

**Bangladesh: Supply with Main-Line Locomotives**

**Ex-post evaluation**

<b>OECD sector</b>	21030 / Railway sector	
<b>BMZ project ID</b>	1988 66 345	
<b>Project-executing agency</b>	Bangladesh Railway	
<b>Consultant</b>	DE-Consult	
<b>Year of ex-post evaluation</b>	2005	
	<b>Project appraisal (planned)</b>	<b>Ex-post evaluation (actual)</b>
<b>Start of implementation</b>	Beginning of 1989	May 1991
<b>Period of implementation</b>	20 months	59 months
<b>Investment costs</b>	EUR 21.6 million	EUR 52.3 million
<b>Counterpart contribution</b>	EUR 3.7 million	EUR 12.7 million
<b>Financing, of which Financial Cooperation (FC) funds</b>	EUR 17.9 million	EUR 39.6 million*
<b>Performance rating</b>	4	
<b>• Significance / relevance</b>	4	
<b>• Effectiveness</b>	4	
<b>• Efficiency</b>	5	

\* Approx. KEUR 30 that remained of the funds provided under the financing agreement (EUR 39.6 million) were used for an FC project in the energy sector. Additionally approx. KEUR 260 were financed under the SFF II to cover the costs of the service engineer.

**Brief Description, Overall Objective and Project Objectives with Indicators**

The Financial Cooperation (FC)/Technical Cooperation (TC) cooperative project comprised the supply of 21 main-line locomotives in 2 lots for the one-meter gauge rail network of the project-executing agency, Bangladesh Railways (BR), as well as measures to ensure the maintenance of the locomotives. Nine locomotives began operating in 1995 and, in 1997, another 12 took up operation. Under the TC component the GTZ provided technical support in the field of locomotive maintenance following the second delivery.

The overall objective is to contribute to maintaining the volume of rail-based traffic in the eastern and western sections of the country.

The indicator defined to measure achievement of the overall objective was maintenance of the volume of traffic of BR at its level at the time of the project appraisal (1988) until the year 1993/94 (i.e. three years after the locomotives planned for delivery in the project appraisal started operating).

The project objective was to contribute to ensuring adequate traction power for Bangladesh Railway.

Indicator of achievement of the project objective: Owing to the low project volume in comparison with the total volume of rail-based traffic, the focus was on the kilometric performance of the project locomotives (target: 100,000 km p.a. per locomotive for passenger traffic and 70,000 km p.a. for freight traffic).

Achievement of the overall objective was to be measured on the basis of whether BR was able to maintain the transport volume at the time of the project appraisal for three years following the start of operation of the project locomotives. Based on a study by the ADB, during the project appraisal the total transport volume (one-meter gauge and broad gauge) was estimated to be 9 billion passenger-km (pkm) and 0.5 billion transport-km (tkm). In actuality, however, according to data provided by BR the total transport volume at the time of the project appraisal (1988) was 5 billion pkm and 0.68 billion tkm, with the one-meter gauge area accounting for 3.9 billion pkm and 0.46 billion tkm. Since locomotives were supplied for only the one-meter gauge area – contrary to the original project design – from today’s point of view it would have made sense to measure achievement of the overall objective against whether the transport volume actually achieved in the one-meter gauge area at the time of the project appraisal had been maintained.

### **Project Design / Major Deviations from the original Project Planning and their main Causes**

The original project design provided for an FC commitment of EUR 17.9 million for the supply of 4 one-meter gauge and 5 broad-gauge locomotives as well as initial equipment with spare parts. High prices forced BR to cancel its plans to acquire two different types of locomotives and, in this way, to reduce the unit costs. Therefore, solely one-meter gauge locomotives were purchased (number: 9). This decision made sense in view of the low share of broad-gauge traffic of the total traffic volume of BR (20% and declining) and of its locomotive stock (approx. 25%). Since the prices rose in the interim, the FC commitment made in 1994 was increased by EUR 1.28 million.

