Meta Analysis of Ex-Post Evaluation Reports
by Country and Sector

Sector Review Report

Road Sector

Final Report

January 2003

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Forward

This analyses ex-post evaluation reports (henceforth, evaluation reports) for 62 road sector projects supported by the Japan Bank for International Cooperation (JBIC).

In order to improve the quality of aid projects in developing countries, the JBIC has conducted ex-post evaluations of completed projects. Ex-post project evaluation is the assessment of how a project was implemented and administrated in contrast with the initial plan, and whether the expected results were realized after completion of the project. The ex-post evaluations are conducted with two goals in mind. The first is to compile the lessons learned from the project evaluations, and to use the lessons in the implementation of future projects. The second goal is to improve the transparency of aid projects, and to increase the accountability for people both in Japan and the borrowing countries through disclosure of evaluation results.

The goal of this review is to create an overview of the performance of completed road sector projects using ex-post evaluation reports, to analyze the data to determine the cumulative effect of the Japanese ODA loan projects in the sector, and to derive possible lessons or recommendations for future yen loan projects. In addition, by reviewing and studying the evaluation indices, it is hoped that reference material for future appraisals, administration and evaluations will be provided.

This report consists of four chapters. The first chapter outlines all projects in the sector as well as the 62 road sector projects analyzed in this report. Chapter two establishes a framework for the analysis, and chapter three analyzes the performance of the 62 projects based on the evaluation reports. Chapter four presents the comprehensive results of the analysis, and offers lessons learned and recommendations for future road sector projects.

The performance analysis is performed through the establishment and analysis of five primary criteria broken down into 23 evaluation check criteria.

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1. The Japanese ODA Loan Projects in the Road Sector

1.1 Loan Conditions for the Road Sector

As of September of 2001, 256 Japanese ODA loan agreements authorized an accumulated total of 2,027,909 million yen in loans to the road sector (including bridges). This accounted for 12 % of all project loans[1].

The geographical distribution of approved loans was focused on Asia, which received 77.6% of all loans, while Africa received 7.0%, the Middle East received 6.0%, and Latin and South America received 5.2%. Road sectors made up 85% of authorized yen loans, while bridge projects made up 15%.

The Japanese ODA loans to the road sector began in the late 1960's, but loan amounts increased dramatically in the 1980's and 1990's, and there was a growth trend in the ratio of bridge projects to road projects. The authorized loan amount for each loan (loan agreement) grew drastically after the 1980's, and from 1996-2000, on average 11 billion yen was approved in each loan agreement. This is approximately ten times as large as the average approved loan amount prior to 1975.

Table 1: Total Approved Loan Value and Distribution of Road Sector Loans

(to September, 2001)

	Roads		Bridges		Total	
	in millions of yen	%	in millions of yen	%	in millions of yen	%
South-East Asia	1,018,166	58.8%	159,315	53.7%	1,177,481	58.1%
South Asia	169,488	9.8%	51,685	17.4%	221,173	10.9%
East Asia	154,976	8.9%	24,715	8.5%	179,691	8.9%
Middle East	104,437	6.0%	17,075	5.8%	121,512	6.0%
Africa	119,433	6.9%	21,893	7.4%	141,326	7.0%
Latin, South America	106,441	6.1%	0	0.0%	106,441	5.2%
Other	58,755	3.4%	21,530	7.3%	80,285	4.0%
Total	1,731,696	100.0%	296,213	100.0%	2,027,909	100.0%

[1] Including Engineering Service loans; bridge projects exclude railroad bridges

Table 2: Approved Loan Amount and Changes in the number of Road Sector Loan Agreements by Year

Year of loan approval	Roads		Bridges		Total	
	in millions of yen	Loan agreements	in millions of yen	Loan agreements	in millions of yen	Loan agreements
-1975	21,029	17	9,797	6	30,826	23
1976-1980	124,113	38	11,300	5	135,413	43
1981-1985	151,147	23	6,010	1	157,157	24
1986-1990	307,327	35	25,782	6	333,109	41
1991-1995	426,405	47	113,103	17	539,508	64
1996-2000	596,791	54	95,926	9	692,717	63

Thailand has the highest approved loan amount for road sector projects, followed by Indonesia, the Philippines, Vietnam and China. Among the top five loan receiving countries, Thailand, Indonesia and the Philippines have continued to receive the Japanese ODA loans since the 1970's, while Vietnam and China began receiving loans in the 1990's. For this reason, the approved loan amount per loan agreement was higher in Vietnam and China than in the top three countries.

Table 3: Approved Yen Loan Value in the Road sector by Country (to September, 2001)

Country	Approved loan value		Loan agreements
	in millions of yen	%	
Thailand	368,813	18.2	40
Indonesia	301,487	14.9	53
Philippines	297,038	14.6	50
Vietnam	194,249	9.6	21
China	176,023	8.7	16
Turkey	108,088	5.3	6
Pakistan	64,413	3.2	5
Sri Lanka	64,241	3.2	9
India	47,594	2.3	6
Bangladesh	44,925	2.2	5
Peru	43,748	2.2	4
Ghana	42,012	2.1	5
Kazakhstan	38,069	1.9	2
Other	237,209	11.7	46
Total	2,027,909	100.0	268

(Note) Includes bridge projects

1.2 Overview of Reviewed Projects

This review focuses on 62 road sector Japanese ODA loan projects for which

evaluation reports were completed by the Japanese fiscal year 2001[2]. These projects have been conducted since the 1970's, mostly in Asian countries. Information including project names, countries, sector (sub-sector), the month and year the loans (loan agreements) were entered into, results, and the year of evaluation are provided in the material appended to this report.

A total of ¥487.7 billion was loaned to the 62 reviewed road sector projects, with an average of ¥7.9 billion loaned in each project. This corresponds to approximately a quarter of the total projects implemented in the road sector.

Broken down by region, Asia received ¥350.1 billion in loans (72%), the Middle East received ¥84.7 billion (17%), Africa received ¥35.1 billion (7%) and Latin and South America received ¥17.8 billion (4%). These percentages generally reflect the regional distribution of all road sector projects, but because expensive projects conducted in Turkey were included, the percentage for the Middle East is comparatively high[3].

Eighteen countries received loans, but over 70% of the total loan amount was loaned to the top four borrowing countries. The largest borrower was Thailand, which was loaned ¥127.6 billion (26% of the total), followed by Indonesia at ¥100.4 billion (21%), Turkey at ¥73.4 billion (15%) and the Philippines at ¥59.3 billion (12%) (Table 4). Considering the total actual value loaned to each country, this report accounts for one-third of the projects in Thailand and Indonesia, two-thirds of the projects in Turkey, and one-fifth of the projects in the Philippines. Vietnam receives a large amount in loans however, because most of these projects have been undertaken in recent years, they are not included in this report.

Broken down chronologically, this report considers 24 loan projects totaling ¥146.3 billion (disbursed amount) from before 1980, 10 loan projects totaling ¥103.6 billion from the early 1980's, 20 loan projects totaling ¥177.8 billion from the late 1980's, and 8 loan projects totaling ¥59,9 billion from the early 1990's. Loans entered into during the late 1990's were not included in this report (chart 5). The projects in this review make up over 80% of the total loans to the road sector conducted in the 1970's, but less than 60% of loans in the 1980's and less than 10% of loans in the first half of the 1990's.

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[2] Single projects that were divided into multiple phases were counted as a single project. There are cases where multiple projects which proved to be closely related were evaluated as a single project. In cases where information was provided in separate evaluations, the projects were counted separately, while if they were evaluated as one project, they were counted as a single project. There were two projects of the latter type.

[3] The regional distribution of total approved loans for road sector projects is as follows: Asia 77.6%, Africa 7.0%, the Middle East 6.0%, and Latin and South America 5.2% (See Section 1.1). A post-project evaluation has been conducted of highway projects which included the second Bosporus Bridge in Turkey. The total yen loan amount for this project climbed as high as 61.6 billion yen.

Table 4: Number of Reviewed Projects and Actual Japanese ODA Loan Amount by Country

Country	Number of projects	Yen loan amount (hundreds of millions of yen)	Country	Number of projects	Yen loan amount (hundreds of millions of yen)
Thailand	15	1,276	Jordan	1	113
Indonesia	7*	1,004	Ghana	1	84
Turkey	2	734	Sri Lanka	1	56
Philippines	15	593	Honduras	1	46
China	4	216	Zimbabwe	1	38
Bangladesh	1	213	Botswana	1	37
Kenya	4	146	Tanzania	1	30
Malaysia	3	142	Peru	1	19
Paraguay	2	113	Senegal	1	17

* Because this chart includes one evaluation where multiple projects were evaluated as a single project, the actual number of projects is larger.

Table 5: Number of Reviewed Projects and Yen Loan Amount by Year*

Year	Number of projects	Yen loan amount (hundreds of millions of yen)
1970-1975	4	133
1976-1980	20	1,330
1981-1985	10	1,036
1986-1990	20	1,778
1991-1995	8	599

* Based on the date the loan was authorized (in cases with multiple loans, the date of the earliest loan)

1.3 Types of Reviewed Projects and their Characteristics

The following differences were seen in the content of road sector projects: 1) project scope and type (road project, bridge project, construction equipment loan project), 2) purpose (construction, improvements, repairs), 3) road type, 4) open roads and toll roads, and 5) project overall goals. This section will list the characteristics of the projects reviewed in this report, focusing on these differences.

(1) Differences in project scope and type (road project, bridge project, construction equipment loan project)

Approximately 60% of projects involved small-scale bridges[4], while 30% involved

[4] All percentages in this sector are calculated on the basis of the actual loaned amount.

roads and large-scale bridges. The remaining 10% of projects involved the loan of construction equipment for creation or renovation of roads. There were a few projects that involved only the loan of construction equipment or traffic equipment such as traffic signals or toll collection systems (Table 6).

The regional distribution of the ten projects where loan for construction equipment was assisted is as follows: Four projects in Asia, three projects in Africa, and three projects in Latin and South America. Such projects were relatively infrequent in Asia[5].

Table 6: Number of Projects and the Japanese ODA Loan Amount by Project Scope*

Roads (includes small-scale bridges)	Large-scale bridges	Construction equipment	Traffic equipment	Number of projects	Yen loan amount (in hundreds of millions of yen)
○				34	2,917 (60%)
	○			13	767 (16%)
○	○			3	728 (15%)
○		○		8	361 (7%)
		○		2	48 (1%)
			○	2	55 (1%)

* Project Scope includes project components conducted using other funds.

(2) Differences in purpose (construction, improvements, repairs)

Nearly 60% of the projects reviewed in this report involved only the creation of new roads and bridges[6], while projects that included the improvement, repair, operation and maintenance of existing roads as well as new construction made up a little less than 20% of all projects. The remaining a little more than 20% were improvement, repair, operation and maintenance projects that did not include new construction (Table 7).

Considering the number of projects, the percentage of projects involving only new construction remained relatively unchanged since the 1980's, hovering around 50-60%. However, the percentage of improvement projects decreased, while the percentage of projects involving operation and maintenance increased[7].

[5] Of 46 projects in Asia, four projects (9% of all projects) were of this type, while outside of Asia, six projects out of 16 (38%) were.

[6] Based on actual loan value

[7] In the first half of the 1980's, 30% of all projects were improvement projects, while 20% were repair, operation and maintenance projects. By the early 1990's, however, the percentages had reversed.

Table 7: Number of Projects and Yen Loan Amount by Project Scope*

New construction	Improvements	Repairs, operation and management	Number of projects	loan amount (hundreds of millions of yen)
○			32	2,875 (59%)
○	○		7	675 (14%)
○		○	1	46 (1%)
○	○	○	3	159 (3%)
	○		6	281 (6%)
		○	9	676 (14%)
	○	○	4	257 (5%)

*Project Scope includes project components conducted using other funds.

(3) Differences in road type

Nearly 30% of the projects in this report were city road projects, which included primary city roads such as toll roads, ring roads, radial roads, as well as secondary city roads[8]. Nearly half of the projects reviewed in this report concerned major national routes (roads such as those connecting regional capitals), some of which were toll roads. The remaining 20% of projects involved other regional roads and production roads (Table 8).

When the number of projects is considered, there is a clear annual growth trend in projects involving city roads[9]. Moreover, 21 of the 22 projects that involved city roads were conducted in Asia. In the late 1970's and early 1980's, a comparatively large number of projects involved regional arterial roads, regional roads and production roads, with a comparatively higher proportion of these projects being conducted in Latin and South America[10].

[8] Based on actual loan value

[9] In the 1970's, 21% of all projects included city roads, while in the 1990's that percentage rose to 44%.

[10] All projects in Latin and South America involved regional arterial roads, while half included regional roads and production roads.

