SECTOR SYNTHESIS OF POSTEVALUATION FINDINGS

IN THE

ROADS AND ROAD TRANSPORT SECTOR

July 1996

ABBREVIATIONS

BME	-	Benefit Monitoring and Evaluation
DMC	-	Developing Member Country
EA	-	Executing Agency
EIRR	-	Economic Internal Rate of Return
PMO	-	Project Monitoring Office
PPAR	-	Project/Program Performance Audit Report
RRT	-	Roads and Road Transport
SSPF	-	Sector Synthesis of Postevaluation Findings
TA	-	Technical Assistance
TPAR	-	Technical Assistance Performance Audit Report
VOC	-	Vehicle Operating Cost

NOTES

In this Report, "$" refers to US dollars.

I. INTRODUCTION

1. The Sector Synthesis of Postevaluation Findings (SSPF) in the Roads and Road Transport Sector provides a summary analysis of Bank's postevaluation experience in the sector. The Report identifies the key factors affecting project performance and highlights the major issues and lessons that are of operational relevance and significance to ongoing and future projects/programs in the sector. This SSPF is based primarily on the review of the findings of postevaluation reports on roads and road transport which were prepared by the Post-Evaluation Office (PEO) including Project/Program Performance Audit Reports (PPARs), Technical Assistance Performance Audit Reports (TPARs), Impact Evaluation Studies, Reevaluation Studies, Special Studies and the Country Syntheses of Postevaluation Findings (CSPFs). It also takes into account the information and data stored in the Postevaluation Information System (PEIS).

II. BANK OPERATIONS IN THE ROADS AND ROAD TRANSPORT SECTOR

A. Overview

2. Bank operations in the roads and road transport (RRT) sector had generally been directed towards the construction and improvement of primary, secondary, and feeder roads. Other activities in the sector included the construction and improvement of bridges, restoration of damaged infrastructure, and road maintenance operations.

3. The first Bank loan for the RRT sector was the Seoul-Incheon Expressway Project in the Republic of Korea ($6.8 million) in September 1968 (see Appendix 1). As of December 1995, the Bank had funded total loans in the RRT sector of $6.9 billion for 113 projects, or an equivalent of 12.1 percent of total cumulative Bank loan approvals. Group A countries received 51 percent of Bank assistance in the sector amounting to $3.5 billion (51 percent) for 51 projects, but Group B countries also had a substantial share amounting to $2.8 billion (41 percent) distributed among 41 projects. Group C countries received the smallest share of $534 million (8 percent) for a total of 21 projects (see Appendix 2). More than half of the total amount of Bank lending in the sector were accounted for by four countries, namely, Indonesia (18 percent), People's Republic of China (15 percent), Thailand (13 percent), and India (10 percent). About 73 percent or $5.0 billion of the funds lent in the RRT sector came from ordinary capital resources (OCR), while 27 percent or $1.9 billion came from the Asian Development Fund (ADF).

4. Bank assistance in RRT had been largely concentrated on interurban and rural roads. However, over the last three decades, there had been some changes in the composition of RRT projects as well as in the strategic thrust of Bank assistance to the sector, which were reflective of development trends in the region. During the 70s, loans in the road sector comprised mainly construction of new highways and rural roads. This focus had changed slightly in the 80s

which was largely predominated by road improvement projects. In addition, road maintenance operations were increasingly included as project components and, in some instances, as the main project activity. It was also during this period when road sector projects were first introduced. The 90s saw a resurgence of road construction but these were all located in the People's Republic of China. The first and, thus far, only road program loan[1] was likewise approved during this period. Bank operational assistance intensified during the 80s and 90s which accounted for about 90 percent of total loan approvals. Loan sizes ranged from a low of $400,000 (Feasibility Study of North-South Freeway in Taipei,China [Loan No. 005-CHI]), to a high of $250 million (Second Road Project in India [Loan No. 1041-IND]). Table 1 presents a brief overview of the Bank's RRT loan operations.

Table 1: Loan Approvals in the Roads and Road Transport Sector during 1968-1995

Item	No. of Projects	Amount ($ million)	Percent
Source of Funding			
from OCR	77[a]	5,013.5	72.9
from ADF	42[a]	1,864.0	27.1
Year of Approval			
1968-1970	5	43.3	.6
1971-1980	32	674.0	9.8
1981-1990	40	2,661.3	38.7
1991-1995	36	3,498.9	50.9
Loan Size ($ million)			
less than 50	68	1,484.3	21.6
between 50-150	35	3,384.8	49.2
above 150	10	2,008.4	29.2

[a] Includes 3 supplementary projects and 3 projects funded under both sources.

5. As of December 1995, 175 technical assistance (TA) grants in the RRT sector amounting to $71.7 million (1 percent of the total RRT loans) have been approved. Of these TAs, 95 (amounting to $30.5 million) were project preparatory, and 80 (amounting to $41.2 million) were for advisory and operational purposes.

