Pakistan

Track Circuits at 94 Mainline Stations Project

Report Date: October 2002
Field Survey: August 2001

1. Project Profile and Japan's ODA loan

Site Map: Target Workshops


Site Photo: Dina Station

1.1. Background

At the beginning of Five-Year National Development Plan after the independence of the Islamic Republic of Pakistan, the federal government had allocated abundant budget to Pakistan Railways. However, since the Third Five-Year National Development Plan (July 1960~June 1965), the competition between the railway transportation and the road transportation had became more apparent and the government had tended to put more priority on road transportation. Thus, the rate of public investment allocation for Pakistan Railways out of the transportation sectors declined from 75.9% at the Second Five-Year National Development Plan (1955-1960) to 21.7% at the Seventh Five-Year National Development Plan (1988-1993). In the Seventh Five-Year National Development Plan, the Pakistan Railways would be allocated for 8,485 million Pakistan Rupees (Rs) of public investment, whereas the road sector had received Rs. 20,762 million of public investment. The targets of the investment included reform of the railway facilities, and rehabilitation and improvement of locomotives. The focus was to maximize the utilization of the existent facilities and the transportation capabilities.

Pakistan Railways is state owned. It is serving an area of 803,943 square kilometers in the country, inhabited by nearly 120 million people.

Out of all the 234 stations along Pakistan Railways of the Islamic Republic of Pakistan (Distance between Karachi and Peshawar: 1700km), approximately half of the stations still had obsolete track circuits systems. In January 1990, an incident of collision took place in Sangi Station. This incident resulted in casualties of 238 deaths and 326 injuries. The cost for this damage was estimated for 138 million Rs. Because of the occasion of such a fatal accident, this project was initiated in order to prevent similar accidents from happening again by providing the security systems.

1.2. Objectives

The provision of track circuits and electric lock system at 94 stations on the train line, which is required for keeping the minimum safety to avoid the recurrence of train accidents such as one at Sangi station.

1.3. Project Scope

a. Installation of track circuits and electric lock system at 94 stations out of 234 stations between Karachi and Peshwar (1,700km) including related civil works. The number of targeted stations are as follows:

(i) Hyderabad - Rohri Section : 29
(ii) Rohri – Lodhran Section : 11
(iii) Multan – Shershar Section : 1
(iv) Khanewal – Lahore Section : 1
(v) Lala Musa – Rawalpindi Section : 28

(vi) Rawalpindi – Peshwar Section : 24

b. Replacement of steel sleepers with concrete sleepers

1.4. Borrower/Executing Agency

Borrower: The President of the Islamic Republic of Pakistan
Executing Agency: Ministry of Railways

1.5. Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	3,221 million yen 3,167 million yen
Exchange of Notes Loan Agreement	January 1992 March 1992
Terms and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 2.6 % p.a. 30 years (10 years) Partially Untied
Final Disbursement Date	December 1999

2. Results and Evaluation

2.1. Relevance

The project was determined immediately after train accident at Sangi station to help increase safety of the railway transportation and accomplish the objective to provide security system to avoid the recurrence of train accidents, such as one at Sangi station.
According to Planning Director of Ministry of Railways, the current federal government supports promotion of railway transportation and still regards the safe train operation under the security system introduced by this project as an important measure. Therefore, the project has been and still is relevant from standpoint of security in railway transportation.

2.2. Efficiency

(2.2.1.) Project Scope

The difference between original and actual scopes is the number of stations that have installed the track circuits. The actual project has 7 stations fewer than the original plan. This was due to the decision of Ministry of Railways to close down the stations. Besides the closedowns, the scope of the project remained the same.

(2.2.2.) Implementation Schedule

The project was originally scheduled to be implemented during the period from July 1992 to June 1996, while the actual implementation was carried out during the period from September 1993 to December 2001. According to Ministry of Railways, this delay of about 5 years was caused due to following reasons:

i) Delay in supply of sleepers by sleeper factories
ii) Non availability of wagons and power for transportation of sleepers and ballast to project sites
iii) Delay in completion of equipment rooms
iv) Delayed release of funds by Ministry of Finance
v) Delayed opening of some stations due to low voltage of electricity
vi) Delay in completion of pre-installation signaling works
vii) Delay in preparation of working rules and maintenance staff shortages

(2.2.3.) Project Cost

The foreign and local currency cost increased, respectively, and Ministry of Railways pointed out the following reasons for the difference:

i) Extension of construction period
ii) Inflation, increase in wages and freight, higher prices quoted by bidders, some additional works, etc.
iii) Increase in custom duties

The foreign currency cost increased from 1,170 million yen to 1,897 million yen as a result of a bid and extension of construction period. The local cost also increased from Rs. 557 million to Rs. 661 million due mainly to inflation and increase in wages and custom duties. Meanwhile, the project cost, originally estimated to be 4,444million yen at the time of appraisal, actually turned out to be 3,984 million yen due to the weakening of the Rupees.