Table 8: Number of Projects and Actual Yen Loan Amount by Project Scope

City roads	Major arterial roads	Regional arterial roads	Regional roads/production roads	Number of projects	loan amount (hundreds of millions of yen)
○				19	1,252 (26%)
○	○			2	83 (2%)
	○			14	2,976 (43%)
	○	○		2	153 (3%)
		○		19	1,041 (21%)
		○	○	3	102 (2%)
			○	3	170 (3%)

*Project Scope includes project components not conducted using yen loans.

(4) Differences between open roads and toll roads

Of the 62 projects, nine projects totaling ¥172.3 billion (35%) involved primarily toll roads. Of these nine projects, four involved urban highways, while the remaining projects involved open roads.

(5) Differences in project goals

The goal for almost all road projects was to improve traffic capacity and safety within the project area, to improve the performance of the road network connected to the project area and to improve the efficiency and smooth flow of transportation. Achievement of these goals should result in a measurable increase in traffic volume and decrease in traffic delays, travel time, and travel costs. Thus, the overall goal of these projects was the realization of indirect socio-economic effects when the project goals are achieved[11].

Among the projects covered in this report, there were a large number of projects (40 projects out of 62, 66% of the total loaned amount) where the overall goal was regional economic development resulting from the impact of road maintenance and improvement, without mention of specific sectors of the economy. However, 13 projects (20% of the total loaned amount) mentioned agricultural development as a overall goal, and 11 projects (17% of the total loaned amount) mentioned non-agricultural industrial development (mining, manufacturing and tourist industries) as a overall goal. Within these projects, five projects (5% of the total loaned amount) mentioned both agricultural and non-agricultural industrial development. The remaining three projects (1% of the total loaned amount) were small-scale projects with a overall goal of social development and the stabilization of people's livelihoods.

[11] In materials and evaluation reports created at the time of appraisal, project goals and overall goals were not clearly differentiated or recorded, and it became necessary to create a uniform framework for analysis. For this reason, prior to analysis, it was necessary to understand and define the project goals and overall goals for each project.

2. Framework for Analysis

2.1 Five Primary Evaluation Criteria and Evaluation Check Items

This chapter consists of a performance analysis of 62 projects based on evaluation reports. The framework for analysis consists of five primary evaluation criteria. These five primary evaluation criteria are based upon the "Principles for Evaluation of Development Assistance" established by the Development Assistance Committee (DAC) in 1991, which evaluates a project from the standpoint of project relevance, efficiency of implementation, effectiveness, impact and sustainability. Each of the five parameters was broken down into the 23 "evaluation check items" listed in Table 9. Also, the Effectiveness parameter has come to include a review of the operation and effect indicators.

Table 9: The Five Evaluation Criteria and Evaluation Check Items

Project Relevance	Does the goal and the approach to the project match the priorities and policies of the target group, counterpart country and the donor?
A1. Consistency with Development Policy and Priority Issues	Do the project goals and overall goals of this project match the development policies (including the national policy and master plan) and priority issues of the country or region in question.
A2. Relevance of Project Scope	Was the project plan (scope and approach) at the time of appraisal judged appropriate to achieve the overall and project goals?
A3. Relevance of Project Scope Alteration	In cases where project scope was altered after the project was implemented, were the alterations adequate?
A4. Relevance of Project Goals at the Time of Evaluation	In cases where terms and conditions were altered after the planning stage, are the project goals still valid at the present?
Efficiency of Implementation	Was the impact appropriate and achieved as planned in terms of quality, quantity and timing? Was the method used the most efficient in regard to output?
B1. Completeness of Output	Was the output (project results) completed as planned?
B2. Implementation Schedule Efficiency	Were there any problems in the project that caused the implementation schedule to exceed original plans?
B3. Project Cost Efficiency	Were there any problems in the project that caused the project costs to exceed original plans?
B4.Project Implementation System	Was the system appropriate for decision-making, monitoring and troubleshooting during the project?
Effectiveness	Achievement of Project Purpose. To what extent did the project output achieve its purpose ?
C1. Output Utilization	Is the output (project results) being used adequately? (Determined primarily using the operation indicators. In cases where there is no planned value, sufficiency will be determined using absolute values.)
C2. Project Goal Realization	Were the direct effectiveness of the project sufficiently realized, and was the project goal sufficiently achieved? (Determined primarily using the effect indicators. When there is no planned value, sufficiency will be determined using absolute values)
C3.Achivement of FIRR/EIRR	Is the Financial Internal Rate of Return or the Economic Internal Rate of Return sufficient when compared with initial project values?
C4.Effect of Technical Assistance	Were the training and technological instruction component effects sufficiently realized?
Impact	Was the intended overall goal of the project achieved? Direct, indirect and subordinate results in terms of technical, economical, socio-cultural, institutional and environmental aspects.
D1. Contribution to Overall Goal Achievement	To what level were the original overall goals of the plan achieved, and to

	what extent did the project contribute to their realization.
D2. Impact on Policy and Institutional Systems	What impact did the project have upon development policy of the country in question and the institutional systems of the sector in question? Was the impact positive or negative?
D3. Socio-Economic Impact	What kind of impact was there on the regional society and economy? Was the impact positive or negative?
D4. Impact on Technology	What contribution did the project make to technological innovation and improvement in the country in question?
D5. Impact on Natural Environment	What impact was there on the regional environment? Was the impact positive or negative?
D6. Resident Relocation and Land Acquisition	What impact was there on regional society in terms of resident relocation and land acquisition?
Sustainability	After completion of aid, to what extent will the agencies and organizations of the counterpart country be able to sustain the output and effects of the project?
E1. Output Condition	Is the output (project effects) being maintained and operated appropriately? Is facility in good condition?
E2. Operation and Maintenance System	Are the systems, human resources (quality and quantity), work procedures (manuals) technology, maintenance facilities and equipment, and stock and procurement of spare parts for operation and maintenance sufficient?
E3. Financial Resources for Operation and Maintenance	Are sufficient financial resources available for appropriate operation and maintenance? Are those resources expected to remain available in the future?
E4. Continuation of Needs	Is it expected that need for the project will continue in the future?
E5. External Factors	What external factors will have a major affect on project effects and sustainability (environment, politics, policy, institutional systems, market, other related projects, etc.)? Is it expected that positive factors can be maintained in the future?

2.2 Sector Specific Evaluation Check Items

Roads function as a network. For this reason, an increase in traffic capacity in a certain section of the network will have an effect upon traffic in other sections. Likewise, limitations of traffic capacity in other sections can limit traffic volume of that section. .

Therefore, in order for a road sector to show results and have a significant impact, it is important that the roads affected by the project be connected to the area traffic network and aid in the creation of an efficient roads network.

This characteristic of road projects resulted in the establishment and application of the following sector specific check item in the performance analysis of road projects:

Sector specific Check Item: Road Sector

Connection to the Road Networks To what extent and how effectively is this project interconnected with the road networks?

3. Performance Analysis

3.1 Project Relevance

(1) Consistency with development policy and priority issues

The majority of the projects reviewed in this report conformed sufficiently to the government's development policy and priority development issues, including the following types of projects:

1) Projects indicated in development plans created by the government (five-year plans) and strategic plans for the Road sector. For example, not only were road projects declared a priority within a Chinese five-year plan, but the four road and bridge projects conducted within the country were specifically prioritized [12]. Also, the Road Maintenance Improvement Project, which provided the loan for construction equipment for the maintenance and development of roads in Indonesia, was vital in the realization of a new government policy to mechanize the routine maintenance of national and provincial roads.

2) Projects where specific needs and problems to be resolved in terms of road maintenance and improvement needs were clear. Many of the projects implemented in metropolitan areas such as Bangkok and Manila were to alleviate ever worsening traffic-jams, and were designed to follow the master plan for the metropolitan transportation network. The road projects in Indonesia, the Philippines and Thailand, were created to develop underdeveloped regions and regional agricultural and non-agricultural industries.

However, there were several projects that showed weaknesses in terms of relevance. For example, construction equipment was lent for road sector projects to stabilize the livelihood of residents in the least developed regions of Kenya and Tanzania. However, at the time of evaluation the projects had yet to be completed[13]. This is the result of governmental budget shortfalls in Kenya, while in Tanzania the budget shortfalls were compounded by a lack of capability of the implementing organization. In each of the regions, population density and development potential for the region was low. Traffic density was as low as 100 cars per day in the case of Kenya.

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[12] The Huangshi Yangtze River Bridge Construction Project, the Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project, the Second Chongqing Yangtze River Bridge Construction Project, and the Second Wuhan Yangtze River Bridge Construction Project in China.

[13] The Rural Road Project in Kenya and the Equipment Supply for the Southern Costal Trunk Road Project in Tanzania.

(2) Relevance of project scope

In the majority of cases, project plans were judged to adequately reflect initial needs and external factors, and there were no major problems resulting from flaws in the initial plan.

However, approximately one quarter of projects displayed a weakness in the initial plan, and in several projects, these problems had a significant effect on project implementation and outcome. In these projects, the weakness was the result of flaws in the project scope and the precision of pre-project evaluations[14]. The following are examples of some of the problems that were encountered:

1) Cases where construction scope was insufficiently studied

In two projects in Turkey, considerable additions were made to the original project scope due to insufficient pre-project survey and design. For example, in the "Renovation and Widening Project for Golden Horn Bridge", it was necessary to drastically increase project scope and extend the construction period because the scope of repair work on the existing bridge was underestimated[15].

In several local road projects, it was necessary to drastically increase the scope of the project when detailed designs were prepared because examination of environmental factors had been insufficient. For example, in the Malaysian "Crocker Range Crossing Road Project", incomplete basic data at the time of detailed design resulted in additional construction costs and an extended construction period in order to implement landslide countermeasures during the execution phase[16].

There were also projects which indicated road specifications higher than necessary in the initial plan[17].

2) Cases where construction equipment needs were not precisely understood.

In nearly half of all projects involving construction equipment, drastic changes in scope and supplementary procurement were necessary due to significant differences between the types and amount of construction equipment detailed in the plan and that which was actually necessary. The cause of the problem was a lack of precise understanding of the need

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[14] In the ex-post-project evaluation reports for these projects, remaining weaknesses in the implementation plan are detailed, but problems were not indicated at the time of appraisal.

[15] Another example is the Turkish Kinali-Sakarya Motorway (Second Bosporus Bridge) Project, which required additional work on the highway portion.

[16] Other examples include the Manila North Road Improvement Project (Rosario-Laoag Section) in the Philippines (where drastic adjustments and drainage work was judged necessary after implementation of the project) and the Thai Productivity Road Program (where attention to slope preservation on certain routes was insufficient).

[17] The Thai Phun Phin-Phattalung Highway Project and the Malaysian Crocker Range Crossing Road Project

for road development (construction, improvements, repairs, maintenance and operation) and the quantity and type of work necessary[18].

3) Cases where traffic volume projections were inaccurate

Cases where inaccuracy of traffic volume projections made drastic plan changes necessary after loans had been made, or where a sufficient traffic volume was not achieved. In the Thai "Outer Bangkok Ring Road (East Portion) Construction Project", a more accurate prediction of traffic volume was conducted and examination of the master plan was completed by JICA after JBIC' s appraisal, which changed the plan drastically to meet these new projections. In the Indonesian "Central and East Java Road Betterment Project", sections of road were left with insufficient width for actual traffic volume due to underestimation of traffic volume.

4) Other problems in preliminary studies.

In the "Regional Tourism Development Roads Project" in the Philippines, implementation was passed on due to an inability to obtain the approval of government environmental organizations. Approval was not obtained because of insufficient pre-program study and preparations related to the environmental impact of certain routes. In the Paraguayan "Road Improvement (Rehabilitation and Maintenance) Project", there was a multiplicity of aid agencies, and the coordination of all concerned parties required additional effort. In the Tanzanian "Equipment Supply for the Southern Costal Trunk Road Project", there were severe delays in project progress because the abilities of the implementing organization were not sufficiently investigated prior to project implementation[19].

At least one-quarter of all projects used master plans and feasibility studies provided by other donor organizations such as JICA or the World Bank. Likewise, implementation of half of these projects involved joint financing or cooperation among donors. This type of cooperation among donors is generally believed to have positive effects on project effectivness.

(3) Relevance of project scope alternation

In approximately three-quarters of all projects, changes were made to the original plan, the majority of which were judged appropriate[20]. The primary reason for changes was

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[18] The Indonesian Regional Road Development Project, the Sri Lankan Road Maintenance Project, the Kenyan Rural Road Project, and the Tanzanian Equipment Supply for the Southern Costal Trunk Road Project

[19] The feasibility study of this project was conducted by JICA, but the study was limited to technological and economic feasibility, and did not include the abilities of the implementing organization.