B. Postevaluation Operations

[1] Road and Road Transport Sector Program in the Philippines (Loan Nos. 1046/1047-PHI) for $100 million, approved in November 1990.

6. A total of 31 RRT projects, covering 10 countries and representing about 27 percent of the total loans approved in the sector, had been postevaluated as of 31 December 1995[2]. Total postevaluated projects amounted to $727.2 million. The postevaluated projects included 28 road construction and improvement projects, one road maintenance project, one road restoration project, and one program loan. These projects were approved during the period 1968-1990, and completed between 1969 and 1992[3]. Four of the 31 projects were in Group A countries, 18 in Group B countries, and 9 in Group C countries. Two TPARs and two reevaluation studies were also conducted (see Appendix 3) for the sector.

C. Objectives and Scopes of Postevaluated Projects

7. The major objectives of the postevaluated projects were to enhance economic growth and to provide development stimulus by (i) promoting more efficient land transportation systems; (ii) facilitating improved access of the agriculture and rural sectors to markets and other social amenities; and (iii) closer integration of rural and urban areas through better interprovincial and national transport capability. These objectives were to be achieved through the construction and improvement of road infrastructure; maintenance of existing roads and bridges; institutional strengthening of the agencies concerned; and policy reforms in the road transport sector.

III. IMPLEMENTATION EXPERIENCE AND PERFORMANCE RESULTS

8. This section summarizes the implementation experience and performance results of the postevaluated projects and technical assistance operations in the RRT sector. In particular, the impacts of changes in project design and scope, physical achievements and performance of the infrastructures built, socioeconomic and environmental impacts, and the overall sustainability and assessments of the postevaluated projects are highlighted.

A. Implementation Experience

1. Project Design

9. The performance of RRT projects is largely dependent on the adequacy of technical specifications and engineering designs, quality of construction and the suitability of the structures in

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[2] The country composition of postevaluated projects do not necessarily reflect the actual country composition of Bank loans to the RRT sector due to differences in the timing of project completion, and the sampling methodology employed in the selection of projects to be postevaluated.

[3] Under the Road and Road Transport Sector Program (Loan No. 1046[SF]/1047-PHI), some of the policy components had not been completed as of postevaluation in 1994.

meeting transport needs of users. In general, the designs of the RRT projects reviewed were considered adequate. Although deficiencies were noted, design experience in countries such as Republic of Korea, Indonesia and Thailand shows gradual improvements over time. For example, compared with the Second Road Project (whose design was deficient in incorporating local soil conditions), the design of the Fifth Road Project in Indonesia was found to be superior. On the other hand, the RRT program sector loan[4] in the Philippines was poorly designed since project preparation relied on inadequate and outdated road studies. In Nepal, failure to anticipate the logistical difficulties of constructing hill roads in a mountainous region resulted in unrealistic implementation schedules and underestimation of costs. Overall, the most common design deficiencies noted during postevaluation were (i) failure to take into consideration local soil conditions and to anticipate land acquisition difficulties; (ii) unrealistic traffic estimates; and (iii) lack of or inadequate feasibility studies.

10. Five[5] of the 31 postevaluated projects reported significant changes in design and scope which comprised (i) reductions in the length of roads constructed; (ii) changes in pavement structure; and (iii) revisions in the height of road embankments. Cost factors, which were largely due to implementation delays, accounted for most of the design changes. Other factors which caused revisions in project design included (i) adoption of new government policies on road construction; (ii) more overloading of vehicles in the absence of enforcement of axle loading limits; (iii) prior road improvements by the government; and (iv) under/overdesign during appraisal. These factors illustrate the sensitivity of project outcomes to the project design quality.

2. Physical Achievements

11. The postevaluated projects were generally completed as envisioned during implementation of projects. These RRT projects mainly comprise the following: (i) construction/reconstruction, rehabilitation, improvement or upgrading of national, local and feeder roads; (ii) construction/reconstruction of bridges; (iii) provision of international and local consultancy services; (iv) technical assistance for road feasibility studies; (v) training and workshops for institutional strengthening; and (vi) procurement of road maintenance and construction equipment. In terms of the civil works component, there were significantly more roads that were rehabilitated/improved than newly constructed. In the postevaluated projects, about 800 km of road were constructed/reconstructed, and 6,000 km were rehabilitated/improved/upgraded, representing 107 percent and 102 percent, respectively, of total original appraisal targets.

12. The quality of the road structures built were dependent on the prevailing road sector policies and road construction standards. For example, the "reoptimization" policy of the Indonesian Government during 1979 led to the lowering of road improvement standards and the deferment of

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[4] This was the Road and Road Transport Sector Program Loan in the Philippines (Loan Nos. 1046[SF]/1047-PHI). Some of the studies could not provide an adequate basis for the formulation of policy reforms since they had been commissioned for preparation of other road investments.

