Sri Lanka

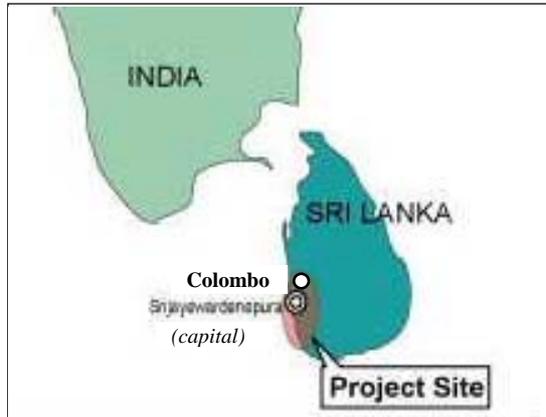## Transportation Rehabilitation Project (Railways)

1. Project Profile and Japan's ODA Loan

Site Map: Rehabilitated Area in Sri Lanka

Site Photo: Rehabilitated Locomotive

1.1 Background

The railway's share of Sri Lanka's transportation volume, both passengers and freight, was decreasing in the 1980s as a result of the following factors:
- Passengers shifting to private bus transportation services
- Cessation of all train operations in the northern and the eastern regions, due to the intensification of interethnic conflicts
- Chronic irregularities in train operations due to deterioration and poor maintenance of locomotives, workshops and track facilities

The importance of Sri Lanka Railways (SLR) for suburban short-distance passengers in the Greater Colombo area and for long-distance passengers, however, was constant. Improvement of transport capacity -- including measures to solve the serious traffic congestion in Colombo, to resume train services in the northern and eastern regions that were planned at the time, and to cope with transport demand for basic commodities -- was therefore a significant task.

1.2 Objectives

To strengthen the transport capacity of SLR by improving locomotive performance, modernizing a rolling stock workshop and rehabilitating track.

1.3 Project Scope

(1.3.1) Improvement of locomotive performance

SLR owned 232 locomotives at the time of appraisal, of which 200 were in service. In this project, 20 diesel hydraulic locomotives were scheduled to be repaired. Of these, 19 (13 units of W1 Class[1] and 6 units of W2 Class[2]) were not in service due to engine transmission failures, and 1

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[1] W1 Class: manufactured in the FR Germany (then West Germany), 1150 horsepower.
[2] W2 Class: manufactured in the then DR Germany (East Germany), 1570 horsepower.

(W3 Class[3]) needed rehabilitation to improve its drastically declining operating rate. The project was split into two phases: the first phase for rehabilitation of 10 units, followed by the second phase for another 10 units, in accordance with the progress of the first.

(1.3.2) Modernization of a workshop

This project aimed to modernize a SLR locomotive workshop at Ratmalana, south of Colombo, by replacing the deteriorated equipment, improving and computerizing the material management system, and installing antipollution facilities (drain facilities). Other than the workshop, SLR owned 3 locomotive depots in the Colombo area and 11 remote depots in other parts of the country.

(1.3.3) Improvement of tracks

Improvement of tracks was planned for a total length of 1,420km along 9 lines. The project scope included fixing significant irregularities in the tracks to prevent derailment, repair of structural defects caused by poor materials on about 300km of track where speed restrictions were in place and thus urgent treatment was needed, and improvement of quarry facilities for a constant supply of ballast.

(1.3.4) Consulting services

For smooth project implementation and technology transfer, consultants were to be hired to perform the following tasks:
   - Detailed design
   - Assistance of procurement
   - Implementation management
   - Operational management (Offering advice for establishing a maintenance & repair system, preparing manuals, and providing training on operations)

1.4 Borrower/Executing Agency

The Government of Democratic Socialist Republic of Sri Lanka / Sri Lanka Railways

1.5 Outline of Loan Agreement

Loan Amount	10,617 million yen
Loan Disbursed Amount	9,114 million yen
Exchange of Notes	January 1990
Loan Agreement	August 1990
Te itions	
Interest Rate	2.5 % p.a.
Repayment Period (Grace Period)	30 years (10 years)
Procurement	Partially Untied
Final Disbursement Date	November 1999

2. Analysis and Evaluation

2.1 Relevance

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[3] W3 Class: conversion from W1- and W2-class locomotives (renamed after the engines were rehabilitated).

