

**Egypt: Replacement Parts for the General Overhaul and Further Maintenance of Thyssen-Henschel Locomotives owned by the Egyptian National Railway (ENR)**

**Ex-post evaluation**

<b>OECD sector</b>	21030	
<b>BMZ project ID</b>	1) Investment in fixed assets: 1992 66 149 (2) Complementary measure: 1992 70 240	
<b>Project-executing agency</b>	Egyptian National Railway (ENR)	
<b>Consultant</b>	DE Consult	
<b>Year of ex-post evaluation</b>	<b>2005</b>	
	<b>Project appraisal (planned)</b>	<b>Ex-post evaluation (actual)</b>
<b>Start of implementation</b>	(1) 1/1993 (2) 1/1993	(1) 9/1994 (2) 9/1994
<b>Period of implementation</b>	(1) 4 years (2) 4 years	(1) approx. 8 ½ years (2) 49 months
<b>Investment costs</b>	(1) EUR 27.8 million (2) EUR 2.1 million	(1) EUR 35.9 million (2) EUR 2.05 million
<b>Counterpart contribution</b>	(1) EUR 4.3 million (2) EUR ..... million	(1) EUR 13.9 million (2) EUR ..... million
<b>Financing, of which Financial Cooperation (FC) funds (in EUR)**</b>	(1) EUR 23.5 m FC/L* (2) CM I: €2.1 m FC/G* CM II: €2.6 m FC/G***	(1) EUR 22.0 m FC/L** (2) CM I: €2.1 m FC/G* CM II: €2.6 m FC/G***
<b>Other institutions/donors involved</b>		
<b>Performance rating</b>	4	
• <b>Significance / relevance</b>	5	
• <b>Effectiveness</b>	4	
• <b>Efficiency</b>	4	

\* Costs after breakdown of the project into two phases. They do not include those funds from Phase II that were not used. They comprised loan funds in the amount of EUR 22.5 million and a grant of EUR 1.2 million. They were successively reprogrammed during intergovernmental negotiations in 1999 and 2000. The original financing volume for the project proposed at the time of the project appraisal in June 1999 was EUR 46.0 million in the form of an FC loan and EUR 3.3 million in the form of a grant.

\*\* The reserves set aside for price increases and contingencies of EUR 1.5 million from the FC loan in Phase I were not needed and were also reprogrammed.

\*\*\* A final report on CM II was already included in the progress report dated May 26, 2000.

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

The project-executing agency is the state-owned Egyptian National Railways (ENR). At the time of the project appraisal (1992) the ENR was operating a total of 253 main-line locomotives of the type Thyssen Henschel (referred to hereinafter as 'Adtranz locomotives' due to the merger with Adtranz), the majority of which were financed through German Financial Cooperation (FC). It also had 305 GM (General Motors) locomotives. Insufficient maintenance over many years plus long overdue general overhauls had a serious impact on the availability of this fleet and, thus, on its transport capacity. Therefore, the project that was originally appraised comprised (1) the general overhaul of approx. 85 Adtranz locomotives and (2) the progressive implementation of all other maintenance work on these and on the other Adtranz locomotives. To ensure the significance and sustainability of these measures, the project financing was tied to conditions to ensure the simultaneous overhaul of the GM locomotives and to improve the overall conditions of the operation and maintenance of the locomotives. In 1993, the delay in the implementation of these conditions caused the project to be split up into two phases. It also led to the addition of a second complementary measure. Phase I, which provided for the general overhaul of 40 Adtranz locomotives and further maintenance of these and of the other Adtranz locomotives, was realized. Phase II was cancelled because the conditions were not fulfilled. The FC funds that had been earmarked for Phase II (EUR 22.5 million in the form of a loan, EUR 1.2 million in the form of a grant) were reprogrammed.

