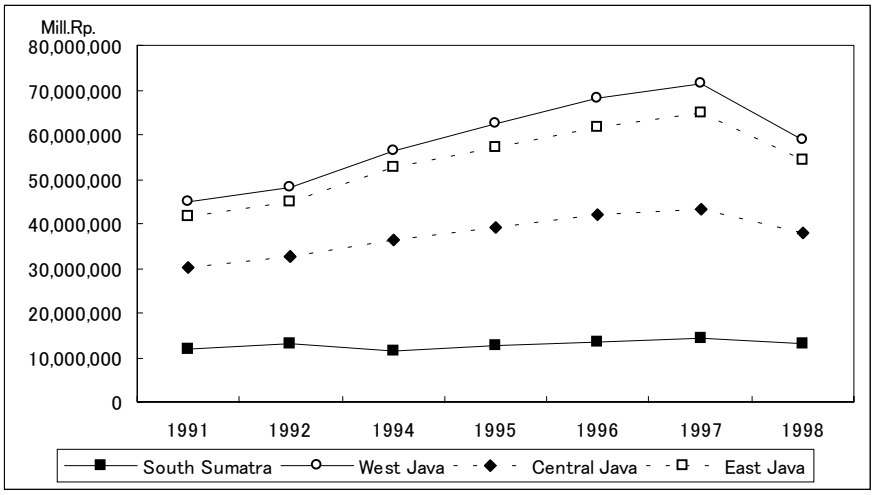
2.4 Impact

The promotion of production, the export of non-oil products, and the contribution to regional development were anticipated as likely regional impacts at the time of project appraisal. Hence, the changes in the Gross Regional Domestic Products (GRDP) and other regional impacts are discussed below.

(2.4.1) Encouragement of Production and Export of Non-oil Products

The GRDP, excluding oil and gas output, had steadily increased until 1997, before the Asian Economic Crisis caused it to decline drastically during the period from 1997 to 1998. Indonesia's economy has not yet recovered from the resulting recession. The project's impact on the promotion of non-oil products seems to have been muted by the adverse conditions of the global economy. It may be too early to assess the impacts on the above objectives.

Figure 1: GRDP Excluding Oil and Gas (at 1993 constant prices)



Source: Statistical Yearbook Indonesia

(2.4.2) Impacts on local industries

In the section between Muara Enim and Peramubeli, in South Sumatra, a pulp/paper company was established using foreign investment in 1993, when the civil work for the project began. The production materials are supplied from the adjacent forest area. Since then, in addition to gradually increasing its production, the company has increased the number of employees, which currently stands at approximately 5,000 people. The project road encompassing the Palembang – Muara Enim section should have contributed to the growth of the company's production as well as to the expansion of hiring, though it is difficult to discern how many and to what extent these changes can be attributed primarily to the impact of the project.

(2.4.3) Impacts on Environment

Since the project road sections are existing ones, there has not been any specific problem

regarding adverse environmental impacts.

(2.4.4) Impacts on Local Residents

According to the Dinas Bina Marga of the Provincial Government in West Java, there have been positive impacts on the local residents, such as the reduction in travel time owing to the higher speed of commuter buses from 40 km/hr before the project to 60km/hr after the project, owing to the project's road improvements.

There was no problem regarding the resettlement of local residents.

2.5 Sustainability

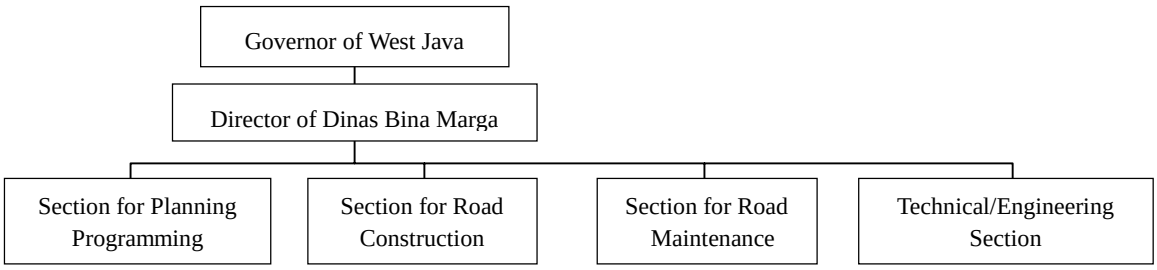
(2.5.1) Organization for Operation and Maintenance

The cabinet under President Wahid prepared the national development program PROPENAS (2000 – 2004) in November 2000. The decentralization of authority is one of the important policies identified in the program.

In line with the decentralization policy, the Ministry of Public Works (Bina Marga) has been divided into two organizations, namely the State Ministry of Public Works and the Ministry of Human Settlements and Regional Infrastructure. The former is responsible for establishing the basic policy of infrastructure development, while the latter directs the actual implementation of the infrastructure, including planning, designing and supervision. Road development is the responsibility of the Directorate General of Regional Infrastructure in the Ministry of Human Settlements and Regional Infrastructure. As for the road betterment and rehabilitation projects, the P3JJ (Project of Planning & Supervision of Roads and Bridges), established under each provincial government, has taken over the role of the Bina Marga's RBO (Regional Betterment Office), in accordance with the decentralization scheme. With regard to road maintenance, the Dinas Bina Marga (Public Works Section) of each provincial government holds responsibility in the case of national and provincial roads.