This project aimed to reduce serious traffic congestion in Colombo and to cope with demand for transporting basic commodities. The project was planned in accordance with the then policy of the World Bank and the Sri Lankan government to increase the capacity of the railway sector. It is deemed that the project objective was relevant at the time of appraisal.

The government continually aims to ensure the efficient and effective operation of railway systems, in order to provide better service to the public. This project is considered to be still consistent with the current transport policy of the government.

2.2 Efficiency

(2.2.1) Project scope

The track improvement component was completed in line with the original plan; however, the scope of JBIC finance in the locomotive rehabilitation component was actually halved to 10 locomotives from 20 planned at the time of appraisal, since a delay in the project implementation (to be discussed in Section 2.2.2) had deteriorated the condition of locomotives and had eventually increased the unit cost of rehabilitation.

Regarding Ratmalana workshop rehabilitation component, computerization of the inventory control system at the workshop was implemented, while full installation of drainage facilities was not. According to the interview with SLR, changes in the project scope were due to a shortage of funds in the local currency portion.

(2.2.2) Implementation schedule

Although the project was scheduled to start in August 1990, immediately after the signing of the loan agreement, actual startup of implementation was postponed by two years. Contracting procedures for consulting services, the approval of contractors and the import of necessary parts were delayed by a change in Government and the subsequent change in the administration of SLR. The overall project was completed in October 1999, the implementation period having been more than four years longer than in the original schedule as a result of delays in bidding procedures and parts supply. It would have taken even longer without canceling the rehabilitation of the 10 locomotives.

(2.2.3) Project cost

In a detailed survey following the loan agreement, the project cost for the rehabilitation of locomotives turned out to be higher than originally estimated. As a result, the replacement of engines was actually implemented for only 10 of the scheduled 20 locomotives. The cancellation of computerization in the workshop component and competitive bidding for track contracts resulted in reduced costs.

The disbursed amount of the JBIC ODA loan was 9,114 million yen, well within the original loan commitment of 10,617 million yen. (The original total project cost, including the local currency portion that was outside the JBIC loan, was 12,491 million yen.)

2.3 Effectiveness

(2.3.1) Number of passengers and passenger transportation volume

The number of passengers increased during the first half of 1990s, but has been stagnating since the middle of the decade. Sri Lanka Railways attributes this to the shortage of locomotives when

demand was still high. In 2000, a slight improvement was seen, partly because of the rehabilitation of track and the introduction of rehabilitated locomotives in 1999. Since the number of locomotives actually rehabilitated was half the original plan, the effectiveness of this project is considered to have been very limited. Performance should be kept monitored for a few more years before effectiveness is measured more precisely.

Table 1: Number of Passengers and Passenger Volume (1992-2000)

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number of Passengers (million persons)	Actual Number	68	70	73	78	85	87	82	81	82	83
	Index (1990=100)	100	103	107	115	125	128	121	119	121	122
Passenger Volume (million person-kms)	Actual Volume	2,780	2,653	2,613	2,821	3,201	3,321	3,103	3,146	3,147	3,175
	Index (1990=100)	100	95	94	101	115	119	112	113	113	114

Source: Answers to the questionnaire, Facts and Figures 1990-1999 (SLR)

(2.3.2) Freight volume

The situation for freight service is less optimistic than that for passenger service. In contrast to the growing volume of road transport, rail tonnes carried has been stagnating since the early 1990s, and rail tonne-kilometers have been on the decrease as a result of decline in average trip length, as shown in Table 2. At the time of appraisal, it was predicted that tonnes carried and the demand for tonne-kilometers would reach 2.2 and 374 in 1998, respectively. It should be concluded that the overall performance has been much lower than originally expected.