During the course of the breakdown of the project into two phases an overarching objective was also added (see also the 1994 progress report). After the breakdown, the project objectives were as follows:

Overall objective I (new, overarching overall objective): Improvement in the transport capacity of the ENR, especially in freight traffic. This overall objective applies to all FC projects with the ENR. No indicator was defined to measure the achievement of the overall objective.

Overall objective II (original overall objective): Sustained attainment of adequate availability of the Adtranz locomotives being operated by the ENR. This overall objective is considered achieved if the availability of these locomotives improves to at least 80% of the total fleet on average on a sustained basis (beyond the year 2000) (=indicator).

#### Project Objectives:

- (1) The proper realization of around 85 necessary general overhauls of Adtranz locomotives (main objective). The number of general overhauls performed serves as the indicator.
- (2) The proper performance of other maintenance work on these and on the remaining Adtranz locomotives (subsidiary project objective). Indicator: Availability of at least 80% of all Adtranz locomotives for at least 3 years from the end of the project.

The original overall objective (overall objective II) did not sufficiently justify the project in development-policy terms since its indicator was identical to the indicator of achievement of the project objective. The appraisal report already noted the efforts of the ENR to maintain its market share in passenger traffic (approx. 35%) and to increase its share of freight traffic

(approx. 7%). This was justified by the macroeconomic cost advantages of rail traffic compared to road traffic. The project was to ensure the needed availability of the locomotives. From this perspective, it was necessary and made sense to expand the goals later on by adding overall objective I. It is understandable that an explicit indicator was not defined (the ENR was expecting its freight transport to increase by 50% in 5 years) because achieving a significant rise in freight transport traffic would only have been possible in conjunction with additional projects, not all of which were certain. What is more, the project measures had to be justified even if the volume of traffic at that time was maintained. In view of the maintenance problems described above, the aspect of sustainability was rightfully given special emphasis in the definition of the objectives.

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

Experience gathered by FC during other projects in the same sector<sup>1</sup> had shown that significant and sustainable project success can only be expected if the project design explicitly takes the problems— mainly institutional and financial – of the ENR on the operating side into account. Its improper and incomplete maintenance of its locomotive fleet was due not only to deficiencies with respect to the existing workshop buildings and equipment, but also to the unfavorable conditions (state ownership) of the project-executing agency. Low state wages and salaries were accompanied by low labor productivity of the workshop personnel (insufficient working hours, poor motivation) and high management deficits (inadequate quality controls). The ENR's state-controlled tariffs led to an insufficient cost recovery ratio, followed by a notorious undersupply of spare parts (see also our final follow-up report dated June 5, 1998 for the project 'Spare Parts for Tabien Workshop'). These problems also impacted the fleet of GM locomotives, so that the planned FC measures to be applied solely to the Adtranz locomotives would not – on their own – have ensured the significance of the project. Therefore, the investment measures under the FC project (repairs and improvements at the locomotive workshops in Boulaq and Farz, delivery of the needed spare and replacement parts for the general overhauls, support for further maintenance of all Adtranz locomotives) were integrated into special project conditions and a separate implementation concept, which were meant to ensure the project's significance and sustainability.

Project conditions: during the project appraisal, disbursement of the FC funds was made subject to

- 1) provision of evidence of secured financing of a complementary project to carry out the needed general overhauls of the GM locomotives. The World Bank project, which was originally planned for this purpose, also provided for support measures to increase the cost recovery ratio of the ENR;
- 2) provision of evidence of a higher cost recovery ratio: coverage of at least 70% (project appraisal) or at least 68% (following the breakdown of the project into phases in 1993 in order to start Phase I) of the planned operating costs (incl. depreciation) via transport revenues. It was agreed that the cost recovery ratio was to be increased in the following years by 5 percentage points per year (Phase II).