A simplified chart representing the organizational structure of the Dinas Bina Marga of West Java Province is illustrated in Figure 1. Under the project manager of the road/bridge maintenance section, approximately 200 people are engaged in maintenance work by the sub-district of West Java.

Figure 1: Organization of Dinas Bina Marga in West Java Province



The information on all the project road sections has been managed as a database by the

central government, by using the IRMS (Integrated Road Management System) developed by the World Bank. The information includes road type, link number, length, width, average daily traffic volume, condition of the road surface and roughness index. The Central Government has revised the data every year and used it for monitoring updated conditions and for planning road rehabilitation programs. However, it is said that there are some inadequacies or inaccuracies in the updating work due to financial constraints at the provincial level, particularly after the Asian crisis of 1997.

(2.5.2) Present Condition

In June/July, 2001, the survey mission visited the following road sections encompassed by the project.

a. Cirebon - Cikampek (156 km) in West Java

The road is a part of the busiest national road, between Jakarta and Surabaya. The average travel speed is more than 60 km/h, and about 80km/h for the section with 4 lanes. The daily traffic volume has reached about 30,000 vehicles, of which 50% are heavy vehicles. This traffic have caused damage to the road surface, including small holes and wear and tear due to heavy wheels. Though the damage is not serious at present, it may become a critical problem in the near future if adequate maintenance is not provided. The old truss bridges are generally vulnerable to the repeated vibrations brought about by the heavy vehicles. Most such bridges have been replaced by PC (Pre-stressed Concrete) bridges already, though some with damaged slabs are still in use because of financial constraints, which limit repair or replacement work.

b. Palembang – Muara Enim (166 km) in South Sumatra

This section is the connecting road between Palembang and the Pan Sumatra Highway. The road in general has been well maintained with patching and repair work. Since the maintenance project was carried out in 1999/2000, using appropriations from the national budget in addition to the routine maintenance, the road surface and the drainage system have been improved. The only substandard areas are found at the connection points of the roads and bridges, where holes and cracks are more noticeable.

(2.5.3) Financial Status

All the project roads are important, arterial ones. As such, large expenditures have been necessary to maintain the roads in good condition. Table 6 shows the actual maintenance costs of the road sections of Palembang – Muara Enim in South Sumatra, and Gempol – Jember in East Java.

Table 6: Road Maintenance Cost

Palembang – Muara Enim (1999/2000)

Section	Cost (Mil. Rp.)	Financial Source
Palembang - Sp.Indralaya	600	N.A.
Sp.Indralaya - Prabumulih	599	INP-23
Prabumulih – Muara Enim	584	INP-23
Town Area	35	APBN (ANGGARAN PEDAPATANDAN BELANJA NEGARA, National Budget)
Town Area	1,887	JBIC loan
Total	3,704	

Source: Dinas Bina Marga of South Sumatra Province

Pasuruan – Jember (Rp. million)

Section	1993/1994	1994/1995	1996/1997	1997/1998	1998/1999
Pasuruan - Probolinggo	–	–	79	236	399
Probolinggo - Grobogan	–	–	–	–	833
Grobogan - Jember	91	243	72	302	1,000
Total	91	243	151	537	2,232

Source: Dinas Bina Marga of East Java Province

Note: Financial Source: APBN

Based on these figures, the maintenance costs for the entire Palembang – Muara Enim section can be calculated at Rp.22 million/km. Similarly, it is estimated that maintenance for the Pasuruan – Jember section cost Rp.18 million/km in 98/99. Both expenditures are regarded as periodic maintenance. The 1993 - 1997 expenditures for the Pasuruan – Jember section are about Rp.260 million/year on average, or Rp.2.0 million/km per year and are regarded as routine maintenance. In spite of these maintenance efforts, deterioration, as stated above, is progressing in some sections of the project roads, which can be explained by the following two factors: insufficient routine or periodic maintenance, and an increase in the axle load. The maintenance costs borne in the past years for the above road sections seem to be very small; only about one-third of the required amount. The axle load is also increasing due to the increase in the number of larger vehicles and of overloaded trucks. As a result, road conditions have become very poor, necessitating a separate project, with additional financial resources, for that maintenance work.

The Central Government (Directorate General of Regional Infrastructure) is aware of this situation, and the following countermeasures are either being undertaken or under consideration.

a. The heavily damaged sections are to be rehabilitated using project loans.
b. In order to secure financial resources, the annual vehicle tax will be increased.
c. The vehicle weight checking system will be made more active and stricter.