[5] These were the Mindanao Secondary and Feeder Roads Project in the Philippines (Loan No. 227-PHI); First Road Improvement Project (Loan No. 261-INO) and Fifth Road Project (Loan No. 484-INO) in Indonesia; Road Project in Papua New Guinea (Loan No. 116-PNG); and Third Highway Project in Thailand (Loan No. 383-THA).

some project components of the First Road Improvement Project. This resulted in poor quality of road sections leading to pavement failures and disruptions of traffic, and requiring intensive and costly maintenance operations. However, this case was not representative of the Indonesian RRT projects inasmuch as subsequent Bank assistance in the sector were implemented without consideration for the Government's "reoptimization" policy. Overall, Bank lending was considered to have generally contributed to improving the quality of the roads at the DMCs.

13. Government policies on road maintenance significantly affected the condition of Bank-funded roads. In many DMCs, road maintenance policies were either absent or inadequate to meet road user requirements. Where adequate maintenance policies exist, the problems often involved their proper enforcement and implementation. The prevalent absence or lack of maintenance at the DMCs led to the early deterioration of most of the project infrastructure. This situation was further compounded when the implementation of traffic policies, particularly those involving axle load limits and vehicle dimensions, were also found to be defective.

3. Performance of Contractors

14. The performance of RRT projects was found to be closely related to the quality of work by civil works contractors. In most projects, contractors performed their work satisfactorily. However, RRT projects in Bangladesh, Nepal, Indonesia, and Philippines reported problems with contractors engaged for road construction/improvement. For example, the inexperience of the local contractor in the Hetauda-Narayangarh Road Project in Nepal necessitated further assistance from the design consultants, which resulted in a five-year delay and a cost overrun of about 22 percent. Similarly, in the Mindanao Secondary and Feeder Roads Project in the Philippines, management problems and financial difficulties arising from the devaluation of the local currency forced one of the contractors to abandon its work, and led to substantial delays in the overall implementation of the project. Shortfall in performance was not however, limited to local contractors only. For instance, the performance of international contractors working in Nepal were found to be no better than that of their local counterparts mainly because of the former's failure to consider the logistic and operational constraints of working in a mountainous environment.

15. The most common difficulty faced by the contractors was their insufficiency of working capital. It appears that given the size of Bank RRT projects, there were very few local private construction firms which had sufficient financial resources to meet operating requirements. On the other hand, some international consultants gave low and unrealistic bids in their desire to win the contracts. Another reason for the lack of working capital was the tendency of contractors to treat some portions of advance payments, which are mainly intended for mobilization and initial fund resources, as advance profit thus further constraining the availability of financial resources. The funding problems were compounded further by the bureaucratic and protracted procedures on government disbursements/payments, and the devaluations of the local currency. Other factors which notably affected the performance of the contractors included: (i) lack of adequate and suitable equipment; (ii) shortage of experienced and competent personnel; (iii) inadequate experience in large-scale infrastructure projects; and (iv) site management problems.

4. Project Cost

16. While, overall, actual total cost of the postevaluated projects ($1.5 billion) did not vary significantly from the appraisal estimates ($1.4 billion), there were some projects which did (see Appendix 4). Of note were four projects which had cost overruns exceeding 100 percent. These were the (i) First Kuala Lumpur-Karak Highway in Malaysia, 101 per cent; and three projects in the Philippines, namely: (ii) Cotabato-General Santos Road Project, 129 per cent; (iii) Tarlac-Santa Rosa and Feeder Roads Project, 148 per cent; and (iv) Iligan-Cagayan de Oro-Butuan Road Project, 187 per cent. The major reasons for the significant cost overrun of these projects were (i) currency fluctuations and increases in cost of labor, materials, and equipment; (ii) large increase in the price of cement, largely as a result the oil crisis during the 70's; (iii) underestimation of initial contract prices; and (iv) the need for additional civil works.

17. Excluding the four projects noted above, projects with cost overruns about equaled those with underruns. In terms of appraisal estimates, overruns averaged about 30 percent, underruns about 20 percent of the respective appraisal cost estimate. The factors that mainly contributed to the cost variations included: (i) changes in scope and design; (ii) over/underestimation of price and cost contingencies at appraisal; (iii) favorable/unfavorable conditions for land acquisition; (iv) timing and duration of project implementation; and (v) other developments external to the projects such as the energy crisis in 1973-74 that led to worldwide inflation, shortage of construction materials, and price and exchange rate fluctuations.