[20] However, even if plan changes were appropriate in the context of the project, there were cases where the changes resulted in extended construction time.

that environmental factors at the site became clear at the detailed design stage and were reflected detailed designs, or changes occurred in environmental, socio-economic and political factors[21] that were not predicted at the time when the initial plan was created and had to be incorporated into the plan.

However, there are some projects where questions remain as to the relevance of plan changes. In Kenya and Tanzania, after construction equipment were installed with Japanese ODA loan, the local governments conducted road construction and repairs using their own funds. At that time, the number of lanes and pavement specifications were upgraded, but questions remain as to the necessity of the changes because predictions suggested that future increase in traffic volume would be limited[22]. Conversely, there are examples where traffic volume exceeded predictions in areas where road width had been narrowed, resulting in similarly adverse effects[23].

Among projects implemented in metropolitan areas of the Philippines, appropriation of land did not proceed as planned, resulting in route changes and the abandonment of work on a certain section[24]. In the latter case, bottlenecks remained after termination of the project, drastically affecting the results of the project. This change was attributed to the fact that the land appropriation system was changed by the government of the Philippines after the appraisal, with the new system requiring more preparation time for land acquisition. In this case, external factors such as systematic changes and land appropriation constraints prevented implementation of the initial plan and the creation of an acceptable alternate proposal.

(4) Relevance of project goals at the time of evaluation

In this section, analysis was conducted focusing on whether the necessity and importance of the initial project was preserved at the time of ex-post evaluation, focusing primarily on fluctuations in traffic volume.

In road sector projects, traffic volume will not decrease as long as transport demand does not decline. As long as the project in question attempts to promote regional development in a region with development potential, it is difficult to conceive that transport demand will drop over time. In fact, in approximately 90% of the projects reviewed in this report, it has been confirmed that after completion of the project, traffic volume has increased or has

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[21] For example, changes in the landscape due to wind and flood damage, drastic changes in prices and the exchange rate, changes in the project implementation system, etc.

[22] The Kenyan Rural Road Project and the Tanzanian Equipment Supply for the Southern Costal Trunk Road Project

[23] One section of the Indonesian Sumatra Road Project

[24] The Metro Manila Radial Road No.10 and Related Roads Project, the Metro Manila Circumferential Road No.5 And Radial Road No.4 Construction Project, and the Metro-Manila Urban Transportation Project

surpassed the projections in the initial plan.

On the other hand, there are a few projects where traffic volume is not increasing, or is even decreasing. In Kenya and Tanzania, projects created roads in regions with low population and development potential, resulting in low traffic volume that is not increasing[25] after completion. However, these projects were implemented with the overall goal of stabilizing the standard of living for area citizens, and for this reason there was no immediate decrease in the necessity or importance of the projects themselves.

Also, in one section of routes in the "Road Improvement Project" in Jordan, a road which continued into neighboring Iraq was improved, but traffic volume decreased after completion of the project. The decrease was the result of economic restrictions in effect in Iraq during the implementation period of this project, an external factor which decreased the necessity of this route.

3.2 Efficiency of Implementation

(1) Completeness of output

In 80% of all projects, output was completed as planned. In the remaining 20% of projects, there were multiple reasons that output could not be completed, and in some cases the incompletion of important sections of project roads impeded project goal realization.

Causes that impeded completion included the following:

1) Shortfall of local currency

Cases where planned work was not completed during the loan period due to shortfalls in local currency that was to be provided by the partner country's government: In construction equipment loan projects in Kenya and Tanzania, the progress of road construction using the construction equipment fell far behind initial plans, and the construction was far from completion at the time of evaluation[26]. In the "West Leyte Roads and North-West Leyte Roads Improvement Project" in the Philippines, only 70% of construction results were realized due to local currency fund shortfalls resulting from costs incurred by typhoon damage. In the "Metro Manila Circumferential Road No. 5 and Radial Road No. 4 Construction Project" in the Philippines, a Build-Operate-Transfer (BOT) scheme had been planned for portions of project road, but had not been implemented at the time of

[25] The Regional Roads Project in Kenya and the South Coast Roads Improvement Project in Tanzania: In both projects, the planned roads had not been completed at the time of evaluation.

[26] The Kenyan Rural Road Project and the Tanzanian Equipment Supply for the Southern Costal Trunk Road Project

ex-post evaluation due to shortfalls of a company in change .

2) Implementing organization or contractor abilities

In the Tanzanian "Equipment Supply for the Southern Coastal Trunk Road Project", funding shortfalls and a lack of competence on the part of the implementing agency impeded project completion[27] to great extent.. In the Thai "Productivity Road Program", some contractors went bankrupt during implementation of the project, and some roads were not completed. In two projects in China, there was a possibility that the quality of construction by some contractors was substandard[28].

3) Land appropriation

In two of the projects in metropolitan Manila, project results were affected by difficulties in land acquisition, which resulted in incomplete construction of sections of the project[29].

(2) Implementation schedule output

In 30% of all projects, completion was delayed up to a year beyond the initial plan. When comparing projects in the three countries where the majority of projects were implemented, delays were comparatively few in Thailand, but pronounced in the Philippines and Indonesia. Causes for delays of over a year are as follows:

1) Plan alterations

In 17 projects (30% of all projects), delays of over one year resulted from plan alterations and increases in project scope[30]. Half of the projects where scope was increased were completed with minor delays of less than three years, while half the cases reported delays of over three years.

2) Natural disasters and bad weather

In 20% of all projects, damage sustained due to storms, wind, landslides,

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[27] Road construction was managed directly by the implementing organization, the Ministry of Communications and Transport, which had no experience conducting this type of large-scale road sector project.

[28] The Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project and The Second Wuhan Yangtze River Bridge Construction Project

[29] The Metro Manila Radial Road N0.10 And Related Roads Project and The Metro Manila Circumferential road No. 5 and Radial Road No. 4 Construction Project

[30] Five projects in the Philippines, two projects each in Indonesia and Paraguay, and one project each in Honduras, Thailand, Turkey, China, Malaysia, Peru, Ghana and Sri Lanka.

earthquakes, and unforeseen extensions of the rainy season caused delays of over one year[31]. Almost all of these projects were village road projects, but there were also cases where bridge projects in metropolitan areas were affected by flooding.

3) Delays in procurement procedures

In nearly 20% of all projects, delays in consultant or contractor bidding and selection resulted in project delays of over one year[32].

4) Problems of land appropriation

In nearly 20% of all projects, problems related to land appropriation resulted in delays of over a year[33]. The majority of these projects were road and bridge projects in metropolitan Manila and Bangkok, half of which showed delays of over three years.

5) Problems with contractor capabilities

In over 10% of all projects, delays of over one year resulted from the low technological capability or the financial status of the contractors[34]. Issues related to technology and finances were mentioned equally often.

6) Shortfalls in local currency funds

In 10% of all projects, the inability of the government to prepare domestic currency funds necessary for construction in a timely manner resulted in delays of over a year[35]. Three of these projects involved the loan of construction equipment, and each of these projects was delayed by over five years.

7) Other causes included the inability to procure construction equipment and materials in a timely manner, deterioration in public safety, price increases, changes in the exchange rate and time required to coordinate with other organizations.

However, there were nine projects where, despite delays in beginning construction, rapid implementation during construction made it possible to complete the project on time.

(3) Construction cost efficiency

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[31] Six projects in the Philippines, two projects each in Thailand and Malaysia, and one project each in China, Paraguay and Jordan.

[32] Four projects in the Philippines, two projects each in Thailand and Indonesia, and one project each in Honduras, Paraguay and Turkey.

[33] Five projects each in the Philippines and Thailand, and one project in Indonesia.

[34] Three projects in the Philippines, and two projects each in Thailand, Indonesia and Paraguay.

[35] Three projects in Indonesia and one project each in the Philippines, Malaysia, Kenya and Tanzania.

Half of all projects were completed within projected costs[36]. In 10% of projects, cost overruns were held to 10% above projected cost. The remaining 10% of projects were completed within projected costs, but construction was not completed, and project cost efficiency was judged to be poor.

The majority of project cost overruns were the result of domestic expense increases. Broken down by country, project cost overruns were pronounced in the Philippines. The causes for increases in project cost were as follows:

1) Additional construction due to changes in plan and natural disaster

In 20% of all projects, increases in construction volume and additional construction resulted in project cost overruns of over 10%[37]. In one-third of the cases, the project suffered damage from natural disasters.

2) Increases in construction equipment and material costs

In nearly 20% of all projects, increases in construction equipment and material costs resulted in project cost overruns of over 10%[38]. Half of these projects experienced delays in construction and extensions of the construction period, during which price increases exceeded predictions. In China, the introduction of a market economy resulted in unpredicted price increases.

3) Other causes include a project that required more than double the allotted budget to acquire land (Thailand), and a project where initial budget planning was poorly conducted, losses during implementation were high, and the construction period was drastically extended (Tanzania).

However, approximately 40% of projects were completed below planned costs for the following reasons:

1) Changes in exchange rate

In ten projects, foreign currency costs were drastically reduced due to appreciation of the yen[39].

2) Competitive bids

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[36] Total cost in foreign currency

[37] Six projects in the Philippines and one project each in Thailand, Indonesia, Ghana, Jordan, Kenya and Malaysia.

[38] Four projects in the Philippines, two projects each in Thailand and China, and one project each in Indonesia and Ghana.

[39] Four projects in the Philippines, three projects in Thailand, and one project each in Kenya, Senegal and Turkey.

In ten projects, competitive bidding for orders resulted in order costs far below those planned[40].

3) Reduction in project scope

In six projects, reductions in project costs resulted from drastic decreases in project scope. There were various reasons for this, including a case where a less expensive type of bridge was used[41], cases where one portion of road project was abandoned due to problems with land acquisition and contractors[42], and cases where a portion of the initial project scope was implemented by the local government using their own funds[43].

(4) Project Implementation System

In 60% of all projects, the project implementation system was judged appropriate, or no particular problems were identified. In 20% of projects, minor weaknesses were identified, and in the remaining 20% of projects, there were problems related to the project implementation system that affected the efficiency of implementation. In a comparison of the three countries where the majority of projects were implemented, the majority of Thai projects where judged to have had an appropriate project implementation system, while weaknesses were seen in many of the systems for projects in the Philippines and Indonesia.

Reported problems with the project implementation system included:

1) Problems related to implementing organization capabilities

In seven projects, the budget management, technical, and/or coordination abilities of the implementing organization showed weaknesses, and had an affect on implementation of the project[44].

2) Problems with contractor capabilities

There were four projects where the technical and financial capabilities of the contractor and poor implementation performance drastically affected project implementation. Three of these projects were implemented in the Philippines, and in each case the contract with the contractor was annulled. The remaining one was a project in Indonesia.

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[40] Five projects in Thailand, two projects each in the Philippines and Indonesia, and one project in Honduras.

[41] The Kenyan Kilifi Bridge Construction Project

[42] The Metro Manila Radial Road No.10 and Related Roads Project and the Circumferential Road No.3 Construction Project in the Philippines

[43] The Road Maintenance and Rehabilitation Project in Sri Lanka and the Thai Highway Sector Project

[44] Two projects in Kenya and one project each in China, Indonesia, Malaysia, Tanzania and Turkey.

3.3 Effectiveness

(1) Output utilization

The output in two-thirds of all projects, such as roads, bridges and construction equipment, was judged as being sufficiently utilized. However, in nearly 30% of projects, the level of utilization was below plan projections, and the achieved effects were thought to be insufficient.

1) Road and bridge utilization

The level of utilization of project roads and bridges can be judged using changes in the volume of traffic as an index. In over 70% of road and bridge projects, traffic volume met or surpassed projections. In cases where projections were not realized, reasons for failure included delays in construction of surrounding roads or remaining bottlenecks (five projects), effects of road construction (two projects), and unimproved bus and/or truck terminals (one project).

In projects involving urban trunk roads, a traffic volume between 30,000 and 200,000 vehicles per day was realized[45]. In projects involving urban and rural trunk roads, a traffic volume of between 1000 and 10,000 vehicles per day was achieved in the majority of projects, although in one project traffic volume was lower than 100 vehicles per day[46].

2) Utilization of construction equipment

In projects involving construction equipment, utilization of output can be judged using the time and ratio of equipment use as an index. However, there were few projects which provided concrete data which could be analyzed. In seven of the ten projects, it is reported that construction equipment was used sufficiently and appropriately. In the remaining three projects, the equipment was not used sufficiently, for reasons including the delegation of operation and maintenance of government roads to the private sector, small budgets for operation, maintenance and spare part purchase, and small budgets for road construction[47].

(2) Project goals realization

The level of realization of road and bridge project goals was judged comprehensively,

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[45] The maximum of 200,000 vehicles per day was achieved in the Turkish Renovation and Widening Project for Golden Horn Bridge.