Table 2: Summary of Freight Statistics

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Tonnes Carried (million)	Actual Number	1.4	1.4	1.6	1.4	1.4	1.2	1.1	1.1	1.3	1.2
	Index (1990=100)	100	100	114	100	100	86	79	79	93	86
Tonne Kilometers (million)	Actual Number	163.8	169.1	166.0	159.2	154.1	136.7	107.5	96.4	105.1	94.5
	Index (1990=100)	100	103	101	97	94	83	66	59	64	58

Source: Facts and Figures 1990-1999 (SLR)

(2.3.3) Number of trains operated and operating rate

Figure 1 illustrates the annual change in the number of trains and in the operating rate of SLR for 1990-95 and 1997-2000. The number of trains operated decreased in the middle of 1990s, mainly due to political instability and the subsequent deterioration of track and shortage of locomotives. The operating rate, however, has constantly exceeded 90 percent in the 1990s, and the number of passenger trains operated has been increasing since mid-1990s, partly because of the additional 10 rehabilitated locomotives. These locomotives came back onto the tracks by 1999, and they are all operating without any serious problem. According to SLR, operational performance of the locomotives improved after project completion, although it was not as good as originally expected.

Figure 1: Number of Passenger Trains Operated and the Operating Rate
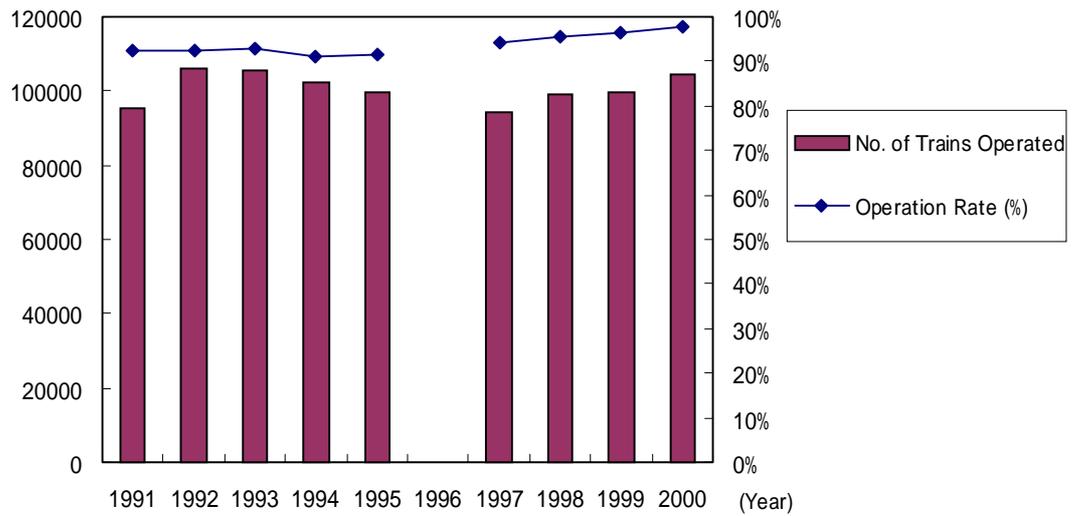
(2.3.4) Delay conditions

The punctuality of train operation, which worsened in the middle of the 1990s, has returned to early-1990s levels as a result of track improvement and rehabilitation. In 2000, nearly half of the trains operated on time (or less than 5 minutes late), and more than 60% of them were 10 minutes or less late.