5. Implementation Period

18. The average implementation period for the RRT projects was about 5.7 years, representing an average delay of about 76 percent (see Appendix 4). Of the projects, only the Highlands Road Improvement Project in Papua New Guinea was completed earlier than projected at appraisal. The shortest time overrun of 5 percent was from the Highway Project in Thailand, while the longest time delay of 176 percent was incurred in the Fifth Road Project in Indonesia. Major factors that contributed to the implementation delays included: (i) delays in the recruitment of consultants and engagement of contractors; (ii) right of way and land acquisition difficulties; (iii) poor performance of local contractors; (iv) changes in project design and scope; (v) shortage of materials and problems with equipment; and (vi) changes in the road policies of government. Also, many of the projects had overoptimistic implementation period estimates during Bank appraisal. This was largely attributed to lack of understanding and failure to take into consideration local conditions and practices. Other factors that affected implementation were local civil disturbances, adverse weather conditions, and earthquakes and other natural calamities.

B. Project Results

1. Traffic Performance and Road Maintenance Operations

19. The RRT structures contributed to the increase in vehicular traffic in their respective areas. In many instances, the actual number of vehicles exceeded appraisal expectations. An important factor which affected traffic volume growth was the development in the surrounding areas and related transport sectors. For example, in the Vientiane Plain Road Improvement Project in Lao PDR, traffic growth surpassed expectations and much of this was attributed to the various agricultural development projects which were ongoing at the time of the Project. Conversely, in the Khulna-Mongla Road Project in Bangladesh, the shortfall in the expected increase in traffic was attributed to the failure in encouraging large-scale cargo handling at the nearby on-shore port facilities. Other factors affecting traffic volumes were outbreak of civil disturbances and oil price increases. The composition of vehicles utilizing the new road facilities changed as a result of the projects. There was a general increase in the number of cars and light passenger vehicles (e.g. minibuses) plying the roads, and a decline in the volume of traffic from small and medium-sized commercial vehicles. The increase in cars and passenger vehicles was attributed to increased mobility, ease and facility of transportation made possible under improved road conditions, while the decline in small commercial transport vehicles was believed to be the result of increases in fuel prices which shifted the demand for higher-capacity commercial vehicles.

20. Most postevaluated RRT projects experienced poor road maintenance which shortened the remaining estimated service life of the structures. Poor maintenance was a major cause of the mediocre operational performance of projects, as in the case of the Iligan-Cagayan de Oro-Butuan Project in the Philippines. Low levels of maintenance were compounded by truck overloading and the poor quality of roads constructed, leading to the accelerated deterioration and decline of pavement structures. Over the years, the Bank had increasingly recognized the importance of road maintenance and had included it as part of many road project components. The postevaluation of the Road Maintenance Sector Project in Fiji had confirmed the economic viability of maintenance operations as a Bank undertaking in the sector. Some countries, such as Indonesia, Malaysia, and Thailand, had also started to recognize its importance and had responded through higher budget allocations for road maintenance operations. However, in many developing countries, road maintenance operations still represented a secondary concern. The major cause of inadequate maintenance of roads was the lack of budgetary support to finance maintenance expenditures. Budget allocations were generally biased towards construction and improvements. Other constraints faced by the road authorities included the shortage of maintenance personnel; lack of qualified and skilled supervisors to oversee operations; and inadequate maintenance equipment.

2. Organization and Management

21. Supervision and management of reviewed projects were generally considered satisfactory. In most instances, supervising engineering consultants oversaw construction, in

addition to a Project Monitoring Office (PMO) in charge of the overall administration, general supervision and management of the projects. The constraints faced by some of the PMOs in the postevaluated projects included inadequate staffing and recruitment problems, bureaucratic procurement procedures and a lack of coordination, particularly in projects which were scattered over a large area. Bank supervision was considered adequate in most cases. However, the practice of scheduling simultaneous Bank review missions for ongoing projects in a country was viewed as a deterrent to adequately reviewing the status of road projects as it became a constraint on Bank staff resources.

3. Institutional Development

22. Bank assistance to institutional development in the road sector was largely limited to the provision of foreign consultants who would act as agents of technology transfer to the local counterparts. Assignment of local staff to the foreign consultants was expected to help in improving the capability of the former in sector planning, understanding contract specifications, formulating geometric and pavement designs, enhancing construction supervision and management, and maintaining quality control of road materials and applications. Specific training programs aimed at improving local capabilities for road construction and management were lacking in most of the road projects reviewed.

23. The results of Bank efforts at enhancing institutional capability through technology transfer was largely dependent on the state of development of the country and the institutions concerned. Though not favorable in many DMCs, some success was experienced in enhancing the capabilities of executing agencies (EAs) such as the Directorate General of Highways in Indonesia. The major constraints to technology transfer from foreign experts included: (i) failure to assign local counterpart staff on a full-time basis because of staff shortages; (ii) short duration of foreign consultancy; (iii) lack of qualified staff to be assigned as local counterparts; (iv) failure to retain the services of trained local staff after a project had been completed; and (v) overextension of local agency due to several ongoing projects. The employment conditions at the local agencies were also considered as a significant factor in institutional development. For example, in the Hetauda-Narayangarh Project in Nepal, postevaluation highlighted the negative effects of an unattractive salary and promotion system in the development of local institutional capabilities.