[46] The Kenyan Rural Road Project

[47] The Honduran Road Improvement Project, the Indonesian Road Maintenance Improvement Project, and the Tanzanian Equipment Supply for the Southern Costal Trunk Road Project in that order

based on the following criteria: whether the project improved the functional capacity of the road network by eliminating traffic bottlenecks, whether the projects continued to take into account differing situations and goals, and indices such as increase in traffic volume, reductions in transport time and alleviation of traffic jams. In projects that included the loan of construction equipment or road-related facilities, the level of goal realization was judged based on equipment utilization.

1) Level of realization of project goals and contributing factors

In 80% of all projects, project goals were sufficiently achieved, and in the majority of the remaining projects, it was judged that portions of project goals were achieved. In two of the 62 projects, it was judged that project goals were not achieved. Both of these projects were African projects involving road maintenance conducted using loaned construction equipment purchased with the loan, in which the majority of planned roads were not completed at the time of evaluation due to shortfalls in the budget of the borrowing country[48].

The breakdown of projects where it was judged project goals were sufficiently achieved were as follows: 81% of the 37 road projects (excluding projects that involved the loan for construction equipment), 100% of the 13 large-scale bridge projects, 60% of the 10 projects that involved the loan for construction equipment (including road construction projects), and 50% of the two traffic equipment projects.

In road projects, the main reason for the inability to achieve project goals was the inability to attain sufficient traffic volume. This was the result of bottlenecks in urban areas (due to difficulties in acquiring land), poor connection to surrounding road networks, and delays in restoration after flood damage. In projects involving construction equipment, the main reasons for the inability to achieve project goals included the aforementioned budget shortfalls and changes in the organizational system of road operation and maintenance[49].

2) Direct effects of road and bridge projects

Table 10 displays the total number of road and bridge projects (including projects involving construction equipment) where each type of direct effect was reported. The most common direct results of road and bridge projects were increases in traffic volume (64% of projects) and reductions in transport time (47% of projects), followed by reports of alleviation of traffic jams in 22% of projects. These direct results were seen more frequently in bridge projects than in road projects, and among road projects more in urban road projects than in rural road projects. In several projects, year-round traffic volume was reported. However, the scope and detail of the ex-post evaluations was varied, and it is expected that the actual manifestation of direct results is higher than the numbers presented in Table 10 because not

[48] The Kenyan Rural Road Project and the Tanzanian Equipment Supply for the Southern Costal Trunk Road Project

[49] The latter case refers to the Honduran Road Improvement Project.

all results were reported.

Table 10: Number of Road and Bridge Projects Reporting Direct Result

	Number of Projects	Increase in traffic volume		Reduction in transportation time		Alleviation of traffic jams		Removal of traffic constrictions	
		Number of projects	Percentage	Number of projects	Percentage	Number of projects	Percentages	Number of projects	Percentages
All road and bridge projects	58	37	63.8%	27	46.6%	13	22.4%	4	6.9%
Road projects	45	26	57.8%	18	40.0%	6	13.3%	2	4.4%
Bridge projects	13	11	84.6%	9	69.2%	7	53.8%	2	4.4%
Urban road projects	21	16	76.2%	12	57.1%	11	52.4%	1	4.8%
Rural road projects*	37	21	56.8%	15	40.5%	2	5.4%	3	8.1%

* Including major trunk roads, rural trunk roads, rural roads and production roads.

The following direct results were realized:

1) Increases in traffic volume

In the majority of projects, there was a trend towards increased traffic volume after completion, and in one-third of projects the pace of increase was faster than predicted. For example, in a project in Jakarta, a toll road was constructed using the median divider of an existing trunk road, traffic volume had doubled predictions two years after completion, and is already near maximum capacity[50]. In a Thai project involving the improvement and repair of three prefectural and rural roads, traffic volume was predicted to be 450 vehicles per day four years after completion, but traffic volume had reached 4,900 vehicles per day after only two years[51]. In Kenyan bridge projects, the effect of a comparison of predicted traffic volume based on past trends to actual traffic volume after completion of the project showed that the project produced a 25-35% increase in traffic volume[52].

2) Reductions in transport time

In approximately half of all projects, reductions in transport time were reported on project roads that connected major destinations. Time reductions were most notable in

[50] The Indonesian Engineering Services for Jakarta Intra-Urban Toll Way Construction Project (multiple projects)

[51] The Thai Highway Sector Project (2)

[52] The Kenyan New Nyali Bridge Project, the New Mtwapa Bridge Construction Project, and the Kilifi Bridge Construction Project

projects including bridge construction. For example, in a project which constructed a bridge over the Jamuna River, which divides Bangladesh in two, the wait for a ferry prior to the project required 12-48 hours and the average crossing time was 25 hours. After completion, crossing the river required only 20 minutes[53]. In a project that improved the road network that connected the prefectural capital and an industrial city in the South of China's Anwhei Prefecture, the construction of a new bridge and a rural trunk road resulted in reducing the travel time between the two cities from seven hours to only two[54].

3) Alleviation of traffic jams

Alleviation of traffic jams and congestion was realized mainly in urban projects. Results were achieved in even the single projects, but there were cases where multiple projects showed a synergistic effect. For example, in a project that constructed a second bridge over the Yangtze River which flows through Chongqing City, traffic that flowed into the city and created traffic jams used the new bridge to bypass the city, contributing to the alleviation of traffic jams[55]. In Metro Manila, ten Japanese ODA loan projects focused on dispersing traffic on major trunk roads resulted in an average reduction in congestion of 10%, and doubled the area that could be reached within a one hour drive from the center of the city[56]. In metropolitan Bangkok, five bridges and highways built using Japanese ODA loans had the same affect, doubling the area that could be reached within a one hour drive from the center of the city and saving up to 30% of total vehicle hours[57]. However, in each case drastic increases in traffic volume meant that traffic jams were not completely eliminated.

4) Elimination of traffic bottlenecks

Effects of rural road projects included making roads passable year round or alleviating weight limits at river crossings. In a Paraguayan road improvement project, a dirt road that was impassable 100 days out of the year was made passable year-round, reducing travel time to the capital by half[58]. In a project in Senegal, a road that was impassable in the rainy season and only passable using four-wheel drive vehicles the rest of the year was made passable year-round regardless of vehicle type[59]. In a Kenyan bridge improvement project, traffic flow improved because weight and speed restrictions were lifted[60].

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53 The Bangladesh Jamuna Multi-purpose Bridge Project
54 The Chinese Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project
55 The Chinese Second Chongqing Yangtze River Bridge Construction Project
56 From the Philippine Republic's Evaluation of the Total Impact on the Manila Metropolitan Area in January of 2001: Nine of the 10 reports included in that report are also included in this report, and the tenth project involved the loan of Light Rail Transit cars.
57 From the Kingdom of Thailand's Impact study of the Bridges over the Chao Phraya River, 1985
58 The Paraguayan La Colmena-Acahay Road Improvement Project
59 The Louga-Dahra Road Construction Project in Senegal
60 The Kenyan New Mtwapa Bridge Construction Project

This type of direct effect created significant economic effects, which is reflected in EIRR to be method in the following section. For example, it is believed that the five bridge projects and the two highway projects implemented in Bangkok before 1985 created an economic benefit (time reduction effects + reduction in vehicle operating cost) of 80% of the total construction cost for the year of 1985 (in 1985 prices)[61]. The seven projects that improved the trunk road running across Indonesia's Sumatra Island are believed to have resulted in user benefits equivalent to 26% of the total construction cost in 1985[62].

(3) Achievement of EIRR

In two-thirds of projects, the recalculated EIRR has been reported. In nearly 40% of projects, the actual EIRR met or surpassed the initial plan. In the other hand, in nearly one-fourth of all projects the recalculated EIRR fell below projections. Reasons for lower actual EIRR included increases in construction costs (five projects), lower than predicted traffic volume (five projects), and increases in operation and maintenance costs (three projects). Table 11 displays the results of recalculation of project EIRRs.

The average recalculated EIRR for the 41 projects was 26.6%. EIRR ranged from 3.7% to 92.5%, with five projects below 10%, 15 projects between 10% and 20%, 13 projects between 20% and 40%, and 8 projects above 40%. Generally, it is thought that an EIRR of around 10% is sufficient for the road sector, so it can be said that 90% of projects displayed positive effects after recalculation of the EIRR. Of the five projects where the EIRR surpassed 50%, four were urban road projects in Manila and Bangkok[63], while the remaining project was a rural road project in Thailand.

The average EIRR value was higher for urban road projects than for rural road projects, for road projects than for bridge projects, and for projects including improvements and repairs than for projects only including new construction.

Table 11: Recalculated EIRR Results

	Number of projects	Average EIRR value
All projects	41	26.6%
Urban road projects	18	33.9%
Rural road projects*	23	20.9%
Road projects	29	29.7%
Bridge projects	13	18.9%

[61] See footnote 51

[62] Republic of Indonesia's Impact Study on South Sumatra Road July, 1987.

[63] The Metro Manila Roads Pavement Improvement Project, the Metro Manila Circumferential Road No. 5 and Radial Road no. 4 Construction Project, and the Circumferential Road no. 3 Construction Project, in the Philippines, and the Sam Yak Sra Krathiam-Kanchanaburi Highway Project and Din Daeng-Klong Toey Port Expressway Project in Thailand

New construction projects	25	25.0%
Projects including improvements and repairs	16	29.1%

* Including major trunk roads, rural trunk roads, rural roads and production roads.

(4) Effect of technical assistance

In two-thirds of all projects, evaluation reports made mention of technological support by the consultant or consultant performance. Judging from the contents of these reports, consultant performance was for the most part appropriate, with only two out of 62 projects reporting insufficient.

The content and results of technological support by consultants are as follows:

1) Technology transfer in road and bridge projects

Because road and bridge projects are comparatively simple, the role of technical assistance was limited to construction methods, detailed process design/operation of implementation, and management, with training and introduction of technology rarely becoming a significant component. Therefore, the evaluation report rarely specifically mentioned the results of training or the introduction of technology. The Senegal "Louga-Dahra Road Construction Project" is a rare example of a case where the results of on-the-job training for road maintenance and operation by the consultant were pointed out as having been effective.

2) Technology transfer in projects involving construction equipment and related road facilities

In projects involving construction equipment and related traffic equipment, there were many cases where the technology to operate and maintain newly loaned equipment was transferred. In these cases, the consultants generally conducted the transfer of technology effectively. For example, In the Indonesian "Road Maintenance Improvement Project", the consultant played an important role by creating manuals and conducting training to develop a system for the mechanized routine maintenance of roads directly operated by the government.

On the other hand, there were two projects where consultants did not produce sufficient effects. In the Peruvian "Roads Improvement Project", the efficiency of training was lowered by the use of only Japanese or English manuals. In the Indonesian "Equipment Supply for Local Roads Support Works", a three-year delay on the part of the contractor meant operators were not prepared to operate new equipment when the project began, which was one reason for the high incidence of early equipment failure during that project.

Also, there were two projects where loan for construction equipment was assisted without the benefit of a consultant. In the "Equipment Supply for Rural Road Development Project" in Zimbabwe, the construction equipment was utilized sufficiently, and was

comparatively well maintained. In the Kenyan Rural Road Project, JICA Experts were dispatched to support in the operation and maintenance of the construction equipment, and the necessary personnel training was conducted. Budgetary constraints, however, caused the majority of the equipment to break and be abandoned.

(5) Utilization of operation and effect indicators and achievement of project purpose.

1) Utilization of operation and effect indicators.

Table 12 presents the types of operation and effect indicators the level of project purpose achievement described in the evaluation reports of the 62 projects.

Table 12: Operation and Effect Indicators, and Level of Achievement*

Type of operation or effect indicators	Index utilization conditions	Level of index realization (for Projects with Indicators)			
	Percentage of projects with an index/indices	Significant results or results surpassing projections	Results generally matched projections	Results fell short of projections, but had some effect	Impossible to determine
Operation and Utilization Condition Indices					
Traffic volume	68%	65%	16%	19%	0%
Percentage of 'good' roads**	6%	83%	33%	0%	0%
Construction equipment utilization time	3%	0%	0%	0%	100%
Road repair results a)	2%	0%	100%	0%	0%
Direct Effects Indicators					
Time saving for traffic	16%	63%	19%	19%	0%
Direct economic benefits	11%	73%	18%	18%	0%
Average velocity increase	5%	0%	100%	0%	0%
Generated traffic volume b)	5%	60%	40%	0%	0%
Increase in public transportation c)	5%	100%	0%	0%	0%
Percentage of traffic volume increase	3%	100%	0%	0%	0%
Frequency of traffic accidents	3%	50%	50%	0%	0%
Income from tolls	2%	0%	0%	100%	0%

* For individual projects only. Does not include cases where a single index was used for multiple projects.