In the year 1993, one year after the project appraisal, it became evident that the World Bank's financing of the complementary GM locomotive overhauls would be impossible to realize owing to a lack of agreement on the contractual covenants/conditions. At that time, however, there

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<sup>1</sup> Cf. in particular the projects 'Basic and Advanced Training of ENR Locomotive Maintenance Personnel – 8304' and 'Spare Parts for Tabien Workshop – 92 65 638'

was already founded hope that this project would be financed in some other way. For this reason the FC project was split into two phases, the first of which was exempted from condition (1). This not only prevented the continued degradation of the Adtranz locomotives, but it also limited the risk that a possible cancellation of the complementary project would affect the significance of the FC project to Phase I. Since condition (2) was fulfilled in fiscal year 1993/94 through tariff increases, the first phase began 1 ½ years later, in September 1994. In order to replace the measures defined for the World Bank project to further improve the cost recovery ratio of the ENR, in this phase a second complementary measure (CM II) was already added to the project (see 'Personnel Support' below). Phase II remained tied to the fulfilment of both conditions. Since the realization of the complementary project (condition 1) was a success but the successive improvement in the cost recovery ratio (condition 2) did not succeed, this phase was finally cancelled (in 1998) – with the corresponding consequences for the project's significance and effectiveness.

Today we can ask whether the cancellation of the World Bank's commitment – which had supported the FC conditions – should not have caused the entire FC project to be cancelled. In actuality, the relatively high share of FC in the ENR's investment budget suggested that the policy dialogue (fulfilment of FC condition 2) would succeed even without the support of the World Bank project. In addition, the project components that were already planned (investment measure, CM I) and also the new, supporting measure CM II that was added to fulfil the condition generated important synergies that had a positive impact on the other FC projects in the same sector. Accordingly, the overall objective set for CM II (to increase the transport capacity of the ENR, above all for freight traffic) also applied to the entire FC commitment in the sector. Against this background the phasing was an appropriate instrument for balancing the usefulness and risks of the project.

In actuality, even after Phase I began the Egyptian government agreed to further major tariff increases that pushed the cost recovery ratio in fiscal year 1994/95 up to an impressive 76%. Against the backdrop of the country's negative economic development, the government refused further tariff increases after 1995 to avoid placing more pressure on the poor population. Accordingly, the cost recovery ratio dropped back down to 63% by 1998/99 owing to inflation. Taking the maintenance deficits described in this evaluation into account, it even dipped as low as approx. 50%. The correct decision to cancel Phase II was confirmed by the further development of the earnings situation of the ENR in the past few years. Even though its cost coverage has since increased slightly to 72% (in fiscal year 2003/04), it remains far below 100%, the target it had set already for 1998.

Investment measures: Since the maintenance work was to be carried out at the ENR's existing workshops, the first steps were to repair and update these workshops (Boulaq and Farz). The 18 months that were planned for this step (until 3/1996) could not be adhered to because of extensive expansions of the repair works (above all at the Boulaq workshop). The cost overruns resulting from the additional work (EUR 16.0 million instead of EUR 5.6 million) were mostly financed by the ENR, whose counterpart contribution to the investment measure then rose from 13% to 36.5% (EUR 13.9 million). The local construction and delivery orders were awarded on the basis of tenders or after the collection of three bids. Equipment and tools that had to be imported were acquired via an international tender, as planned. The last installation works – for a cleaning system for motor parts that was financed out of remaining funds – were completed in January 2005. The completion of the project was delayed by a total of around 8 years. However, the locomotives began to be overhauled as early as the beginning of 1997. The overhauls were limited to the 40 locomotives included in Phase I and were completed within 17 months, according to the contract.

In order to find a long-term solution to the problem of the ENR's institutional inefficiency, the project provided for the transfer of the general overhauls and further locomotive maintenance to a company from the private sector. This partial privatization of ENR work was to be continued after completion of the project. Complementary measure I assisted the ENR with the elaboration of a corresponding concept (see 'Personnel Support' below), which compensated for the deficiencies of the project-executing agency as described above and produced the expected results, at least in the implementation phase. The locomotive manufacturer and supplier Adtranz, which was awarded the contract following an international tender, added a total of 120 ENR employees from the Boulaq and Farz workshops to its own staff and carried out the 40 general overhauls on schedule and properly. The needed spare and replacement parts for the locomotives were procured in coordination with Adtranz. The procurement procedure took the limited competition in this sector into account through price comparisons and price checks by the consultant (in the case of direct awards).