4. Economic Returns

24. Bank methodology for the calculation of economic internal rates of return (EIRRs) of projects in the roads sector are distinct in terms of benefit estimation. Economic benefits are usually estimated based on changes in traffic growth rates and in vehicle operating cost (VOC) savings. A comparison of the calculated EIRRs at appraisal and during postevaluation did not reveal significant variations. There was almost an equal number of projects with reestimated EIRRs below or above the initial estimated rates of return (see Appendix 4). Positive variations in the recalculated EIRRs ranged from 1 percent to more than three times above the appraisal estimates. Negative variations ranged from 6 percent to 53 percent below the appraisal EIRRs. The major reasons for the variations in EIRR reestimation included: (i) deviations of actual traffic counts

against appraisal projections; (ii) implementation cost overrun/underrun; (iii) differences of actual VOC savings from appraisal forecasts; (iv) differences in methodological approaches to the EIRR estimation during appraisal, project completion, and postevaluation; and (v) implementation delays.

25. In some instances, post-project developments significantly affected the viability of EIRR recalculation at postevaluation. In the Mindanao Secondary and Feeder Roads Project in the Philippines, the EIRR for the secondary road component could not be reassessed because a USAID improvement project was superimposed on the Bank's Project two and half years after it was completed, making benefit estimation difficult. Similarly, in the Khulna-Mongla Road Project, EIRR reestimation was not considered viable as the preconditions for the achievement of the Project' objectives, i.e. the massive diversion of cargo from anchorage to the on-shore port facilities, did not materialize as expected. Two other projects whose EIRRs were not recalculated were the Vientiane Plain Road Improvement Project in Lao PDR, and Highlands Road Improvement Project in Papua New Guinea.

5. Socioeconomic Impact

26. The major socioeconomic benefits of the postevaluated projects consisted of higher VOC savings and increased producer surplus in the areas served by the road infrastructures. VOC savings accrued from better surface standards and higher vehicle capacity of the roads. Producer surplus accrues because of better farm to market accessibility. These benefits have contributed to improved living standards, particularly in the rural and previously inaccessible areas. In addition, additional employment opportunities for unskilled labor arose during the construction phase of the projects. An unquantified but important socioeconomic impact was the increase in land values in areas adjacent to the road infrastructures. Similarly, cost savings from reduced traffic accidents due to better roads were acknowledged but not estimated.

27. Other benefits attributed to the road projects included: (i) improved accessibility to schools, health care clinics, community centers and other public services; (ii) lower transport fares; (iii) lesser travel time; (iv) greater comfort during road travel; and (v) increased mobility and commercial activity at the Project sites. These benefits were more pronounced in the case of rural and feeder road projects, and new road constructions. For example, in the Vientiane Plain Road Improvement Project in Lao PDR, the improved condition of the feeder roads was believed to have contributed in making Vientiane a year-long major market center. Other signs of improvements in living conditions were also evident. These largely were in the form of new housing investments and housing renovations, and in-migration into project zones of influence. In the case of road restoration projects such as the Flood Damage Restoration Project (Roads and Railways) in Bangladesh, reconstruction of the damaged infrastructures was believed to have provided the impetus for the return to normalcy of local activities and hastened the rehabilitation of the affected communities.

6. Impact on Women

28. Road projects were not designed to specifically target women beneficiaries.

However, women were believed to have significantly benefitted when the road projects resulted in greater and improved accessibility to educational, health, child care, and market facilities.

7. Environmental Impact

29. A major contribution of the road projects was the reduction in dust particles and improved air quality at the roadside areas. The installation of drainage structures and raising of the embankments accompanying road construction and improvement were also considered to have had beneficial effects in the prevention of soil erosion. However, in the case of new road construction, some agricultural lands had to be utilized and trees had to be cut. For example, in the Second Road Project in Indonesia, about 300 hectares of rich agricultural land were lost with the construction of the Surabaya-Gempol Highway. Nevertheless, these losses were compensated with the reclamation of about 3,000 ha of land under the Project. Meanwhile, the use of river gravel as construction materials has raised concerns regarding the impact of road projects on the depletion of gravel deposits, river bed degradation, and upstream erosion. Improved accessibility provided by the RRT projects also had some environmental implications, especially when the infrastructures were located in fragile lands. In the case of the East-West Highway (Phase II) Project in Malaysia, environmental concerns were raised especially since the central section of the Highway traversed a forest reserve, and might reduce the effectiveness of measures employed against illegal logging and forest degradation. Similarly, in the reevaluation of the Road Improvement Project in the Philippines, improved access was cited as having far-reaching environmental consequences such as the alienation of land for settlements, and uncontrolled land use that intrude into areas of natural beauty.