** In road projects it is considered an operation indicator (operation and maintenance), but for projects involving construction equipment it is considered a direct effect index.

a) Measured in the total extension of roads where each type of repair work was completed.

b) The difference between the traffic volume after completion of the project and the predicted traffic volume had the project not been undertaken.
c) The total number of bus lines or the number of busses in service during a single day.

In the majority of projects, traffic volume was used as an index. In approximately 70% of projects, data relating to the traffic volume on the road or bridge in question was utilized, but a comparison of projected volume and actual volume was only possible in half of these projects, and a pre-project/post-project comparison was only possible in one-third of these projects. In the majority of projects, the daily average traffic volume for a section of road (vehicles per day) was predicted, but few projects included information such as vehicle direction or vehicle type in the traffic volume data.

The next most common index was time saving in traffic. This data was available in just under 20% of projects, although the establishment of target values was rare. In the majority of cases, only information such as, "before the bridge was completed, it took __ hours and __ minutes to cross the river (including, for example, time waiting for a ferry), but after completion, crossing the river required __ minutes," or "travel time between city__ and city __ (or points __ and __ within a city) was reduced from __ amount of time to __ amount of time."

The direct economic benefits were determined by recalculating the EIRR for each project, although it was calculated synergistically for related projects. For example, in four projects that were simultaneously evaluated in Thailand, in order to predict the entirety of the impact that the project would have on the urban road network, road network function and traffic volume were compared on a with/without basis using an urban traffic simulation model, and time-reduction effects and cost-reduction effects were included in the estimation of economic benefits. Moreover, the economic benefits of the entire transport network and the contributions of each project were demonstrated.

Besides these indicators, each of the indicators included in Chart 12 were implemented, but each was infrequently used.

2) Achievement of operation and effect indicator goals.

In two-thirds of projects which utilized traffic volume, time saving in traffic and direct economic benefits indicators, projects surpassed predicted values or absolute figures showed positive effects. Reasons for success or failure were numerous, but as they mirror those reasons previously listed, they will not be listed here.

3) Use of impact-related indicators

In order to understand the various socio-economic impacts of projects, the following indicators were used in analysis of project impact on certain regions and areas:

- Changes in regional GDP, industrial output, population or land price
- Increase in the establishment or size increase of businesses, industry or industrial

development regions, or the acceleration of housing construction

- Evaluation by residents and drivers (a five stage evaluation of time saving in traffic, improvement in congestion, regional development and social climate)

Also, various single indicators were created for multiple, related projects. One example of this is the comprehensive impact study preformed on ten projects in metropolitan Manila[64]. In that case, as in the study of the Bangkok metropolitan area mentioned above, direct and indirect project effects were evaluated. These included various indicators calculated after comparing road network function and traffic volume using urban traffic simulation models on the base of with/without comparison, air pollution studies around project roads, and studies involving detailed interviews of road users and local residents. Major utilized indicators included “traffic volume/passage speed” (comparing either actual measurements or using a with/without simulation), “road conditions” (physical road conditions), “occurrences of traffic accidents," “noise or air pollution” (comparing actual measurements), “volume of pollutants from car exhaust” (comparing with/without simulation results), “evaluation of the project by road users” (evaluating the impact upon mobility, accessibility, traffic safety, the local economy, the local society and the environment), and “evaluation of the project by local residents” (evaluating the awareness of various positive and negative impacts).

4) Thoughts on the use of indicators in road and bridge projects

On the project goal level, improvement in road performance is relatively easily measured, and is most commonly measured using traffic volume and transport time data.

It is preferable that traffic volume data measure the annual traffic volume on the project road or river crossing before and after project completion, which is then compared with projected values. Using this method, it is possible to compare not only estimates and actual effects, but also the values before and after completion of the project, making it possible to quantify the resulting change in traffic volume. At that time, if it is possible to collect data on the type of vehicle, it is possible to measure the scale and type of impact the project had. Increase of resident mobility is relatively measured with ease with the number of busses using the roads.

It is preferable that data relating to time saving in traffic be collected by determining a start point and end point using common destinations that involve traversing the road or bridge in question, and taking transport time measurements before and after implementation of the project. Also, as some road or bridge projects are designed with the object of dispersing or rerouting traffic volume from another road, it is possible to perform a more detailed analysis of project effects if data about traffic volume or reduction in transport time are

[64] See footnote 56

available.

In terms of overall goals, there are no easy-to-use indicators to measure the performance improvement of the entire road network, the resulting increase in the efficiency of economic activity, or the promotion of development. Such analysis was performed, however, in the comprehensive study of projects in the Manila and Bangkok metropolitan areas, or the studies that evaluated a "Sumatra road projects in Sumatra, Indonesia" and bridge projects in China.

In the example of Manila and Bangkok, the impact of each project on the urban traffic network was analyzed utilizing a simulation. If an accurate simulation can be conducted by collating measured traffic volume and other data, it is possible to conduct a convincing analysis describing the economic benefits of reduced transport time and decreased transport costs. However, difficulties include the necessity of performing a large-scale study and the applicability of the study in rural trunk road projects without a supporting network.

The Chinese report analyzed diverse impacts by focusing on trends in statistical data related to trends in regional development, GDP, industrial production and population in the project region. This method results in a convincing analysis based on objective facts, but has the weakness that it can not be determined to what extent socio-economic changes were the result of the project and to what extent other factors played a role.

In any case, it is difficult to describe the wide range of impacts that road and bridge projects can produce while relying only on a small number of quantative indicators. In order to precisely evaluate project impact, it is preferable that the following procedures be implemented:

(1) Describe the overall goals of the project as objectively as possible. For example, "promote an increase in economic activity in the area by improving the flow of traffic between ___ and ___ through the reduction of traffic jams in the ___ area."

(2) Establish a small number of measurable indicators (for which data can be collected) which are most appropriate to measuring the achievement of the overall goals, and establish a plan to actually gather the data. Establish all the possible objective target values for each index. For example, "reduce the congestion time on __ road to __ hours per day by __ (year)." In cases where it is technically difficult to establish a target value, establish indicators such as, "the number of registered businesses in the __ area." In either case, it is necessary to gather baseline data.

(3) At the time of evaluation, verify the aforementioned indicators, but also solicit opinions and information from people related to the project (including beneficiaries), and record the diverse impacts. For example, gather information about the convenience, comfort and increase or decrease in accidents from road users (commuters, taxi and bus driver

associations, freight companies, etc.). Gather information about air and noise pollution, increase or decrease in accidents, access to facilities and services, traffic volume on surrounding roads and resulting changes in economic activity from local residents (heads of household or homemakers). Gather information about changes in economic activity from businesspeople (shops and businesses in the project area, business organizations). Also, request opinions about whether there is a cause and effect relationship between the project and the changes.

3.4 Impact

(1) Contribution to overall goal achievement

In this report, overall goals are defined as the indirect socio-economic effects that stem from the direct effects of a road sector project (increase in traffic volume, alleviation of traffic jams, time reduction, decreases in travel cost). The projects were evaluated to determine to what extent overall goals were achieved, and how the project contributed to that realization. As a result of this evaluation, it was determined that approximately 60% of the 62 projects made important contributions to the realization of overall goals, while over 10% made some contribution. In the remaining projects, there was not enough information to determine what contributions the project made. As it is difficult to understand the wide range of socio-economic impact from reading a limited study, it is thought that this type of impact was realized more often than it was reported. Concrete examples of the indirect socio-economic effects realized as the overall goals of projects are presented in the section titled, "Socio-economic impact."

There were two cases where the projects did not contribute to the realization of overall goals. One was a bridge project in Bangkok, where one of the two bridges constructed did not contribute to upgrading the entire traffic network, and the other was a Tanzanian project which loaned the assistance to purchase construction equipment used to make roads in order to stabilize the livelihood of residents, where road construction progressed only slightly[65].

(2) Impact on policies and institutional system

Because road sector projects consist of simple construction of infrastructure or procurement of, material and equipment, it was rare that the projects impacted policy or organizational systems. Only the following two projects mentioned this type of impact:

In the "Jamuna Multi-purpose Bridge Project" in Bangladesh, there was a large-scale relocation of residents, which was conducted employing a new relocation policy initiated by the World Bank. This new relocation policy was applied in implementation of other subsequent large-scale projects in that country[66]. This policy is summarized in the section titled, Impact of resettlement and land acquisition.

In the "Metro Manila Traffic Engineering and Management Project" in the Philippines, subsequent to the first phase, which was assisted by the World Bank, to Metro

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[65] The Thai, New Memorial Bridge Construction and Rehabilitation Project and the Tanzanian Equipment Supply for the Southern Costal Trunk Road Project

[66] This project was jointly financed and implemented by the JIBC, the World Bank and the Asian Development Bank.

Manila. It was reported that as a result of this project, policy makers in the Philippines realized the efficacy of using central control traffic signals system in widespread traffic management.

(3) Socio-economic impact

Three-fourths of all evaluation reports cited the socio-economic impacts of a project, but only a limited number of projects objectively studied the cause-effect relationship between the project and the reported impact, and there are reports that analyzed the socio-economic impacts with speculation. This is because the socio-economic impacts of road projects are varied, external factors are numerous, and it is difficult to objectively verify the impact from a limited study.

It is necessary to keep in mind the limitations of the studies, but it was reported that over 60% of all projects reported significant and positive socio-economic impacts that were directly related to the overall goals, and 10% of projects reported positive secondary socio-economic impacts. Except for negative impact on the environment or resettlement and land acquisition (to be reported in subsequent sections), negative impacts were rarely reported. In projects that were not completed or where sufficient traffic volume was not realized after completion, socio-economic impact was small.

Reported socio-economic impacts were as follows:

1) Promotion of industrial and economic development

In nearly 40% of all projects, promotion of non-agricultural industry and economic development were reported. Specifically, this includes the expansion or creation of area roads and factories, the creation of economic development zones, an increase in the number of shops and markets, the promotion of tourism development, and an increased efficiency of distribution in large-scale industrial zones. For example, in rural trunk road construction projects in China, eight new economic development zones were established in the areas surrounding the road after completion[67]. In the case of provincial cities in Paraguay, transport time to the capital was halved, and as a result the number of shops in the cities doubled in five years, and local prices for goods, which had been comparatively high, fell to rough parity with prices in the capital[68]. In metropolitan Manila, the daytime and nighttime population ratio[69] in the project area increased by up to 20% over 15 years, activating commercial and business activity in the region[70].

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[67] The Chinese Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project

[68] The La Colmena-Acahay Road Improvement Project in Paraguay

[69] The population during the day / the population at night

[70] See footnote 50.

2) Promotion of agricultural development

Road projects facilitate the collection and distribution of agricultural products. An impact upon the agriculture industry was reported in over 10% of projects, most significantly in projects involving rural roads and roads in agricultural communities. For example, in Honduras the roads developed using loaned construction equipment provided distribution paths so self-sufficient villages could become a major provider of fruits and vegetables to urban areas[71]. In the mountains of Thailand, agricultural workers were able to transport their agricultural and animal products directly to market without going through an agent after roads were improved, increasing their income[72]. In nine of the 13 villages in this region, an increase in cultivated land area was confirmed. Also, another route included in the same project, propelled development of the sugar industry, resulting in improvements in the resident income.

3) Increases in employment opportunities and income

In several projects, an increase in employment opportunities and income were reported. Moreover, it is believed that there are cases where the aforementioned industrial or agricultural development is tied to increases in employment opportunities and income.

4) Population increase and decentralization

In nearly 20% of projects, increases in population and housing construction in the project area were reported. In several projects, it is indicated that the highly concentrated urban population became decentralized. Also, a bridge project in Bangladesh promoted the development of that country's western region, where development was lagging because of isolation due to a large river. It is expected that this project will lead to a correction of disparity between East and West Bangladesh[73].

5) Improvement of public transportation service

In over 10% of projects, it is reported that improvements to roads were tied to improvements in public transportation including bus services. In the city of Ghanzi in the Kgalagadi Desert in Botswana, public transportation service to the capital using large busses was initiated for the first time after the completion of road maintenance[74]. In metropolitan Manila, road maintenance lowered the number of transfers between different *jeepneys* (small

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71 The Honduran Road Improvement Project: JICA had been conducting an agricultural development demonstration project in this town before the initiation of this road project.
72 The Thai Productivity Road Program
73 The Jamuna Multipurpose Bridge Project in Bangladesh
74 The Trans-Kgalagadi Road Project in Botswana

busses) that citizens often use[75]. The paving of rural roads in the Philippines lowered the operation and maintenance cost of long distance bus services, making bus company operations more efficient[76].

6) Improvement in access to social services

Several rural road projects reported improved access to public facilities such as schools and hospitals[77].