2.3. Effectiveness

The objective of this project is to prevent reoccurrence of catastrophe like the one that happened in Sangi station. It should be noted that (i) there has been no severe accidents reported since the new track circuit system was installed and (ii) the safe image of train operation has been recovered according to interview survey to personnel in Pakistan Railways. However, since there is no data available such as number of trains in operation or hours of train operation for several years after project completion, it is difficult to conclude numerically that this project effectively reduced the risk of railway accidents. It may safely be said that the sense of tension among personnel at Pakistan Railways after the accident at Sangi Station was one of the main causes of eliminating the catastrophe.

2.4. Impact

(2.4.1.) Technical Transfer

According to Pakistan Railways, local engineers had acquired maintenance skills for the new system, although Pakistan Railways faces lack of maintenance staffs as referred to in (2.5.1) below,. Pakistan Railway has provided training program for old staffs when this new system was introduced. Since this new track circuit system is not very sophisticated, the staffs of Pakistan Railway have mastered sufficient skill to operate the system without any difficulty.

(2.4.2.) Environmental Impact

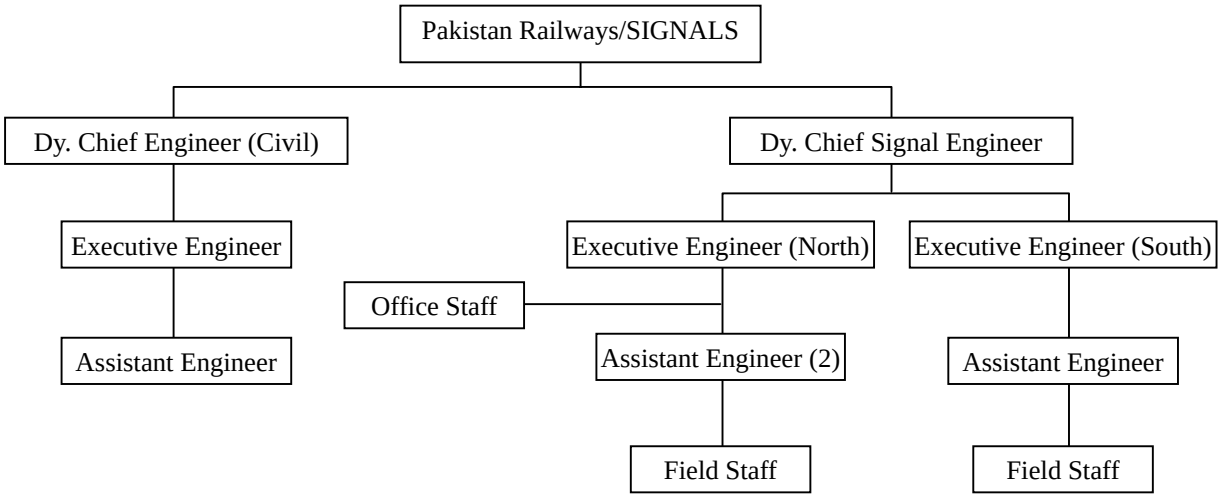
According to Pakistan Railways, there has been no impact to be mentioned in terms of environmental factors. In addition, there was no problem reported in terms of reallocation of residents.

2.5. Sustainability

(2.5.1.) Organization of Operation and Maintenance

The signal engineering department of Pakistan Railways executes the maintenance of the signal system. The problem of maintenance of this system is lack of staffs. The government stopped recruiting the staff from 1998 to 2000. This has caused lack of young trained engineers within Pakistan Railways. There are currently 1949 persons hired by Pakistan Railway. According to the interview survey, it is considered that Pakistan Railways is facing a shortage of maximum500 technical maintenance staffs in providing adequate service of railway operation.

Figure 2-1:Organization Chart of Signal Engineering Department of Pakistan Railways



Source: Pakistan Railways

(2.5.2.) Technical Capacity

Technologies and skills to operate the new system have been acquired by staffs through an adequate education system. Pakistan Railways provides a certificate to engineers who have passed the education program. Whenever new system is introduced, Pakistan Railways provides refresher courses for veteran staffs.

Routine maintenance of the system has been conducted by five regional divisions: Peshawar, Sukkar, Rawalpindi, Multan, and Karachi. Pakistan Railways has provided individual manual for routine maintenance and system inspection for each station. The maintenance of the system would be monitored in several terms, such as a half-year, three years, and eight years.