Figure 2: Time Keeping (Delayed trains out of all trains operated)
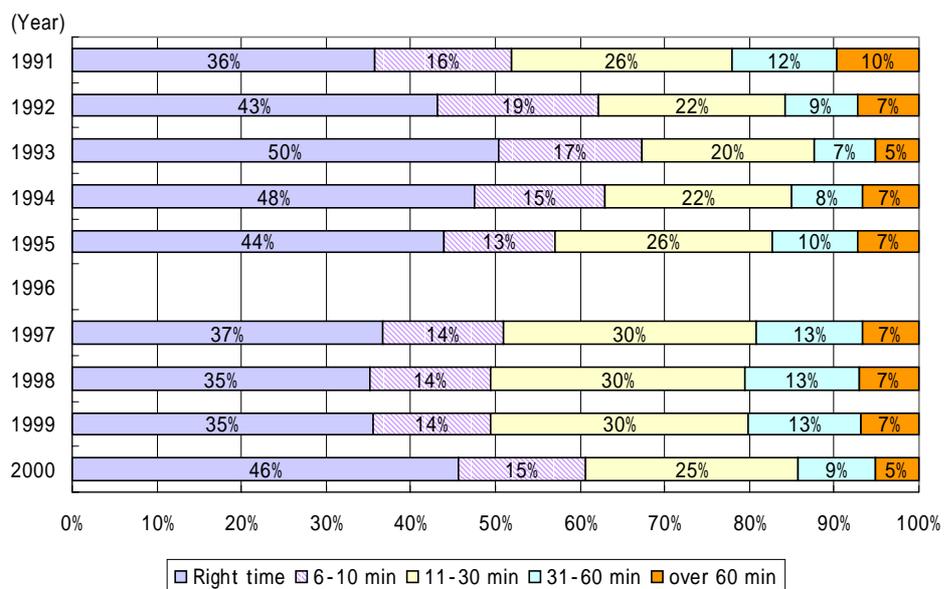
(2.3.5) Train accidents

Due to limited data availability, it is difficult to analyze project effectiveness in terms of improved

track conditions. It should be re-evaluated in a few years when more data are available[4].

Decreasing the number of train accidents was an important issue for achieving a decrease in the number of cancelled or delayed trains. According to data available up to 1999, the number of derailments and collisions is relatively high, at a total number of around 1,000, or roughly 0.5% of operated trains in the late 1990s, while analysis was not possible whether it had any relation with the achievement of this project. After project completion, there was a very serious accident caused by derailment on a section of rehabilitated track in August 2001 that killed more than 10 people, while it cannot be concluded whether the track rehabilitation, the train operation or the track maintenance was responsible for this case.

(2.3.6) Economic/Financial Internal Rate of Return (EIRR/FIRR)

At the time of appraisal, the EIRR was estimated to be 13%, and the FIRR 12%. In this evaluation report, however, it is not possible to recalculate the EIRR or the FIRR, since no relevant data are available.

2.4 Impact

(2.4.1) Change in modal share

No comprehensive studies have been done on the change in modal share since completion of the project in 1999.

Daily flows at 4 points on Colombo Metropolitan City (CMC) boundaries and the modal shares in 1995 are shown in Table 3 below; it is estimated that the railway's share has not increased dramatically since then because the number of the trains operated has not increased. It can be observed, from Figure 3 below, that the railway's share in per capita mobility in the Colombo Metropolitan Region has not increased, while that of public buses has been increasing rapidly. The reasons for this phenomenon are as follows:

- Bus services are much more frequent than railway services (There are several buses per hour in daytime while trains run fewer than 10 times per day).
- Bus fares are not expensive and are generally more inexpensive than railway fares for intercity connections (e.g. Colombo-Kandy: Rs 72 for Intercity Express trains, Rs 41 for CTB buses).
- Some train stations are far from city centers while bus terminals are usually located in the central areas.

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[4] However, the improvement of track conditions by this project is perceptible in that trains run smoothly in the improved sections while they make a noise and vibrate in the sections not covered by this project.