7) Social impact on urban traffic projects

An impact study of projects in metropolitan Manila showed both positive and negative project impacts, but changes in the community due to projects were generally judged positively by local residents. The most significant impacts included population growth, increased commercial and business opportunities, improved public safety, improved access to public services and a general improvement in living conditions. The majority of road users are aware of these positive impacts. Negative impacts included a sharp rise in land costs, rent, and living expenses. The most significant impact on residents, resident resettlement, is detailed in a subsequent section.

(4) Impact on technology

This section evaluates the technological effects other than technology transfer by consultants, which was reported in nine of the 62 projects. The impact most often seen in projects were the technology transferred from a Japanese consultant to a local consultant or the implementing organization during a road or bridge project.

In the "Road Improvement Project" in Jordan, technology was developed to use basalt, which was easily obtainable, as a base layer during project implementation. This technology was transferred to the local contractor. In the Turkish "Renovation and Widening Project for Golden Horn Bridge", technology for repairing the existing bridge (which was said to be comparable to constructing a new bridge) was transferred to the local contractor and implementing organization. In other projects, it is reported that in projects involving bridges and mountain area roads, important technology was transferred through project implementation.

(5) Impact on natural environment

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[75] See footnote 56

[76] The Regional Tourism Development Roads Project in the Philippines

[77] The West Leyte and North-West Leyte Road Improvement Project, the Philippine-Japan Friendship Highway Rehabilitation Project and the Regional Tourism Development Roads Project in the Philippines, and the Thai Sam Yak Sra Krathima-Kanchanaburi Highway Project

In urban road projects, the major environmental impact is thought to be air and noise pollution, while in rural projects is primarily affect on plants and animals. However, data related to environmental impacts was rarely collected. In half of the projects no mention was made of environmental impacts, but the majority of these projects involved loans in the early half of the 1980s.

Reported environmental impacts broken down by location, are as follows:

1) Urban projects.

There are two sides to the impacts upon air pollution resulting from road and bridge projects. Looking at the bigger picture, these projects decreased the amount of pollutants released into the air as car exhaust by improving the functional capacity of the road network and alleviating traffic congestion. No post-project evaluation substantiated this directly, but a comprehensive impact study of ten projects in the Manila metropolitan area calculated the difference in air pollution with and without the project by conducting a traffic flow simulation for each case. According to these calculations, all yen loan projects are contributing to reductions in air pollution in metropolitan Manila[78]. It is predicted that by 2015, CO_2 levels will drop by 4.2%, NOx by 0.6%, SOx by 3.0%, and SPM by 1.7%.

On the other hand, increases in traffic volume on roads surrounding the project area contributed to environmental damage by increasing air pollution, noise pollution and vibrations in the local area. According to the aforementioned impact study conducted in metropolitan Manila, the majority of area residents are aware of the deepening air pollution problem. Even the impact report conducted in the Bangkok metropolitan area reported that citizens in general had negative impressions of the project's impact on air pollution[79]. Looking at measured data in some road projects in Metro Manila and some bridge projects in China, air pollution on surrounding roads reached or surpassed environmental standards. However, it is impossible to relate all environmental damage in the project area to the project because there are many factors that lead to increase in traffic volume. Because contamination was not acute, localized air pollution was not considered as an especially important problem in the post-project evaluation reports.

2) Rural projects

Negative impact on the environment was rarely reported in rural road and bridge projects, with only two projects reporting specific negative impacts. In the Trans-Kgalagadi Road Project in Botswana, roads were left unfenced and watering holes were created in order to not impede the migration of wild animals. Although the effects of the project upon wildlife

[78] See footnote 56
[79] See footnote 57

were minimized through these steps, incidence of traffic stoppages and accidents involving wild animals has happened. In the Jordanian "Road Improvement Project", it was reported, woodland in the project area receded from the road, and reforestation efforts were implemented.

Also, in the "Regional Tourism Development Roads Project" in the Philippines, one portion of project roads was scheduled to pass through old growth and mangrove forests. After the loan was provided, the project was unable to obtain environmental conformance certification from the Environmental Protection Agency. This certification should have been obtained before the project started, and so ultimately that portion of the project was excluded to prevent negative environmental impact.

(6) Resident relocation and land acquisition

Over 80% of projects involved the new construction of roads and bridges or improvement work such as widening of roads, but only 25 projects (40%) referred to the relocation of residents and acquisition of land.

According to the records of the 25 projects, 14 projects proceeded without problem, and six took time, but managed to resolve problems which arose. In five projects, four of which were in metropolitan Manila, problems could not be resolved, and it was necessary to eliminate portions of projects or change the project scope.

A post-project evaluation studying the effects on relocated residents was conducted in the following two projects:

1) The "Jamuna Multi-Purpose Bridge Project" in Bangladesh

In this project, the construction of a massive revetment wall and approach road to prevent displacement of the course of the river required the acquisition of 2,600 hectares of land, directly or indirectly affecting 15,000 households. The government created a thorough resident relocation plan prior to the program, and implemented both reparations for relocated residents and improvements in living conditions at the relocation area. In this project, the following new concepts in resident relocation were applied:

- Increased scope of Project Affected People (PAP) who were to receive reparations
- Set reparations based on market prices
- Project implementation only after assigning the roles of local government, the project, NGOs and consultants.
- Aid to increase the income of relocated residents as they were relocated.

The process and effects of resident relocation were carefully evaluated by a local consultant. In this evaluation, it was determined that the income of relocated residents had increased slightly when compared with before implementation of the project, and that for

several reasons effects were better on the east bank of the river (the side closer to the capital of Dacca) than on the west.

2) Road maintenance projects in the Metro Manila area

One portion of a comprehensive evaluation study on the impact of the ten Japanese ODA loan projects implemented in the Metro Manila area included a case study of the four areas where residents were relocated for the "Metro Manila Radial Road No. 10 and Related Roads Project". In that case, it was determined that the following problems occurred, despite the efforts of the Philippine government:

- The relocation process was not necessarily clear, and the program lacked transparency. This was true for the optional and compelled destruction of homes, and for whether an agreement existed between the related parties as to the relocation area. This problem was especially severe when it involved illegal occupants.
- The relocation area was not prepared in a timely manner. Relocated residents are deeply concerned whether they would have electricity, water, medical service, and with how close schools would be. In many cases, the relocation area was not prepared until after pressure was placed on the related authorities by groups of relocated residents. The government had to respond to professional squatters, budget shortfalls and adjustments to the established plan.
- Illegal occupants with no opportunity for employment or source of sustenance had no option but to sell their rights to ownership and use of the relocation area and relocate. Aid to improve employment opportunities and improve levels of sustenance for relocated residents was insufficient during the relocation process.
- Reparations for legal residents were insufficient. In most cases, reparations fell drastically short of market prices.

3.5 Sustainability

(1) Output condition

In 30% of projects, problems with the physical conditions of equipment and facilities were reported. Within these, 10% of the projects faced problems so large as to inspire fears that project effects could not be sufficiently sustained[80]. In the remaining projects, it was confirmed that implementation was proceeding smoothly, or no operation and maintenance problems were reported.

In a comparison of problems in the three countries where the majority of projects were implemented, problems were exceptionally rare in Thailand (one of 15 projects), but were more common in Indonesia and the Philippines, where nearly half of the projects had problems. Problems were most common in projects involving the loan of construction equipment (including traffic related facilities), followed by rural projects and finally urban projects[81].

Problems were reported in one-fourth of all road and bridge projects. The most common problem was road surface damage. Light road surface damage was confirmed in six projects, and relatively severe damage was confirmed in two projects. The damage was the result of poor construction quality and the number of overloaded heavy vehicles using the road. It was also reported that response to landslides, flood damage and soil erosion was insufficient in five rural road projects.

In half of the projects involving construction equipment, problems were reported with operation and maintenance of the equipment. Insufficient budget for the procurement of spare parts was a common problem in these projects. In some projects, superannuation of repair equipment and deterioration of operation and maintenance technology was also indicated as a problem.

Other problems included damage and theft of supplementary road materials, and the

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[80] In the Chinese Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project, damage to the road surface was severe and in some sections slope-damage was evident. In the Indonesian Road Rehabilitation Project, damage and wear of the road due to such things as overloaded trucks was obvious, and in one section of road full-scale repairs had not been undertaken to repair landslide damage. In the Ilocos Norte Rural Road Improvement Project in the Philippines, the approach to the bridge was left damaged by a typhoon. In the Indonesian Road Maintenance Improvement Project, construction equipment could not be utilized to full potential, with one-third of all trained operators dispatched to different locations. In the Peruvian Roads Improvement Project, the budget was insufficient to acquire spare parts to respond to maintenance requirements and damage to the construction equipment, and the organization which operated one portion of construction equipment lacked the ability to operate and maintain the equipment, resulting in a drop in the capacity utilization rate.

[81] The numbers of projects by type where problems were reported are as follows: eight out of 12 projects involving the loan of construction equipment (including traffic related facilities), 13 out of 38 rural road projects, and five out of 21 urban road projects.

illegal occupation of the sidewalk around urban trunk roads.

(2) Operation and maintenance system

In 30% of all projects, apprehension or problems with the operation and maintenance system were indicated. In other projects, it was confirmed that the operation and maintenance system was appropriate, or no problem was reported.

Indicated problems include budget shortfalls, inadequate facilities, inadequate technology, and lack of an organizational system and confusion. Each problem was reported in between four and six projects.

With the exception of budget shortfalls, in the most severe cases the problems were the effect of changes to the organization system for operation and maintenance. For example, 80% of routine maintenance and operation of roads, which used to be under the direct management of the Ministry of Works, Transport, and Communications in Botswana was outsourced to private companies. The lack of personnel with the ability to conduct appropriate plan and contract management within the ministry, and the lack of experience with routine maintenance and operation of the contracted private agencies, resulted in a rash of cases where operation and maintenance was insufficient[82]. In Indonesia, it was decided that operation and maintenance of regional roads would be transferred from the central government to regional governments as a part of the central government's policy to decentralize authority. However, a legal system for such actions had not yet been completely established, resulting in confusion over the relegation and operation of construction equipment[83]. Also, after an administration change in the Peruvian government, construction, operation and maintenance of rural roads was transferred from the Ministry of Works, Transport, and Communications to the COOPOP. Based upon this, one portion of construction equipment procured using Japanese ODA loans was apportioned to the COOPOP, but the organization's operation and maintenance system was weak, raising fears of a low capacity operating rate for the construction equipment[84].

(3) Financial Resources for Operation and Maintenance

In 30% of all projects, it was judged from the post-project evaluation report that it would be possible to secure a sufficient budget for operation and maintenance in the future. In over 20% of projects, there were reasons for concern over the operation and maintenance budget, while in less than 20% of cases there were clear problems. In the remaining 30% of projects, no information relating to financial resources was provided.

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[82] The Trans-Kgalagadi Road Project in Botswana
[83] The Indonesian Road Maintenance Improvement Project
[84] The Peruvian Road's Improvement Project

In comparing the three countries where the majority of projects were implemented, problems were reported any in over 10% of Thai projects, while one-third of projects in the Philippines, and nearly half of the projects in Indonesia. Problems were most common in projects involving the loan of construction equipment (including traffic equipment), followed by rural projects and urban projects[85]. The majority of projects where problems were clearly indicated were rural road projects and projects that involved the loan of construction equipment, while almost no problems were reported in toll-road projects.

Rural road projects in the Philippines, Indonesia and Malaysia all shared the common problem of shortfalls of budget for repairing flood damage and soil erosion. In some projects, the damage was never appropriately repaired.

Moreover, the budget for routine maintenance and repairs cannot be said to have been adequate. In Indonesia, it was reported that the budget for routine maintenance of regional roads was one-third of that which was necessary[86]. In one Thai road project, damage was incurred more quickly than expected due to increases in traffic volume, and the repair budget was only sufficient to complete one-third of repairs[87].

As mentioned previously, in many cases insufficient budget for the procurement of spare parts for the construction equipment was a reason for decreased operation capacity rates.

(4) Continuity of Needs

Needs for roads and bridges are measured in road traffic demand, the change in which can be measured by the yearly change in traffic volume. In nearly 80% of projects, increase in traffic volume was confirmed or could be predicted, and it was determined that the need for the roads and bridges will remain in the future. In four projects, an increase in traffic volume was not necessarily desirable, so there is a possibility that the need for the improved roads will not increase. However, there was no fear that the importance of the project will completely disappear and the road will fall into disuse.

(5) External factors

When considering only the 62 projects covered by this report, the most important external condition for the realization of results and impacts from the road or bridge is

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[85] The numbers of projects by type where operation and maintenance budget problems were reported are as follows: seven out of 12 projects involving the loan of construction equipment (including traffic related facilities), 18 out of 38 rural road projects, and five out of 21 urban road projects.

[86] The Indonesian Road Maintenance Improvement Project

[87] The Thai Productivity Road Program

whether the project road is sufficiently connected to the area road network. In approximately one-third of all projects, this was not the case. This will be explored in the next section.