30. Overall, the RRT projects were regarded as having no significant direct adverse effects on the environment. This, in part, could be attributed to the relatively fewer projects involving new road construction than road improvements or rehabilitation. It is also important to note that Bank efforts at environmental impact assessments have only been emphasized during the 80s, when most RRT projects were directed at road improvement or rehabilitation. In addition, the indirect effects of road projects, such as motorization and traffic pollution, had not been a major part of the impact analysis, until recent times.

8. Performance Rating

31. The overall performance of projects in the RRT subsector has been favorable. Twenty-seven projects (87 percent) were rated generally successful, two (6.5 percent) were rated partly successful, and two were rated unsuccessful (see Appendix 5). The two unsuccessful projects were located in Bangladesh (Khulna-Mongla Road Project) and in the Philippines (Mindanao Secondary and Feeder Roads). Major reasons attributed for the failure of these projects included: (i) non-development of expected interrelated investments (e.g. port facilities) which were deemed essential for the success of the project; (ii) failure to maintain the road structures; (iii) inadequate feasibility studies and lack of alternative project design strategy; (iv) implementation delays; and (v) security problems at the Project site.

9. Sustainability

32. Long-term sustainability of benefits in many of the postevaluated road projects were generally regarded as uncertain at the time of review. For most RRT projects, sustainability would depend on the respective EAs being able to administer and maintain the improved roads. Most postevaluated projects were found to have inadequate maintenance and this placed the sustainability of their benefits at risk.[6] For instance, in the Road Project in Papua New Guinea, reduction in traffic flows after project completion was attributed to the poor condition of the road surface as a result of deficient road maintenance. The importance of adequate maintenance to sustaining project benefits was best illustrated in the case of Thailand. Earlier projects (e.g. Highway Project, Second Highway Project) which fell under the regime of low road maintenance activities experienced lower than expected traffic volume and shortened project life, while those which underwent improved routine maintenance care (e.g. Highway Sector Project) had greater success in the build-up and sustainability of benefits. In most countries, budgetary considerations were cited as the major constraint to effective maintenance procedures. Other factors were staffing constraints and the unclear delineation of maintenance responsibilities between national and local agencies.

33. The problem of sustainability, given inadequate road maintenance, was further compounded by the high incidence of axle overloading by commercial vehicles; and ineffective enforcement of traffic legislation, especially those pertaining to vehicle overloading. In the Second Highway Project in Thailand, the premature failure of the pavements constructed under the project was attributed to the widespread practice of heavy overloading by 10-wheeler trucks and specially constructed 18-wheel gypsum trucks. Project design failed to anticipate the extent of overloading which resulted in less-than-adequate engineering specifications for the pavement design.[7] Cost of strategic raw materials, in particular fuels and oil, have shown a strong potential for disrupting the flow of benefits and to negate overall project viability. In general, postevaluation of RRT projects has suggested that unless such factors which affect sustainability are realistically taken into account at design, long term project viability cannot be taken for granted.

IV. ISSUES AND LESSONS LEARNED

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6 Projects department stated that over the last 10 years, greater emphasis had been given in incorporating pavement and bridge management systems (PMS) in the design of RRT projects as a measure for enhancing the sustainability of benefits from the structures. The PMS, combined with the Bank's conscious decision to move away from creating new facilities to upgrading or improving existing facilities is indicative of the former's thrust and recognition of the importance of sustainability.

7 According to the Projects department, "...the gypsum mine (which was the cause for the overloaded gypsum trucks) only opened during the latter part of construction of the road, and that failure was predicted at the time of the PCR to occur within one year of project completion. The Bank offered the use of surplus loan proceeds to the EA to strengthen the road pavement but this was declined and the road duly failed within one year of completion."

A. Key Issues

34. A number of key issues that have continuing relevance to ongoing and future Bank operations in the RRT sector were identified. In particular, these relate to project design, institutional capability, traffic monitoring and evaluation, overloading and road regulations, road maintenance operations, and cost recovery and road pricing. All these are significantly related to the overall imperative of sustaining the completed project through its economic life span as a condition of overall project viability.

1. Design of RRT Projects

35. Designs of RRT projects were generally based on inadequate appreciation of local conditions. In postevaluated RRT projects, failure of appraisal traffic forecasts to reasonably predict actual traffic growth was common. There was a tendency to underestimate the impact of the road project on traffic growth, particularly on the number of overloaded vehicles. For example, in the Second Highway Project in Thailand, project design failed to consider increases in the number of overloaded vehicles, especially of gypsum trucks. This resulted in early pavement failure for the Project. Other issues which were not adequately considered by RRT projects during project design relate to right-of-way and land acquisition problems, agricultural linkage of the road infrastructures, soil and climate conditions, and civil disturbances and security risks.