During the intergovernmental negotiations in 1994 the supply of additional main-line locomotives for BR was agreed in principle. After the ADB had identified the need for an additional 18 locomotives for the one-meter gauge area, in 1995 the FC commitment was increased again, this time by EUR 20.45 million, in order to finance more locomotives. Owing to favorable price and exchange rate developments, instead of 10 locomotives as originally planned a total of 12 locomotives including initial equipment of spare parts could be financed.

Serious maintenance bottlenecks became evident during implementation. Improving maintenance was the goal of a TC project – which did not begin until 1998, however – under which mainly one review of the situation took place during the first two years. The original goal of technical/practical support for locomotive maintenance was cancelled once it became clear in initial local talks that this would mainly involve activities that had already been carried out by the Canadian International Development Agency (CIDA). CIDA was involved in locomotive maintenance from 1988 until 2001. The main goal of the TC project then became the introduction of institutional reforms. As a result, efforts were made to outsource the locomotive maintenance from BR on a commercial basis. In the end no progress was made due to the stubborn resistance of the government. Overall the TC measures did not lead to an improvement in the maintenance of the project locomotives. In order to improve the maintenance of the supplied locomotives, the assignment of the supplier’s service engineer was extended beyond the guarantee period to a total of 3 years. The cost (EUR 0.26 million) was financed from the Studies and Experts Fund. Efforts to coordinate the maintenance of the FC locomotives with ongoing activities by other donors (CIDA and the Indian RITES, which provided maintenance services under a maintenance agreement for the Indian locomotives supplied in 1996) were not successful.

The refusal of the Bangladeshi government to implement an extensive reform of the railway sector through outsourcing and the commercialization of BR finally led to the withdrawal of German development cooperation (DC) from this sector in 2003.

Compared to the original project planning – the schedule of which was far too ambitious - the project implementation was delayed by about 4 years. Delays of 3 years are the result of difficult decision-making processes at BR. A further delay of one year arose as due to excessively high prices for the purchase of the broad-gauge locomotives, it was decided not to purchase these kind of locomotives but instead undertake a new tender for meter-gauge locomotives only. Therefore, the first lot of locomotives was delivered in the first half of 1995 (plan: autumn 1990). The delivery of the locomotives financed from the commitment increase took place largely as planned, i.e. in the first half of 1997.

Due to a lack of willingness or ability on the part of the Bangladeshi government, the project was not sufficiently coordinated with measures by other donors in the railway sector such as those carried out for BR by CIDA for maintenance and by the ADB as 'lead donor.'

### **Key Results of the Impact Analysis and Performance Rating**

The main result of the project was the provision of 21 main-line locomotives for the BR's one-meter gauge rail network. The locomotives' design matched the conditions for use and the operational requirements of Bangladesh Railway.

The project's design was based on a transport study by the ADB, which estimated the transport volume in 1986/87 at 9 billion pkm and 0.5 billion tkm and projected that it would increase to 10 billion pkm and 0.54 billion tkm in the period 1990/91. Based on these figures and after deducting outdated locomotives taken out of the fleet, at the time of the project appraisal the need was estimated at around 52 locomotives altogether. The project appraisal was based solely on the figures from the ADB, which were ultimately revealed to be overly optimistic estimates and projections. The actual transport volume at the time of the appraisal in 1988 was only 5 billion pkm and 0.68 billion tkm. What is more, compared with the project appraisal the traffic in the dominant sector of passenger traffic in which the supplied locomotives are used to almost 90% declined from 5 billion pkm in 1988 to 4.1 billion pkm in 2003. With regard to freight traffic the transport volume in 2003 was 0.95 billion tkm. In the one-meter gauge area that is relevant to the project, passenger traffic declined from 3.9 billion pkm in 1988 to 3.4 billion pkm in 2003 and reached its lowest point of 2.7 billion pkm in the year 1996. As regards freight traffic the transport volume increased slightly from 0.46 billion tkm to 0.57 billion tkm in 2003. The drop in passenger traffic by about 1/3 during the period 1992-1996 was accompanied by a decline in the number of kilometers by only 10%. This is an indication that the decrease in passenger traffic was not caused by a locomotive bottleneck but instead by a declining use of capacity of the trains. Parallel to the drop in traffic volume, between 1995 and 1997 BR started operating a total of 31 new locomotives (approx. 15% of its average locomotive stock). The use of capacity of the entire locomotive fleet (measured in motor hours/day) dropped significantly between 1995 and 1998, i.e. the capacity effect produced by the project locomotives was largely counteracted by a declining average use of capacity of the available fleet of locomotives. As outdated locomotives have since been scrapped and due to a certain increase in passenger transport, it was not until 1999 that a rise began to be observed that, from 2001, has led to a satisfactory use of capacity of the locomotives of approx. 16 locomotive hours per day on average.