Other external factors include problems with the management of urban roads. In an impact study conducted in Metro Manila, illegal occupation of sidewalks and roads, unlicensed street vending, the encroachment of vendors, defective operation of traffic signals, the mix of automobiles, other vehicles, and pedestrians, and illegal roadside parking were indicated as major factors that reduced the efficiency of road use[88]. By strengthening traffic management, it is possible to increase the effects and the impact of improved roads by decreasing these problems.

Flood damage and land slides were other external factors that affected the results of road projects. In many cases developing countries did not have sufficient funds to perform road repairs, and once damaged, road functionality was compromised for an extended period. In road projects in the Philippines where wind and flood damage is common, it was indicated that both consideration of the location and design of routes, and fundamental flood control and soil erosion countermeasures are necessary[89].

[88] See footnote 56.
[89] The Ilocos Norte Rural Road Improvement Project in the Philippines

3.6 Sector-Specific Evaluation Check Items

(1) Overview

The sector-specific evaluation check item for the Road sector is the "connection to area road networks," which is defined as "the level of improvement the project had on area road networks and the efficacy of the connections to area road networks."

In one-third of all projects, it was judged that the connections to the area road network were sufficient. Similarly, in approximately one-third of all projects it was determined there were concerns or problems with the connection to area road networks. In the remaining one-third of projects, reports did not include sufficient information to judge connection efficacy.

(2) Projects with sufficient connection to area road networks

The one-third of projects where connection to area road networks was judged sufficient consisted of long-distance rural road projects that were conducted in parallel with other related Japanese ODA loan or World Bank projects. The majority of these projects were either based on overall goals as defined in a master plan, or had the project scope determined cooperatively by donors.

For example, in the "Trans-Kgalagadi Road Project" in Botswana, the Southern Africa Development Collective conceptualized an international trunk road, nearly 600 km of which was constructed under joint financing by the African Development Bank, the African Development Fund, the Arab Bank for Economic Development in Africa and the Kuwait Fund. In Indonesia, 1,200 km of trunk road which led from the capital of Jakarta to the ferry that connects to Sumatra Island, and then on to Jambi was constructed and improved through seven Japanese ODA loan projects. After the mutual compatibility of the seven projects was sufficiently studied, the loans were made within a period of three years, and the projects were finished one after another.

The majority of projects improved bottlenecks in the urban road network and rural trunk roads. For example, the Chinese "Second Wuhan Yangtze River Bridge Construction Project" drastically expanded the traffic capacity at the Yangtze River crossing, which had been a bottleneck. At the same time, it constructed a section of ring road that allowed traffic to bypass the city, alleviating the traffic jams that resulted when the traffic had flowed into the city. In the Bangkok metropolitan area in Thailand, multiple bridge and metropolitan expressway projects resulted in drastic improvements in the function of the urban traffic network as a whole[90]. In the "Philippine-Japan Friendship Highway Rehabilitation Project",

[90] See footnote 57

the project contributed to ensuring secure transportation by improving sections of the trunk road that circles Luzon Island, which had been closed frequently because of road damage or flooding.

(3) Projects where connections to area road networks were insufficient

Among projects where connections to area road networks were insufficient, some included plans to improve conditions through future road projects. However, in nearly 20% of all projects there were problems with the connection to area road networks, and there was no plan to resolve these problems at the time of evaluation. The following problems were reported:

1) Delays in area road improvements

Projects can not achieve sufficient effects if there is a limited number of roads connected to the project road, or if traffic volume is low. In China, a bridge was built to connect a trunk road over a river which had previously required a ferry to cross. Delays in improvement to area roads resulted in a realization of only one-third of the projected traffic volume[91]. In Jakarta, a highway was constructed using Japanese ODA loans, but insufficient traffic capacity on roads connecting to interchanges and intersections made traffic jams common[92]. In Malaysia, improvements were made to western sections of an existing road that connected two provincial towns. Despite the completion of a feasibility study, however, there is no government plan to implement improvements to the eastern sections of the road, which would increase the effects of the western project[93].

2) Remaining bottlenecks in project areas

Because portions of projects were not completed due to difficulties in land acquisition, insufficient effects were realized in completed sections. In a road improvement project implemented in metropolitan Manila, project goals included the improvement of a ring road, but problems related to land acquisition meant that portions of the project had to be cancelled, resulting in significant bottlenecks[94] in the ring road system. In another project in metropolitan Manila, construction of a portion of roads connecting to radial trunk roads were cancelled. According to calculations, had those project sections been completed, the direct economic benefits from the project would have increased by 20%s[95].

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91 The Chinese Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project

92 The Indonesian Engineering Services for Jakarta Intra-Urban Toll Way Construction Project (multiple projects)

93 The Malaysian Crocker Range Crossing Road Project

94 The Circumferential Road No. 3 Construction Project in the Philippines

95 The Metro-Manila Radial Road No. 10 and Related Roads Project in the Philippines

3) Road network location importance

Even if the project is completed and connected to the area road network, a poorly located network will make little contribution to alleviating traffic jams. In a project implemented in Bangkok, two bridges were constructed, with one of the bridges being located on the outskirts of the city. As it was used only for the short-distance transit of local residents, it made little contribution to alleviation of traffic jams[96].

[96] The Thai Nonthaburi and Pathumthani Bridges Construction Project

4. Conclusions

4.1 Performance Analysis Overview

(1) Summary

Of the 62 road sector projects subjected to ex-post evaluation, most were found highly relevant, having directly resulted in increased traffic volume, reduced transportation time, alleviation of traffic congestion, and so on. Effects such as these have brought tremendous benefit to the economies of the countries concerned, as reflected by a high EIRR for the road sector as a whole. In addition, at least 60% of road projects enabled positive socio-economic impact in the form of industrial development in the form of industrial development, employment/income creation, increased population in project areas, more balanced population distribution, improved public transport services, and better access to social services.

On the down side, problems with efficiency were reported for half of the projects surveyed. Reasons included changes in and additions to project scope at the implementation stage; delays in procurement; insufficient local currency budgets and problems with land acquisition; as well as external factors such as natural disasters and steep price hikes for materials and equipment. Also, some 30% of projects demonstrated problems or cause for concern with regard to sustainability, with the main difficulties being budget and organizational constraints on operations and maintenance systems. Another important factor determining the success of a project's outcome and sustainability was linkage with surrounding road networks.

(2) Relevancy

ODA-loan road sector projects are generally very consistent with policy and development planning of the countries concerned. Moreover, projects evaluated are highly relevant in that they are central to road sector policy and planning and/or represent the necessity for road enhancement or the need to resolve related traffic problems. The great majority of projects were either equally or more important and/or necessary at the time they were evaluated than they were at appraisal.

Many road projects were deemed appropriate in that their planning addressed specific needs and conditions such as alleviation of traffic congestion problems in metropolitan areas, development of underdeveloped rural areas, and the switch to automated equipment for everyday road maintenance. However, approximately 25% of projects exhibited some type of inherent weakness at the preliminary planning stages. Three-fourths of projects were subjected to planning changes subsequent to the conclusion of ODA loan contracts. Most changes were appropriate, reflecting natural conditions of the project site areas that became

more apparent following the detailed design phase. At least one-fourth of projects were assisted in the planning stages by other donors such as JICA, the World Bank, and so on, with joint financing and/or coordination between donor agencies yielding beneficial results.

Just two projects were considered somewhat weak in terms of relevance. These were conducted in Africa around 1980, when machinery procured with ODA loans was utilized to construct domestic-budget rural roads [97]. These particular projects were, however, implemented mainly to achieve greater stability for local residents, and must therefore be emphasized that the projects were both necessary and relevant despite these anomalies.

(3) Efficiency

Approximately half of road sector projects carried out with ODA loans were deemed efficient in terms of both level of completion of facilities and construction period/project costs. Some projects, however, were considered to have turned out to be inefficient due to various reasons. Some 80% of road and bridge projects completed according to plan, but facilities remained incomplete for a few projects. For instance, among projects carried out in the capital area of the Philippines, routes had to be altered when land acquisition did not progress as planned –a result of changes instituted by the government to the land acquisition system. In other cases, construction had to be abandoned altogether, leaving parts of the road obstructed with narrow bottlenecks. Besides the above mentioned cases which remain incomplete, it was noted that only approximately 30% of projects were completed with delays of less than a year.

Reasons for the setbacks included, as mentioned above, land acquisition problems in big cities as well as changes in planning or expansion of scope subsequent to conclusion of the ODA loan contract; natural disasters and/or adverse weather conditions for projects taking place in rural areas; lack of local currency budget; delays in procurement procedures; sharply rising prices for materials, equipment of land; and competence issues on the part of executing agencies and/or contractors. On the other hand, nearly 40% of projects were completed within budget, attributed mainly to the rising value of the yen as well as fierce competition during the bidding process.

Significant discrepancies in efficiency can be observed between projects carried out in the three countries where the majority of projects were conducted. Efficiency was highest in Thailand, while Indonesia was plagued by delays, and projects in the Philippines were hindered by both delays and project costs in excess of budget.

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[97] The Rural Road Project in Kenya and Equipment Supply For The Southern Coastal Trunk Road Project in Tanzania. In the project in Kenya, although the project site did not have much traffic volume due to the limited traffice demand, the number of lanes were increased in some part of the profect after the signing of the loan agreement, while in the case of Tanzania, the spec of the pavement was up-graded more than necessarily. On top of that, the constructions of the road were not completed at the time of evaluations due to lack of budget of the governments.

(4) Effectiveness

Judging from factors such as usage rates for roads and construction machinery, and the extent of directly manifested project effects, 80% of road sector projects were deemed to have effectively reached their goals. Output/usage rates for 70% of projects (bridges/roads/construction machinery, etc.) was considered sufficient. The following represents an overview of important direct effects of the projects.

- Increased traffic volume: Traffic volume tended to improve subsequent to completion of most of the projects. This trend is particularly noteworthy for a third of the projects, where the increased volume came about faster than expected. Construction of a toll road in Jakarta resulted in more than double the volume originally forecast within tow years of completion, and a number of roads in rural Thailand were operating at 10 times the traffic volume initially forecast.

- Reduced transport time: For roughly half of the projects surveyed, transport time required to traverse the distance between two major geographical points linked by the road constructed under the projects was reduced. Shortened travel time made possible by bridge projects was particularly conspicuous. A new bridge constructed on a river in Bangladesh enabled the river to be crossed in just 20 minutes, compared to a minimum of 14 hours by ferry.

- Alleviation of traffic congestion: Mainly urban-based projects have resulted in alleviation of traffic and congestion, with mutually potentiating effects observed for multiple projects. Preliminary calculations for Metro Manila indicate that a series of 10 ODA loan projects distributed traffic from the city's major arteries to alleviate congestion and double the area of the city center traversable in one hour. Comparable results can be observed with the Bangkok metropolitan area, stemming from the construction of bridges and highways. In both cases, however, traffic problems have not been fully resolved due to dramatic increases in traffic volume.

- Removal of traffic restrictions: Mainly in rural areas, the projects have enabled roads to be traversed by vehicles year-round and limitations on heavy vehicles crossing bridges to be eliminated. In Paraguay, in the case of dirt roads previously closed 100 days out o f the year, it was reported that year-round use of roads was achieved and transit time to the capital also reduced by 50%.

Direct effects such as these have had major positive economic benefits, reflecting a

high EIRR for the road sector in general. Amongst 41 projects for which EIRR was re-calculated, approximately half exhibited an EIRR of 20% or higher, and only five projects had an EIRR of 10% or less. Some projects were forecast to produce direct economic benefits. In Bangkok for instance, five bridges and two highways produced economic returns worth 80% of total construction cost within one year (1985).

(5) Impact

According to ex-post evaluation reports, 70% of projects resulted in indirect positive socio-economic impact, summarized as follows.

- Promotion of industrial/economic development: Nearly 40% of projects brought about positive industrial and economic impact including expansion and/or establishment of factories along roads and/or new project sites; establishment of new economic zones; increasing numbers of shopping areas/markets; development of tourism; efficiency of logistics operations linking large-scale industrial areas, and so on.

- Promotion of agricultural development: More than 10% of projects, mostly those pertaining primarily to regional and rural roads, had an impact on agriculture. The roads facilitated pickup and distribution of agricultural commodities, and were also linked to cultivation of new cash crops as well as to expanded areas of cultivation.

- Employment/income enhancement: The above-mentioned industrial and agricultural development almost always led to employment and income enhancement.

- Increased Population/dispersion of population: Nearly 20% of projects have been linked to increased population in road-linked/project areas and increased residential construction. There were projects that had the effect of dispersing population which trends to be concentrated in urban centers, and thereby promoting elimination of disparities between geographical areas.

- Improved public transport: Improved busing and other public transport resulting from improved roads was reported for more than 10% of projects surveyed.