36. Bank experience with RRT projects also suggests that environmental aspects need to be considered early during project design. The indirect effects of road projects such as motorization and traffic pollution would have to be included in the projects' impact analysis. In addition, roads in ecologically sensitive areas need to be subjected to environmental impact assessment. This would address the concern that construction of roads do not lead to encroachment of forests and the establishment of illegal settlements.

2. Capability of Local Agencies and Contractors

37. The implementation of RRT projects is highly dependent on the capabilities of local contractors and field offices of the executing agencies. These being generally deficient, most postevaluated projects experienced difficulties and delays during construction in many DMCs. There is a dearth of qualified local contractors who are often undercapitalized and lack management skills and technical staff. For instance, some RRT projects in the Philippines and Indonesia were abandoned by the contractors during mid-construction because operating funds were no longer available and the companies were bankrupt. While deficiencies in the prequalification of contractors were often cited as a major reason for the above, the recurrence of this problem in most of the DMCs indicate a commonality in implementation constraints that could not be interpreted as being merely project-specific. Thus, while the Bank should adopt a more diligent role in the approval of procedures for prequalification of contractors, future RRT projects would also need to assess private sector capability and enlist necessary government support in providing technical as well as financial assistance.

38. Additionally, problems in staffing, in particular, a shortage of experienced professional staff at the middle management and operational levels, were common among the local contractors and EAs. The Bank addressed this problem through the engagement of foreign consultants as advisers and for supervision during project implementation. It was intended that through this procedure, there would be some technology transfer that would result in the strengthening of local capabilities. However, this approach did not prove to be very successful in most projects, and only fostered dependence on foreign expertise. Also, the tight schedule given to most of the foreign consultants and the limited availability of local personnel hampered the transfer and learning process. Where some positive results were observed, local staff were found to have subsequently left the local agency after the projects were completed. This would indicate the need for systematic and definitive goal setting in terms of technology transfer objectives. Additionally, institution building would need to become an essential part of future Bank lending, in particular as components of program loans. This would require that a thorough study and evaluation of local agencies' staff resources, their capabilities, and prospects for technical absorption, be made prior to the design of training and capacity building components.

3. Traffic Monitoring and Evaluation

39. A major indicator used in the assessment of RRT Bank project planning and design in postevaluated projects is the average daily traffic count. This indicator can be misleading, however, as traffic count procedures are often defective and counts are not conducted on a regular basis. The EA capacity of DMCs for such work is usually limited, especially as far as staffing and funding are concerned. Poor quality of traffic monitoring in many executing agencies has left the Bank with an inadequate data base for planning its projects. Moreover, the Bank did not adequately address traffic monitoring in the design of earlier RRT projects as benefit monitoring and evaluation (BME) was introduced only during the 1980s. For improved traffic monitoring, future RRT projects would need to consider the following: (i) standardization of time periods and duration of traffic surveys; (ii) existence and regular operations of permanent counting stations; and (iii) analysis and timely circulation of traffic survey results to officials concerned. To the extent possible, future road projects would also need to include freight and passenger charges as items for benefit monitoring.

4. Overloading and Road Regulations

40. Overloading of vehicles, a major cause of road deterioration, was a chronic problem in most countries. Truck and cargo operators were inclined to maximize earnings per trip by exceeding the load limits of their vehicles. The damage to roads due to overloading was further compounded by the predominant use of heavy capacity commercial vehicles. Cases of excessive overloading were found in RRT projects in Thailand, Malaysia, Papua New Guinea, Philippines, Fiji, and Indonesia. While legislations on truck load limits do exist in the DMCs, their enforcement were found to be largely ineffective and inadequate. Required facilities such as weighbridges and loadometers that check the weight of trucks were often not available. On the other hand, those that had been installed were hardly used due to problems in operation such as staffing constraints. Given the difficulties in controlling truck overloading, future projects would need to continue taking into consideration the reality of vehicle overloading and its implications on road engineering and structure during project preparation and design.

5. Road Maintenance Operations

41. Most of the RRT projects were characterized by poor road maintenance operations. Shortage of funds was cited as the major reason for the low level of maintenance, as government budgetary allocations for this activity were often very low. In fact, it was observed in the Second Road Project in Indonesia that road improvement and reconstruction enjoyed higher government priority over this activity. Another factor which accounted for the low level of maintenance operations of the RRT projects relate to insufficient and inadequately skilled road personnel, which was further aggravated by the lack of necessary maintenance equipment. Staff shortages were attributed to low wages, diversion of maintenance crews and machinery to other construction activities, and funding constraints. Also, where responsibility for road operations had been decentralized to local government, as was the case in the Philippines, there existed some confusion as to which government agency would be responsible for maintenance operations. This fostered a sense of apathy and lack of concern for the completed structures. As transportation and road infrastructure become increasingly important and vital to the development efforts of DMCs, maintenance operations would need to take a forefront in the design of RRT projects, especially as it constitutes a key issue in the optimal and sustainable operating performance of the Bank's efforts in the roads and road transport sector.