The intended continuation of this cooperation between the private enterprise and the ENR after the end of the project was not realized, however. The reasons for this were, firstly, the decision to cancel Phase II of the project and, secondly, the weak finances of the ENR, which was unable to ensure that replacement parts were available on time. CM II, which was added to the project to strengthen the ENR financially, proved to not be successful on a sustained basis (see below). It is characteristic of the ENR's limited scope for operational decision-making that it had – albeit unplanable – access to state investment funds to finance the considerable added costs of the workshop expansion. Despite this, however, it was unable financially to ensure that the spare and replacement parts needed for the operation of these workshops were available on time. Ultimately, the cancellation of the private-sector maintenance concept prevented the intended structural effect of the project, i.e. ensuring the prescribed maintenance work for the locomotive fleet on a sustained basis, from occurring.

#### Personnel Support:

Complementary measure I (adaptation of the maintenance work for locomotives): This cooperation with a private enterprise to perform maintenance work, which was new to the ENR, made it necessary to advise the ENR on the preparation (concept and tender of the work), implementation (monitoring) and acceptance of the work as well as on the planning and introduction of the internal administrative adjustments required by this maintenance concept. What is more, the ENR was to be assisted with the planning, award and implementation of the preparatory measures at the workshops in Boulaq and Farz, which were then to be used by the private enterprise. This complementary measure (CM I) was to be financed with a total of EUR 3.3 million in the form of an FC grant (over two phases). However, due to the cancellation of the second phase, only EUR 2.1 million of this amount were used, and EUR 1.2 million were reprogrammed. CM I ended when Phase I was completed in October 1998.

The direct award of the consulting services to DE Consult, which the project-executing agency already knew well, proved to be a good idea. Since this CM ensured the proper implementation of the investment component but did not bring about a continuation of the private-sector concept as expected, its success was only limited and – measured against its result – overdimensioned. However, the phasing of the CM did contribute to keeping the ratio of its cost to the investment costs (approx. 6%) at an appropriate level.

Complementary measure II (measures to improve the cost recovery ratio of the Egyptian National Railway): CM II, which was integrated into the FC project once the World Bank project fell through, aimed to ensure long-term financing for the new maintenance concept (including procurement of replacement parts). For details on this measure and its results we refer to the

final follow-up report from May 26, 2000. Ultimately, this CM did not achieve its goal (rating 5) and did not make a sustainable contribution to project success.

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

The project's main results were, firstly, the repair and modernization of the locomotive workshops Boulaq (for major maintenance work/general overhauls) and Farz (for minor maintenance work) and, secondly, the general overhaul of 40 Adtranz locomotives as well as the continued maintenance of these 40 plus other Adtranz locomotives in the ENR's fleet. Complementary measure I laid the organizational and administrative foundation for transferring key maintenance tasks to the private sector. Additionally, the qualification of the ENR personnel assigned under this concept improved significantly. As a result, the results expected from the investment measure of the first phase were achieved. Yet, as the new maintenance concept was not continued, the sustainability of these results is not guaranteed. What is more, Phase II of the project did not take place. Overall, we assess the achievement of the overall objectives and the project objectives as follows:

Project objective (1): Of the 85 general overhauls that were originally planned, only 40 were carried out owing to the cancellation of Phase II. Taking the lower volume of funds for Phase I into consideration, the project objective is considered achieved. In terms of project efficiency (adequate use of funds), the decision against further project measures incurring high sustainability risks was correct.