- Improved access to public services: Rural road projects led to better access to public services such as schools and hospitals.

It is difficult to ascertain the total picture of socio-economic impact with only the limited research available here; it can be inferred, however, that more projects did, in fact, result in this type of impact than reported.

In terms of technical aspects, more than 10% of projects resulted in substantial technology transfer from Japanese to local contractors and/or executing agencies.

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Environmental impact can be double-edged, as illustrated by the impact of urban road projects on levels of air pollution. Road projects are said to alleviate urban traffic congestion, resulting in reduced emissions from vehicles. It is estimated that 10 ODA loan projects in Metro Manila will collectively reduce air pollution emissions by 0.6%-4.2% by 2015. On the down side, certain areas equipped with roads may experience increasing levels of air pollution due to increased traffic. People residing in road-equipped areas respond that environment is deteriorating, and actual data available for some projects indicates that they barely meet environmental standards. However, reasons behind increases in traffic are numerous, and location-specific pollution cannot be entirely attributed to road projects.

Land acquisition and relocation issues have significant impact on the people affected, as well as on the implementation of road projects. The majority of projects allot an appropriate time frame to solve land acquisition problems. In the case of five projects in Metro Manila, however, the problem could not be solved, resulting in an unavoidable change in project scope. Detailed studies on the relocation process and its impact on affected individuals have been carried out in Bangladesh and the metropolitan Manila areas, providing a number of critical lessons.

(6) Sustainability

Road projects are not generally viewed highly sustainable. 30% of projects exhibited some type of physical problems on roads of facilities, with 10% in danger of proving ineffective due to these problems. Some 30% of projects exhibited reason for concern or problems with regard to operations and maintenance systems; further, projects demonstrating potential problems with financial backing for operations and maintenance, and those with serious problems in this area, amounted to approximately 20% each. Meanwhile, for 30% of projects, no problems with operations and maintenance were reported, and project effect is expected to continue into the future. By country, projects carried out in Thailand exhibited few problems, while nearly half the projects conducted in Indonesia and the Philippines were categorized as problematic. By sector, the three most problematic were construction machinery, rural road, and urban road projects, in that order.

The biggest difficulty specified was a lack of operations and maintenance budget. In particular, inadequate budget for rural road rehabilitation in the wake of natural disaster,

and for spare parts procurement, greatly hindered maintenance. Also, budget for everyday maintenance and rehabilitation was not nearly sufficient.

In some cases, changes to organizational systems pertaining to management operations affected project sustainability. Serious problems sometimes arose at newly appointed operations and maintenance agencies/system management.

Further, in other cases, roads and bridges were properly maintained, but improperly-handled external factors hindered project effect to be sustained. Significant external factors influencing road projects include proper linkage between local road networks --- considered the most critical factor --- as well as appropriate traffic controls for urbgan roads, infrequent folding/landslides, and so on.

4.2 Lessons Learned / Recommendations

(1) Linkage to the road network

Linking project roads and bridges with local roads in considered an important factor in bringing about sustained project effect. The stronger the link, the greater the traffic volume enabled by the new roads and bridges, and consequently the greater the effect of the project. Among projects reviewed, one third were appropriately linked to local roads while another third were not. The latter category negatively affected the projects outcome.

Therefore it follows that section and planning of road and bridge projects should take local road networks, including future road/traffic area planning, into consideration. Specifically, the following strategies are considered effective: 1) coordination with the government's basic traffic plan --- and priority plans within urban/regional planning as well as other road sector projects --- should be carefully considered, 2) coordination should be carried out with other ODA loan projects, both planned and in progress, and/or projects of other donors in such a manner that the various projects complement each other, 3) project priority should be assigned to road sections which are the most severe bottlenecks in traffic.

(2) Due consideration of risk factors such as land acquisition and/or natural disasters

Land acquisition is a critical risk factor pertaining to urban road projects, while natural disasters greatly affect rural road projects. Where these risk factors manifest, project completion may be delayed considerable, and/or budget beyond original targets may be required. Among projects reviewed those that were delayed by more than one year due to problems related to acquisition and natural disaster comprised 20% each of the total. In the worst-case scenario, these factors can cause fatal damage to projects by leaving huge bottlenecks in traffic routes.

It is therefore advisable that, beginning with formulation and planning stages, the parties concerned carefully consider strategies to both avoid risk factors and to control hem once they have arisen. Lessons derived from past projects should also be incorporated. Inn addition, project status must be monitored at the implementation stage so they any problems arising can be handled immediately.

(3) Allocation of operations and maintenance budget

Operations and maintenance comprises the weakest aspect of road sector projects, with lack of budget being a primary cause for concern. Slightly more than 20% of projects reviewed exhibited warning signs in this area, while slightly less than 20% had obvious problems. In particular, operations and maintenance budget problems related to rural roads

and construction machinery were conspicuous.

In order to resolve these problems, sufficient financial resources and methodology to accurately estimate budget required for each road section and each piece of construction machinery are critical. Also, efficient organizational systems are required to allocate budget when necessary and in the proper amounts. Finally, in addition to ensuring due consideration of the above points at appraisal stages, consulting services as well as SAF, etc., should be applied with a view to establishing a system where operations and maintenance budget can be properly secured.

Reviewed Projects (Road Sector)

Project Name	Country	L/A
SECOND WUHAN YANGTZE RIVER BRIDGE CONSTRUCTION PROJECT	CHINA	Nov-90
HUANGSHI YANGTZE RIVER BRIDGE CONSTRUCTION PROJECT	CHINA	Nov-90
HEFEI-TONGLING HIGHWAY AND TONGLING YANGTZE RIVER HIGHWAY BRIDGE CONSTRUCTION PROJECT (I)	CHINA	Oct-91~ Oct-92
SECOND CHONGQING YANGTZE RIVER BRIDGE CONSTRUCTION PROJECT	CHINA	Oct-91
NORTH SULAWESI ROAD REHABILITATION PROJECT	INDONESIA	Nov-72~ Feb-77
SUMATRA ROAD PROJECTS (LUBUKLINGGAU-TELUKBETUNG)	INDONESIA	Nov-76~ Dec-77
JAKARTA INTRA URBAN TOLLWAY CONSTRUCTION PROJECTS	INDONESIA	Jul-78~ Mar-87
CENTRAL AND EAST JAVA ROAD BETTERMENT PROJECT	INDONESIA	Jun-80
EQUIPMENT SUPPLY FOR LOCAL ROADS SUPPORT WORKS	INDONESIA	Jul-80
ROAD REHABILITATION PROJECT	INDONESIA	Oct-88
ROAD MAINTENANCE IMPROVEMENT PROJECT	INDONESIA	Sep-91
THE CROCKER RANGE CROSSING ROAD PROJECT	MALAYSIA	Mar-77
SEREMBAN-AYER HITAM TOLL EXPRESSWAY PROJECT (PACKAGE I)	MALAYSIA	Apr-83~ Jul-85
HIGHWAY TOLL SYSTEM PROJECT	MALAYSIA	Nov-86
PHILIPPINE-JAPAN FRIENDSHIP HIGHWAY AND ITS RELATED ROADS IMPROVEMENT PROJECT	PHILIPPINES	Mar-76
MANILA NORTH ROAD IMPROVEMENT PROJECT (ROSARIO-LAOAG SECTION)	PHILIPPINES	Nov-78
ILOCOS NORTE RURAL ROAD IMPROVEMENT PROJECT	PHILIPPINES	Jun-80
PHILIPPINE-JAPAN FRIENDSHIP HIGHWAY LOAN PROJECT (II) (LAOAG-ALLOCAPAN SECTION)	PHILIPPINES	Jun-81
METRO MANILA TRAFFIC ENGINEERING AND MANAGEMENT PROJECT	PHILIPPINES	May-82
WEST LEYTE ROADS AND NORTH-WEST LEYTE ROADS IMPROVEMENT PROJECT	PHILIPPINES	Sep-83~ May-89
METRO MANILA RADIAL ROAD NO.10 AND RELATED ROADS PROJECT (STAGE I)	PHILIPPINES	Sep-83
CIRCUMFERENTIAL ROAD NO.3 CONSTRUCTION PROJECT	PHILIPPINES	May-86
METRO MANILA CIRCUMFERENTIAL ROAD NO.5 AND RADIAL ROAD NO.4 CONSTRUCTION PROJECT	PHILIPPINES	Jan-88
PHILIPPINE-JAPAN FRIENDSHIP HIGHWAY REHABILITATION PROJECT	PHILIPPINES	May-88
METRO MANILA URBAN TRANSPORTATION PROJECT	PHILIPPINES	May-89
REGIONAL TOURISM DEVELOPMENT ROADS PROJECT	PHILIPPINES	May-89
METRO MANILA INTERCHANGE CONSTRUCTION PROJECT (I)	PHILIPPINES	Feb-90~ Jul-91
DISASTER PREVENTION AND REHABILITATION PROJECT (PHILIPPINE-JAPAN FRIENDSHIP HIGHWAY AND NAGUILIAN ROAD)	PHILIPPINES	Feb-90
METRO MANILA ROADS PAVEMENT IMPROVEMENT PROJECT	PHILIPPINES	Jul-91
THE PHUN PHIN-PHATTALUNG HIGHWAY PROJECT	THAILAND	Oct-74
DIN DAENG-KLONG TOEY PORT EXPRESSWAY PROJECT	THAILAND	Mar-78~ Jun-79
PRODUCTIVITY ROAD PROGRAM	THAILAND	Mar-78~ Sep-83
PHITSANULOK-DENCHAI HIGHWAY PROJECT	THAILAND	Aug-78
SAM YAK SRA KRATHIAM-KANCHANABURI HIGHWAY PROJECT	THAILAND	Aug-78
DAO KANONG-KLONG TOEY PORT EXPRESSWAY PROJECT (STAGE II)	THAILAND	Sep-83
CHOLBURI - PATTAYA NEW HIGHWAY CONSTRUCTION PROJECT	THAILAND	Nov-88~ Sep-91
OUTER BANGKOK RING ROAD(EAST PORTION) CONSTRUCTION PROJECT(I)	THAILAND	Dec-90~ Sep-93

BANGKOK-CHONBURI HIGHWAY CONSTRUCTION PROJECT (I)	THAILAND	Dec-90
HIGHWAY SECTOR PROJECT (2)	THAILAND	Jan-93
THE THA-CHANG BRIDGE PROJECT	THAILAND	Feb-71
THE SATHORN BRIDGE CONSTRUCTION PROJECT	THAILAND	Mar-77
MEMORIAL BRIDGE CONSTRUCTION AND REHABILITATION PROJECT	THAILAND	Aug-80
NONTHABURI AND PATHUMTHANI BRIDGES CONSTRUCTION PROJECT	THAILAND	Apr-81
NEW RAMA VI BRIDGE CONSTRUCTION PROJECT	THAILAND	Sep-87
JAMUNA MULTIPURPOSE BRIDGE PROJECT	BANGLADESH	Jun-94
ROAD MAINTENANCE AND REHABILITATION PROJECT	SRI LANKA	Jul-88
ROAD IMPROVEMENT PROJECT	JORDAN	Jan-89
KINALI-SAKARYA MOTORWAY (SECOND BOSPORUS BRIDGE) PROJECT	TURKY	Aug-85~ Nov-87
THE RENOVATION AND WIDENING PROJECT FOR GOLDEN HORN BRIDGE	TURKY	Apr-91
TRANS-KGALAGADI ROAD PROJECT	BOTSWANA	Feb-93
KUMASI-PAGA ROAD REHABILITATION PROJECT	GAHNA	Dec-90
NEW NYALI BRIDGE PROJECT	KENYA	Dec-75
NEW MTWAPA BRIDGE CONSTRUCTION PROJECT	KENYA	Jul-77
THE RURAL ROAD PROJECT	KENYA	Aug-78
KILIFI BRIDGE CONSTRUCTION PROJECT	KENYA	Jan-86
LOUGA-DAHRA ROAD CONSTRUCTION PROJECT	SENEGAL	Sep-79
EQUIPMENT SUPPLY FOR THE SOUTHERN COASTAL TRUNK ROAD PROJECT	TANZANIA	May-80
EQUIPMENT SUPPLY FOR RURAL ROAD DEVELOPMENT PROJECT	ZIMBABWE	Nov-82
ROAD IMPROVEMENT PROJECT	HONDURAS	Aug-85
LA COLMENA-ACAHAY ROAD IMPROVEMENT PROJECT	PARAGUAY	Sep-77
THE ROAD IMPROVEMENT (REHABILITATION AND MAINTENANCE) PROJECT	PARAGUAY	Jul-90
ROADS IMPROVEMENT PROJECT	PERU	Jun-80

The first Loan agreement year/month and the last Loan agreement year/month are described for multi-phased projects, etc.