Table 3: Daily Flows at the CMC Boundary and Modal Splits (1995)

Location		Passengers per Day			
		Public Bus	**Private Vehicle**	**Railway**	**Total**
Galle Road / Coast Line	Number	187,881	82,154	61,000	331,035
	Share	57%	25%	18%	-
Negombo Road / Puttalam Line	Number	146,019	82,597	8,000	236,616
	Share	62%	35%	3%	-
Kandy Road / Main Line	Number	205,534	77,785	88,000	371,319
	Share	55%	21%	24%	-
Ratnapura Road / KV Line	Number	142,830	54,981	8,000	205,811
	Share	69%	27%	4%	-
TOTAL	**Number**	**682,264**	**297,517**	**165,000**	**1,144,781**
	Share	**60%**	**26%**	**14%**	**-**

Source: Colombo Urban Transport Study Stage 2: Working Paper 25

Figure 3: Per Capita Mobility by Mode in the Colombo Metropolitan Region (1991-1997)
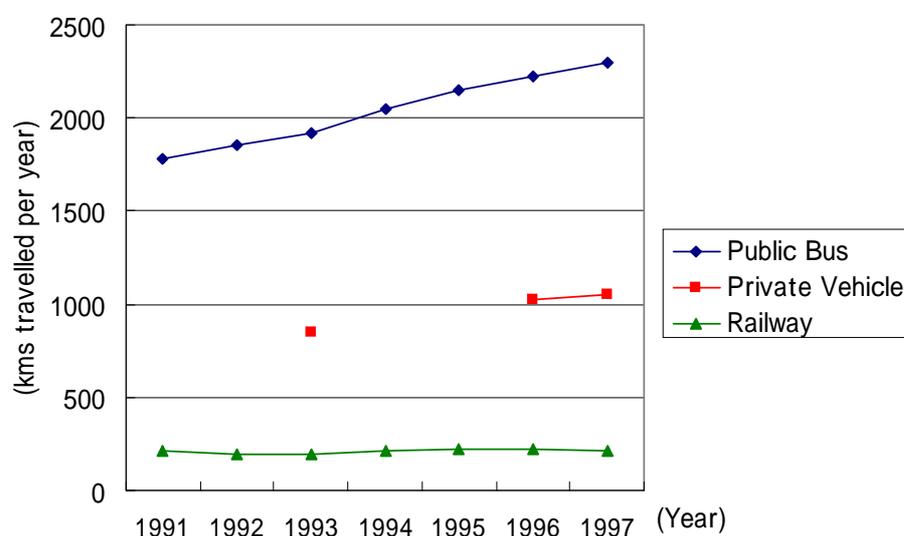
Source: Colombo Urban Transport Study Stage 2: Working Paper 25

In view of these circumstances, the Ministry of Transport states that, 'in contrast to the early years of railways, the purpose of rail has transformed from being the main mode of transportation to providing comfortable passenger travel within metropolitan regions and between cities. It has to compete with the increasing popularity of road transport methods and means.' Thus, it will be necessary for SLR to take countermeasures to compete with other lower fare services and to reach its goal of 10% modal share in the whole traffic in the near future[5].

(2.4.2) Impact on environment

This project may have reduced to a certain extent CO_2 and NOx that would have otherwise been emitted from road traffic. However, this impact on environment, if any, should be limited, since the

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[5] However, 'Colombo Urban Transport Study' in June 1999 analyzed that the overall share of the market in Colombo Metropolitan Region would continue to remain at less than 10% even with the proposed doubling of market shares.

number of repaired locomotives was small.

2.5 Sustainability

(2.5.1) Organizational structure

Sri Lanka Railways (SLR), the executing agency of the project, is under the supervision of the Ministry of Transport. With a General Manager and three Additional General Managers at the top, there are 12 subdepartments and 18,632 staff members. The Chief Mechanical Engineer Department and Chief Engineer (Way & Works) Department, with a total of 9,495 staff members, are responsible for operation and maintenance (O&M), with additional support from Chief Engineer (Motive Power) Department. However, there are nearly 2,500 vacancies in these departments; SLR reports that the shortage of human resources, especially of skilled workers, is affecting its operational performance, resulting in long delays in the repair process.