Project objective: In the years 1994/95 until 2002/03 the average kilometric performance of the project locomotives ranged between 105,000 and 125,000 km/year, with freight traffic accounting for between 5-10%. Thus, at the current point in time the indicator of achievement of the project objective has been achieved, yet in view of the current situation of Bangladesh

Railways and the seriously neglected repair and maintenance (see below), the project objective is not expected to remain fulfilled on a sustainable basis. What is more, it can be noted that the use of capacity of the locomotives financed under FC, most of which are used in intercity traffic between Dhakka and Chittagong, was most recently at approx. 10 h/day, which is far too low, also in comparison to the use of capacity of all locomotives taken together (16 locomotive hours/day). Overall objective: Owing to the strong decline in passenger traffic, which is the dominant of the two areas, the total transport volume of BR has dropped substantially since the project appraisal. In 2003 it was 3.4 billion pkm and 0.57 billion tkm in the relevant area of one-meter gauge. The volume of passenger traffic, where the project locomotives are used to 90%, is about 15% below its level at the time of the project appraisal. Overall the importance of the railway compared to other means of passenger and freight transport in Bangladesh has declined considerably. The corresponding shares are currently only 10% and 6%, respectively (project appraisal: 27% and 10%).

The financial situation of BR is very tight. In 2000/01 the ongoing operational expenses (excluding interest and depreciation) were covered to only 70% by the operational revenues of BR. Taking the public service obligation – a compensatory payment by the state to BR to (partially) compensate for tariffs still set by the state that have not been increased since 1998 – into account, the coverage of the operating costs was 88% and has not increased much since. This reduces the equity of BR. Here it needs to be considered that the running expenses are being kept low artificially, and that owing to financial bottlenecks BR is not in a position to adequately maintain its rolling stock. According to data provided by the ADB, a lack of funds is currently preventing approx. 80% of the necessary repair and maintenance of the locomotives.

The consequences of insufficient maintenance are reflected in a considerable decrease in availability of the locomotives. Since the CIDA put an end to its activities in this area, their availability has decreased by a total of 91% to 82% (2003). The initial equipment with spare parts that was financed under the project has since been used up. According to BR, the availability of the locomotives purchased under the FC project dropped between 1999 and 2003 from 89% to most recently 73%, which is unacceptable in view of the young age of the locomotives. The main factor that caused the availability to drop so low is the insufficient budget for maintenance and spare parts, which was merely around KEUR 385 in 2003 for all 21 locomotives. This is not enough to finance the soon pending, extensive general overhauls of the project locomotives. In view of the persistent economic difficulties of BR, significant sustainability risks are arising. As illustrated by the clear decline in availability of the project locomotives, some of these risks have already occurred.

Overall, our assessment of the project's developmental impacts is as follows:

Measured in terms of kilometric performance, the 21 locomotives that were purchased are being used slightly more than expected during the project appraisal. Their use measured in motor hours/day and their availability are both unsatisfactory, however. The unsatisfactory financial situation of BR also led to inadequate repair and maintenance. Therefore, we classify the project's sustainable effectiveness as slightly insufficient (rating 4).