Project objective (2): At the time of the final follow-up (mid-2002), i.e. around 4 years after the last locomotive subject to a general overhaul resumed operation, the availability of the 40 locomotives that were subject to a general overhaul was far higher than the projected 80%. At this stage, however, it was already clear that this availability rate could not be achieved for the remaining Adtranz locomotives that were not subject to a general overhaul. In the meantime (as of November 2004) the availability of the entire fleet of Adtranz locomotives (including those on which a general overhaul was performed) decreased to 60% on average. Thus, project objective (2) of the project was not achieved and complementary measure I failed.

Overall objective I (increase in the transport capacity of the ENR, especially in freight traffic): Since introduction of the overall objective in fiscal year 1993/04, the annual transport capacity in the area of freight traffic – following an increase of approx. 10% in fiscal year 2003/04 – dropped back down to its original level of around 11.8 million. Thus, overall objective I of the project was not attained.

Overall objective II (sustained availability of at least 80% of the Adtranz locomotives operated by the ENR): As already mentioned above, this availability rate was not attained on a sustained basis. Thus, overall objective II missed its mark.

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

For the most part, the intended results of the individual project measures in Phase I were achieved. The annual kilometric performance of the Adtranz locomotives that were overhauled was very high at the time of the final follow-up, at 240,000 km. Initially the locomotives were used solely for passenger traffic, for which the km level is far higher. In the meantime, the kilometric performance has probably declined along with their availability. Insufficient fulfilment of the conditions regarding cost coverage led to maintenance deficiencies, as a result of which the overall availability of the Adtranz locomotives sank to a level that is no longer acceptable. We therefore rate the project's long-term effectiveness as slightly insufficient (**rating 4**).

The developmental relevance and significance expected for the project depended on the performance of all necessary general overhauls of GM and Adtranz locomotives as well as the proper continuation of major and minor maintenance work at the ENR's own responsibility. This was the only way to achieve overall objective I (increase in the transport capacity of the ENR). Although the complementary overhauls of the GM locomotives were carried out, the cancellation of Phase II of the FC project had a serious impact on the availability of the Adtranz fleet. Since the new maintenance concept was not continued on a sustained basis, the number of overhauls carried out after the project did not keep up with the requirements of the fleet. Both factors contributed to the current low level of availability. This was accompanied by unsatisfactory development of the transport services. It is to be expected that the ENR will continue to lose ground in competition with road transport. Thus, from today's perspective the significance and relevance of this project are clearly insufficient (**rating 5**).

The special project design (private-sector implementation concept, conditions to ensure significance and sustainability) aimed to make the project efficient. In addition, the split into two phases was to limit the risk of inefficient use of the FC funds. The success of this approach depended heavily on political support by the Egyptian partners and, from today's perspective, can be summarized as follows:

The production efficiency is considered achieved. The specific costs of the general overhauls of approx. EUR 0.5 million per locomotive were upheld and were thus far below the specific cost of purchasing new locomotives, as was typically the case in Egypt at that time (after 12-15 years of operation).

In terms of the allocation efficiency, however, the ENR is still unable to push through tariffs that cover the costs of operation. We rate the efficiency of the project as slightly insufficient overall (**rating 4**).

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

The project did not specifically aim for any gender-specific impacts, nor did it target environmental protection and resource conservation, direct poverty reduction or better governance. Thus, it has not had any corresponding impacts.

## **General Conclusions**

The project showed that FC, together with its projects and instruments, can take on a leading role in the sector dialogue. The related requirements to reform include the risk that in some cases, the negative sector conditions will not improve on a sustained basis. In such cases, to ensure efficient use of the FC funds a project should be split up into different phases and should even be cancelled if necessary, although this decision is always difficult to make. This even applies if the sustained success of other FC projects that have already been carried out in the same sector is also jeopardized. If, during implementation, it becomes apparent that key sector reforms cannot be performed, to be consistent all FC activities in that sector should cease, as in the case at hand.

## 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.