Figure 4: Organization Chart
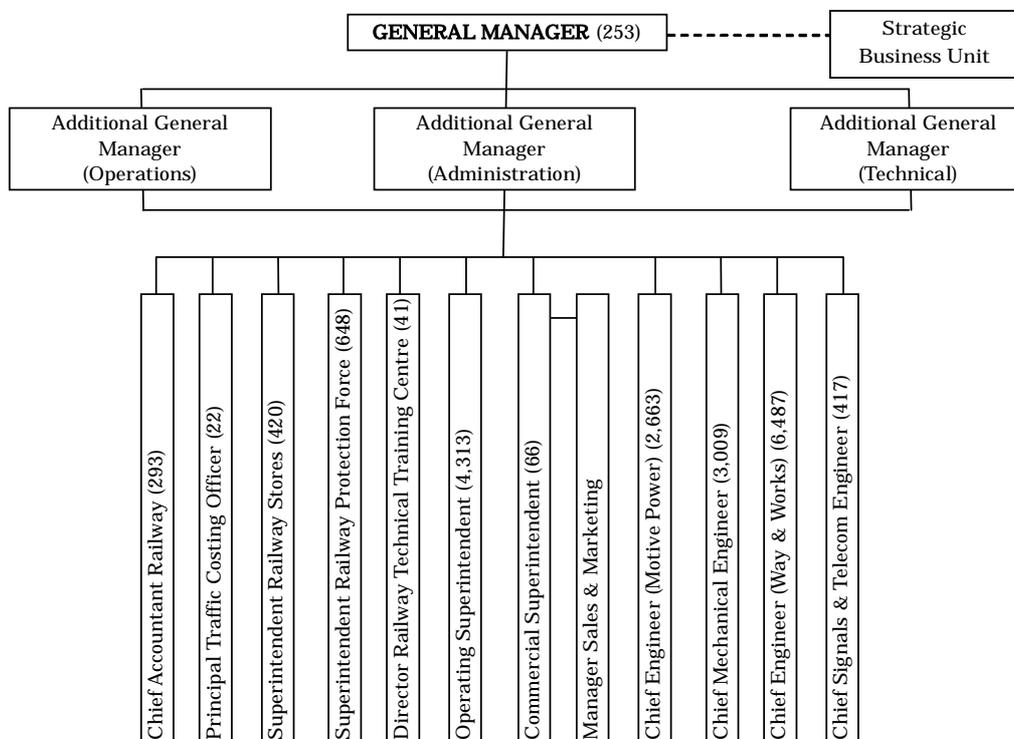
Note: (   ) indicates the number of staff in each office

(2.5.2) Number of employees and personnel expenses

In order to reduce financial constraints, SLR has been cutting the number of employees, but overall personnel expenses are rising. In interviews, SLR staff commented that facilities are not well maintained since the number of technicians is insufficient. Moreover, since most of the parts necessary for repairs are not domestically produced, import delays prolong the time necessary to repair locomotives and return them to operation.

Table 4: Summary of Employees and Their Cost

Year	No. of Employees	Cost of Staff (Rs mil)	Cost of Staff as % of Recurrent Exp.
1990	21,196	822.4	55.6
1991	18,478	841.4	45.8
1992	18,393	846.0	46.0
1993	18,633	969.8	54.3
1994	18,542	1,198.1	52.5
1995	18,843	1,350.4	56.8
1996	18,070	1,330.5	54.5
1997	18,209	1,350.0	54.6
1998	18,605	1,367.3	59.2
1999	17,377	1,752.7	60.7

Source: Facts and Figures 1990 to 1999 (SLR)

(2.5.3) Financial sustainability

Despite a gradual increase in revenue, operating losses have risen mainly because of increases in personal emoluments and fuel costs, 1.3 times and 1.7 times respectively, over the five years from 1995 to 1999. Combined with rapidly increasing expenses of annuities and interest payments, the overall losses in 1999 reached approximately Rs 7,000 million, nearly 7 times the operating revenues (approximately Rs 1,000 million). As a countermeasure, SLR is planning to cut costs by closing down uneconomical services and not filling vacant posts.