The first measure is presently applied for most of the trunk roads. The second is also regarded

as appropriate, considering the principle that the beneficiaries should bear the expenses for maintenance. The third one has some institutional problems: The budget for road maintenance is managed by the Directorate General of Regional Infrastructure, while checking vehicle weight is done by the regional office of the DGLC (Directorate General of Land Communications). As a result, the proceeds from penalties collected for overweight heavy vehicles are not added to road maintenance resources. That procedure has created problems, owing to an unfair/inaccurate weighing and charging system. In order to make the system more functional, renovation of the checking system, augmentation of the institutional mechanism and an increase in the number of checking points will be required.

3. Lessons Learned

During the engineering study stage, the original road design was reviewed and revised in accordance with the local conditions. For the section between Cirebon and Cikampek, for instance, the number of lanes was changed from two to four, taking into account the rapid traffic growth. These changes were generally effective for maximizing the project effectiveness.

4. Recommendations

According to Dinas Bina Marga of the Provincial Government, the HLR Project was effective for maintaining the roads in good condition. However, some sections have suffered natural wear and tear caused by heavy wheels.

This suggests that the actual axle load on the project road might be exceeding 10 tons, the design standard for HLR projects. Accordingly, various countermeasures should be examined, including the following: (1) reviewing the current vehicle checking system, including its institutional aspects, to make it more active and stricter, and (2) re-examining the design axle load by conducting a survey or the actual axle load conditions.

Comparison of Original and Actual Scope

Item	Plan	Actual
① Project Scope		
Palembang - Muara Enim	Road Improvement: 170km	166km
(AB-1, AB-2)	Bridges: 2 bridges (40m)	-
Jakarta – Cilegon	Road Improvement: 91km	91km
(AB-3, AB-4)	Bridges: none	2 bridges
Cirebon – Cikampek	Road Improvement: 156km	101km
(AB-5, AB-6)	Bridges: 1 bridges (20m)	-
Bawen – Surakarta	Road Improvement: 55km	64.5km
(AB-7)	Bridges: none	-
Malang - Gempol	Road Improvement: 55km	51km
(AB-8)	Bridges: none	-
Gempol – Jember	Road Improvement: 156km	125.2km
(AB-9)	Bridges: 3bridges (155m)	18 bridges (262.6m)
Total	Road Improvement: 683km	599.5 km
② Construction Period		
Selection of Consultant	December 1992	October 1992
Consulting Service	Jan.1992 to Oct.1994 (34 months)	May 1992 to Sept.1996
Tender for Construction	Aug.1992 to Sept.1992	Sept.1992 to March 1993
Construction Work	Oct.1992 to Sep. 1994 (24 months)	Apr.1993 to Sep. 1996
Engineering Service for Surabaya Ring Road	Jan.1992 to June 1993 (18 months)	This service was cancelled
③ Project Cost		
Foreign Currency	7,313 million yen	9,175 million yen
Local Currency	6,796 million yen	4,851 million yen
Total	14,109 million yen	14,026 million yen
ODA Loan Portion	11,992 million yen	11,882 million yen
Exchange Rate	1 Rp. = 0.068 yen	1Rp.=0.060 yen

Note: estimated on the basis of the Final Construction Report by Consultant

Independent Evaluator's Opinion on Heavy Loaded Road Improvement Project

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The main objective of the project, i.e., to build road networks that are capable of accommodating heavily loaded vehicles remains relevant today and will become even more so in the future. The volumes of goods transported through national road and highway networks are expected to increase with the country's economic development and, therefore, more of similar projects will be needed to meet the demand.

The report states that the project resulted in positive economics and social impacts to the host regions. It argues in particular that the steady increase in the gross regional domestic product (GRDP) of the host regions prior to the economic crisis and development of certain industry (e.g. pulp and paper) in one of the host provinces may be used as indicators of the positive economic impacts of the project. However, as the report also cautions, it is difficult to measure the extent to which these changes may be attributed to the impact of the project. Moreover, the benefits resulted from the project are enjoyed not only by the residents of the regions in question but also by residents of other regions as well. So, instead of using the above indicators, other indicators such as changes in transportation cost, changes in traveling time (VOC) may be used as alternatives to measure the impacts of the project. For instance, cost saving due to a lower transportation cost for the pulp and paper company is better to reflect the direct impact of the project to local economy. Also, a field survey – interviewing the stakeholders are more appropriate in reflecting the impact of the project.

The sustainability of this kind of project depends on the capacities of concerned regional (provincial) institutions to undertake the specific assignments. As mentioned in the report the responsibility to undertake road development, road betterment and rehabilitations, and road maintenance projects go to at least three different institutions. Under such an arrangement coordination failures are likely to happen. In addition, the sustainability of the project will depend also on the technical capabilities on those institutions to undertake their specific assignment. Finally, it will also depend on the availability of funds to maintain the existing roads. The last factor will become increasingly important issue as various government tasks are being sift from the central to the regional and district governments. Some regional and district governments will face difficulties to raise enough funds to road development and maintenance programs.

* I have benefited from discussions with Ms Titik Anas who has been kind enough to provide some insightful comments about the report. The usual disclaimer applied.