Considering the current level of maintenance skills, thanks to the solid training system, and the physical durability of the new system, technical capacity in terms of the system maintenance is regarded as established, the overall staff shortage notwithstanding. This project has also contributed to an establishment of basic condition for adopting an interlock system.

(2.5.3.) Financial Status

Table 2-1 indicates the financial condition of Pakistan Railways for last five years. The operational revenue decreased from FY 1997/98 to FY1998/99, but increased from FY1998/99 to FY2000/01. This is mainly due to 21% increase in ton kilometers and 6% increase in passenger kilometers from the previous year. In order to improve the financial condition of the railway, Pakistan Railways has (i) disposed of railway bungalows allotted to employees, (ii) privatized Rawalpindi and Karachi railway hospitals, (iii)eliminated 20,000 ghost pensioners, and (iv)reduced employees from 135,000 to 96,000. Though there is still a deficit from the operation of the railway, the amount of deficit decreased drastically from FY1999/2000 to FY2000/01.

Table 2-1: Financial Condition of Pakistan Railways

(million Rupees)

	1996-1997	*1997-1998*	*1998-1999*	*1999-2000*	*2000-2001*
Revenues	9804	9941	9310	9581	11907
Expenditure	11975	11886	11922	12044	12726
Surplus/Deficit	-2171	-1945	-2612	-2463	-819

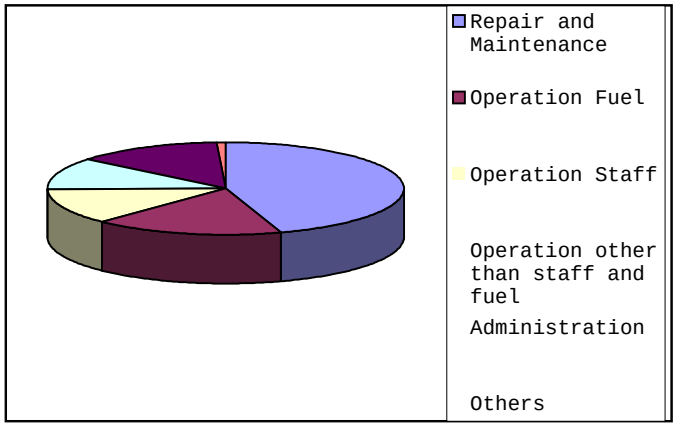
Source: Pakistan Railways

Figure 2-2 shows the breakdown of operational expense of Pakistan Railway in 1999-2000. The repair and maintenance cost has been the most dominant with the ratio of 45% to the total expenditure. The operational fuel follows with the ratio of 13%.
These figures are higher than those of Japan Railway (21%, 5% respectively) and the difference seems to be attributed to Pakistan Railway's repeated operation with the old and bad condition of the rail, locomotives, and other facilities.

As a part of restructuring for improvement of its financial sustainability, Pakistan Railways is planning to do followings:

1. To reduce the number of train services on un-remunerative routes
2. To cut down electric consumption
3. To reduce work force by another 5,000 employees

Figure 2-2: Breakdown of Operational Expense (1999-2000)



Source: Pakistan Railways

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Project Scope		
1. Installation of Track Circuit System and Electric Lock System at 94 Main Lines Stations between Karachi and Peshawar (1,700km)	Total: 470 lines or 195 km	Total: 288 lines 275 km
Track circuit system		
- Track circuit	94 Stations	87 Stations
- Indication panel	94 Stations	87 Stations
- Station master control circuit	94 Stations	87 Stations
2. Replacement of Sleepers	Replace concrete sleepers with steel sleepers	211,185 Nos
3. Target area (94 stations)		
a) Hyderabad – Rohri Section	29 stations	28 stations
b) Rohri – Lodhram Section	11 stations	10 stations
c) Multan – Shershar Section	1 station	as planned
d) Khanewal – Lahore Section	1 station	as planned
e) Lala Musa – Rawalpindi Section	28 stations	23 stations
f) Rawalpindi – Peshawar Section	24 stations	as planned
(2) Implementation Schedule		
・ Replacement of Sleepers	July 1992 – November 1994	September 1993 – July 2000
・ Pre-installation Work	July 1992 – May 1995	December 1992 – June 2001
・ Track Circuits Contract Arrangement	July 1992 – April 1993	July 1992 – August 1993
・ Track Circuits Procurement and Allocation	May 1993 – April 1996	October 1993 – October 2000
・ Commissioning	June 1996	December 2001
(3) Project Cost		
Foreign currency	1,170 million yen	1,897 million yen
Local currency	557 million Rs	661 million Rs
Total	4,444 million yen	3,984 million yen
ODA loan portion	3,221 million yen	3,167 million yen
Exchange Rate	1 Rs = 5.88 yen (As of March 1991)	1 Rs = 3.048 yen