Table 5: Details of Revenues and Expenditures 1995-1999 (Rs mil)

Classification	1995	1996	1997	1998	1999
Revenue					
-Passenger	595.3	622.0	657.7	682.1	678.5
-Freight	190.2	174.6	152.3	179.4	209.6
-Parcels & Mail	39.5	37.9	38.0	42.0	39.4
-Miscellaneous	122.2	103.9	181.7	286.7	110.9
Total	947.2	938.4	1,029.8	1,190.2	1,038.4
Recurrent Expenditure					
-Personal Emoluments/Salaries	1,348.7	1,394.9	602.1	1,639.2	1,751.7
-Fuel	410.9	537.1	477.9	280.4	691.6
-Stores Materials	488.8	477.9	0.6	155.7	129.8
-Other Expenditures	131.2	148.0	2,560.8	161.9	312.5
Total	2,379.6	2,557.9	2,731.3	2,630.6	2,885.6
Annuities & Interest	2,344.3	2,731.3	3,242.5	3,712.1	4,140.8

Source: Facts and Figures 1990 to 1999 (SLR)

(2.5.4) Technological sustainability

In this project, no advanced technology was employed. However, some of the equipment procured during implementation was abandoned after it broke down because there were no technicians to make repairs. Details are shown in Table 6. In this respect this project is not as effective as originally expected; it would have been desirable to have an adequate technical training program covering equipment repair.

Table 6: List of Machines/Equipments Out of Order

Machine / Equipment	Description
Steam Jet Cleaner	Mechanical & electrical defects
Bearing Inner, Race Induction Heater	Coil burnt
Jib Crane A	Electrical defects
Jib Crane B	Electrical defects
Ultrasonic Flow Detector	Waiting on attention by OEM
Water Drainage Equipment	Electrical defects
Lifting Platform Vehicle	Mechanical defects
Steam Jet Cleaner	Mechanical defects
Trailers	Physical defects
T/Motor Load Tester	Electrical defects
Horizontal Surface Grinder	Electrical defects
Heat Treatment Furnace A	Electrical defects
Molding Machines	Mechanical defects
Engine Test Stand	Waiting on attention by OEM
Load Box	Waiting on attention by OEM

Source: SLR

3. Recommendations

It is reported in Section 2.5.4 that some of the equipment procured during the project implementation was abandoned after it broke down because there were no technicians to make repairs, while no advanced technology was employed in this project. The executing agency is recommended that it should build capacities of its own human resources based on realistic maintenance plans, for instance by providing sufficient technical training on equipment repairs and other necessary works, in order to enhance project sustainability.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Project Scope Rehabilitation of tracks	300km	300km
Rehabilitation of W Class locomotive	W1 Class: 14 Units W2 Class: 6 Units	W1 Class: 10 Units
Rehabilitation of Ratmalana workshop	- Replacement of deteriorated equipment - Improvement and computerization of the material management system - Provision of a drainage facility	} Completed Withdrawn
(2) Project Period	August 1990 - June 1995	August 1990 - October 1999
(3) Project Cost Foreign Currency Local Currency Total ODA Loan Portion Exchange Rate	8,521 million yen 3,970 million yen 12,491 million yen 10,617 million yen Rs 1 = 3.9 yen	Data not available Data not available Data not available 9,114 million yen

Independent Evaluator's Opinion on Transportation Rehabilitation Project
Buddhadasa Hewavitharana, Professor

An internally causative factor in the SLR's chronic poor performance is the neglect of capital infusion to improve its infrastructure. Thus, weakened tracks, insufficient availability of locomotives and obsolete conditions of existing locomotives have resulted in a deterioration of the quality of the services of the SLR and a lowering of its reliability. The Project's interventions in these two critical areas in rehabilitating the track on the lines which carry traffic of high density and rehabilitating locomotives by setting up a new mechanical engineering workshop are therefore of direct **relevance** to correcting these chronic investment deficiencies and to assisting Government in arresting the decline and improving quality of the services.