Overall the project did not make a sufficient contribution to the overall objective of maintaining the volume of rail-based transport. The actual transport volumes of BR were far lower than described in the project appraisal. In passenger transport, the main area in which the project locomotives were used, the volume has continued to fall in the meantime. The use of the locomotives (entire fleet) has not reached a satisfactory level until just recently, yet for the project locomotives alone it remains unsatisfactory. The considerable decline in the share of rail transport for both passenger and freight traffic also had a dampening effect on the project's significance. Therefore, we rate the project's relevance/ significance as slightly insufficient (rating: 4).

The project appraisal did not compare the microeconomic advantage of purchasing new locomotives to other possible alternatives (rehabilitation). The tender, which was limited to Germany upon the request of BR, probably had a negative effect on the cost efficiency because it led to restrictions in the price competition. The capital productivity of BR, which was already low anyway, decreased further as a result of the investments in additional locomotives. In terms of the allocation efficiency, BR is ultimately unable to push through tariffs that would at least cover its operating costs. Therefore, overall we judge the project's efficiency to be clearly insufficient (rating: 5).

Under consideration of the key criteria mentioned above, we assess the project's developmental effectiveness as slightly insufficient overall (rating 4).

The project targeted neither gender-specific goals, direct poverty reduction, environmental protection goals nor the improvement of governance. Consequently, it has not had any corresponding impacts.

### General Conclusions

In retrospect the problem analysis conducted during the project appraisal that focused mainly on an insufficient number of locomotives as the key bottleneck hindering the development of railway traffic was not sufficiently well-founded. The relevant framework conditions ought to be reviewed before a substantial investment is undertaken (the project costs added up to 70% of the annual turnover of BR) and, should any conditions be inadequate, corresponding covenants should be introduced prior to the investment. It should also be examined whether organizational changes such as improved coupling plans or maintenance agreements might also lead to improved availability and greater use of the preexisting rolling stock and, whether this could significantly reduce the volume of 'hardware investments.' Finally, all technically relevant investment alternatives (rehabilitation, purchase of new locomotives) have to be subjected to a detailed assessment of their profitability that takes various scenarios of how the transport services may develop into account. There should be no extensive investments in new objects unless their profitability – also taking risks into adequate account in the projected development of the transport volume – is higher than that of other relevant technical alternatives.

#### Legend

Developmentally successful: Ratings 1 to 3	
Rating 1	Very high or high degree of developmental effectiveness
Rating 2	Satisfactory developmental effectiveness
Rating 3	Overall sufficient degree of developmental effectiveness
Developmental failures: Ratings 4 to 6	
Rating 4	Overall slightly insufficient degree of developmental effectiveness
Rating 5	Clearly insufficient degree of developmental effectiveness
Rating 6	The project is a total failure

#### Criteria for the Evaluation of Project Success

The evaluation of the "developmental effectiveness" of a project and its classification during the ex-post evaluation into one of the various levels of success described in more detail below concentrate on the following fundamental questions:

- Are the **project objectives** reached to a sufficient degree (aspect of project **effectiveness**)?
- Does the project generate sufficient significant developmental effects (project **relevance** and **significance** measured by the achievement of the overall development-policy objective defined

beforehand and its effects in political, institutional, socio-economic and socio-cultural as well as ecological terms)?

- Are the **funds/expenses** that were and are being employed/incurred to reach the objectives **appropriate** and how can the project's microeconomic and macroeconomic impact be measured (aspect of **efficiency** of the project concept)?
- To the extent that undesired **(side) effects** occur, are these tolerable?

We do not treat **sustainability**, a key aspect to consider for project evaluation, as a separate category of evaluation but instead as a cross-cutting element of all four fundamental questions on project success. A project is sustainable if the project-executing agency and/or the target group are able to continue to use the project facilities that have been built for a period of time that is, overall, adequate in economic terms, or to carry on with the project activities on their own and generate positive results after the financial, organizational and/or technical support has come to an end.