6. Cost Recovery and Road Pricing

42. In light of funding problems encountered for the maintenance and upkeep of roads, cost recovery becomes an important concern in the management of RRT projects. Cost recovery is desirable not only for sustaining and expanding road networks but also for encouraging the efficient use of scarce national resources. Road costs were usually recovered through fuel taxes, import duties on vehicles and spare parts, registration fees, and motor vehicle fees. However, no direct relationship had been found between the level of revenue collected from road user charges and the road maintenance expenditures. Since road user charges were not directly related to the

financial costs required to maintain the roads and highways, maintenance funds had to be continually sought from the national and provincial governments which had different budget priorities. This procedure also led to the subsidization of roads and their users by other taxpayers, which often resulted in fewer available funds for road improvement and maintenance. Lack of transparency in road maintenance financing did not augur well towards increasing the budget allotments. For better allocation of road maintenance funds, it is important that efforts be taken to ensure that costs for the improvement and maintenance of the roads and road transport sector be funded directly from the sector itself, i.e. from road user charges, and that mechanisms that will adequately account for the fund utilization on road disbursements be set in place.

B. Lessons Learned

43. The highlights of the major lessons learned from the RRT projects are summarized below. A list of selected postevaluation findings and lessons learned in the RRT sector is presented in Appendix 6.

(i) There is a need to improve project formulation and design. Adequate feasibility studies should be prepared and carefully evaluated to avoid technical and implementation problems, and subsequent increases in project costs. Important issues that would have to be carefully considered during design are the local land ownership structure for right-of-way and site acquisition considerations, RRT project linkages to agriculture and other socioeconomic sectors, political and legislative climate in the road sector, soil structure and climatic conditions, security risks and road safety, and movements in local and international prices of oil and fuels. There is also a need for more realistic and reliable estimates on the effects of RRT projects on the composition and growth of local road traffic, as well as on VOCs and their resulting impact on transport operators and road users.

(ii) Attention should be given to the development of institutional and local private sector capability in the construction and management, including maintenance, of RRT infrastructure. The technical and financial capability of contractors should be carefully assessed during the prequalification stage to ensure the smooth flow of project implementation and minimize construction delays. Often, weak prequalification criteria result in unsatisfactory performance of contractors, increased costs and implementation delays. Institutional development through attracting and retaining adequately trained personnel and supporting professional advancement through in-service training can help improve the EA's efficiency.

(iii) BME systems are essential for the realistic assessment of project impact and for future road planning. Baseline traffic and benefit monitoring parameters should be established early at the start of the projects. A careful selection of local traffic or counting stations, application of appropriate vehicle weighing techniques, and promotion of counting accuracy is essential in ensuring a truly representative data base for planning and

maintenance purposes. This is not only true for project lending but for program lending as well, and every effort should be made by the Bank to ensure that financial, economic, social, or indicator-based monitoring is carried out for all types of assistance.

(iv) In view of the increasing number of overloaded vehicles on the road projects, the Bank would need to closely follow-up on local governments' enforcement measures against overloading. Conversely, where reductions in overloading cannot be reasonably expected with certainty, stronger initial road design can be adopted to prevent early deterioration of the RRT infrastructure.

(v) All available means should be exhausted to encourage governments to improve its attitude towards road maintenance. The Bank should pay special attention to maintenance issues during project formulation and design, and would need to express a more definite view regarding the earmarking of government funds for road maintenance during policy dialogues. Routine and periodic maintenance of roads should be encouraged as it will enable the early detection of shortfalls in pavement design and structure. An alternative for the Bank would be to improve maintenance standards through advisory technical assistance, prior to the launching new road projects. Other road operations that need to be encouraged include: (i) periodic checks on the quality of road maintenance work; and (ii) monitoring and verification of maintenance expenditures against budgets and physical accomplishments.

(vi) As DMCs experience increasing volume of vehicular traffic on its road infrastructure, more direct cost recovery mechanisms in RRT projects would have to be devised and urgently pursued, particularly in the light of governments' ambivalence in allocating road maintenance budgets. This could be discussed more extensively by the Bank during policy dialogues, particularly on the subject of overall budget management. Additionally, the persistence of truck overloading despite existing legislations and in the face of inadequate enforcement suggests the suitability of a pro rata road user tax based on the extent and quality of road utilization.

(vii) The expansion of road networks as a result of investments in RRT projects would ultimately affect ecologically sensitive areas. Certain parts of river watersheds and forest enclaves would have to be violated by the construction of new roads. In view of their adverse impact on the environment, future similar RRT projects will need to undergo an environmental impact assessment and specify the requirements for environmental intervention according to the Environmental Assessment Requirement and Environmental Review Procedures of the Bank, and the Sector Specific Environmental Guidelines.