Assessing the **effectiveness** of Project's interventions, the Report (Table 1, p 3) can see only a "slight" improvement in the number of passengers by 2.4% between 1999 and 2000. This is not acceptable because the base figure of 83 million used for 1999 needs to be corrected to 81 million according to more recent statistics of the SLR. With this correction the rate of improvement rises to 5% crediting greater effectiveness to the Project. I agree that, had the Project not halved the number of locomotives to be rehabilitated its effectiveness would have been greater. To illustrate this point and also to get the proportions in proper perspective, be it noted that while only 10 rehabilitated locomotives were added by the Project, 4 rehabilitated plus 8 new locomotives had been added independently between 1996 and 1998, making a total of 22. Assessment of Project's contribution to increasing the number of passengers (Report 2.3.1) and the number of passenger trains (Report 2.3.3) should be with due attention to these proportions. I observe that a strengthening of rolling stock position when coupled with a change in the relative levels of train and bus fares can make it more effective. Thus in 2001 a sharp shift of commuters from bus to train transport took place as bus fares rose by 50% while 15 new power sets and 25 new train services got added.

I agree with the Report that rehabilitation of tracks has arrested a worsening of delay conditions, but add that nothing more could have been achieved in the context of the outmoded communication and signaling system. The serious derailment in August 2001, happened to be on a stretch of the rehabilitated track. Inquiries conducted have found that it was due to carelessness in the repair and maintenance work. Figure of 1000 given as total for derailments and collisions (p 6) is wrong because it is the total for all kinds of accidents. Besides, it is the number of derailments that should be considered for assessing the effectiveness of rehabilitated tracks. These according to SLR's latest statistics have declined by 15.7% between 1998 and 1999 and by 16% between 1999 and 2000 showing the effectiveness of track rehabilitation in a favourable light.

The problem of financial sustainability of the SLR which has its roots in it losing its dominant role due to the liberalisation of the economy in 1977 and the consequent phenomenal growth in road transport was compounded by the two internal factors of a lack of infusion of capital for its infrastructure and the non-practice of commercial principles in its management. Hence the continuous increase in operating losses. I must point out that, entries of recurrent expenditure figures for the year 1997, are glaringly distorted. The correct SLR's statistics are annexed herewith for making the necessary corrections, for the record, for the years 1997 and also for 1998.

I note that the repair and maintenance of equipment is affected by a lack of relevant skills and systems. A lesson to be learned is that inclusion of institution of systems and training of skills for repair and maintenance as Project components is a must for ensuring technological sustainability.

Sources Consulted
Facts and Figures 1991 to 2000 – SLR.
Central Bank of Sri Lanka Annual Reports for 1996, 1997, 1998, 1999, 2000, 2001.
Public Investment Programme – 1995-1999, 1999-2001, Department of National Planning.
Interview with Mr. Premasiri, Additional General Manager, SLR.

Note made by JBIC:

The discrepancies that the independent evaluator has pointed out herein were assumed to stem from the differences in the timing of data collection: the JBIC evaluation report is based on the data obtained during the survey in mid-2001, while the independent evaluator consulted some of more updated data.

As for the procurement partly cancelled during the implementation period, SLR had an intension to rehabilitate the remaining 10 locomotives using its own funds at that time. According to an SLR officer, it procured 14 locomotives and had 4 others rehabilitated at the cost of Sri Lanka's side between 1997 and 2001.