Egypt: Rehabilitation of Baharia Railway Line

Ex-post evaluation

OECD sector	21 / Transport and Storage	
BMZ project ID	1) Phase I - Physical investment: 1982 65 357 2) Phase II - Physical investment: 1989 66 699 3) Phase III – Complementary Measure: 1991 70 382	
Project-executing agency	Egyptian National Railways (ENR)	
Consultant	DE-Consult	
Year of ex-post evaluation	**2004**	
	Project appraisal (scheduled)	**Ex-post evaluation (actual)**
Start of implementation	(1) 2nd quarter 1985 (2) 4th quarter 1991 (3) 4th quarter 1991	(1) 4th quarter 1986 (2) 2nd quarter 1995 (3) 2nd quarter 1995
Period of implementation	(1) 2 years (2) 6 years (3) 6 years	(1) 5.5 years (2) 8.5 years (3) 8.5 years
Investment costs	(1) EUR 56.2 million (2) EUR 95.3 million (3) EUR 3.6 million	(1) EUR 26.6 million (2) EUR 75.3 million* (3) EUR 3.6 million
Counterpart contribution	(1) EUR 41.4 million (2) EUR 44.2 million	(1) EUR 11.8 million (2) EUR 24.2 million
Financing, of which FC amount (EUR)	(1) 11.0 / 3.8 million FC/FL (2) 46.0 / 5.1 million FC/FL (3) 3.6 million FC	(1) 11.0 / 3.8 million FC/FL (2) 46.0* / 5.1 million FC/FL (3) 3.6 million FC
Performance rating	4	
• Significance/relevance	5/2	
• Effectiveness	4	
• Efficiency	4	

* including the balance of EUR 1.4 million that was not used and was proposed for reprogramming

Brief Description, Overall Objective and Project Objectives with Indicators

The project comprises the rehabilitation of the Baharia Line, which connects the state-owned Heluan Steel Works in the south of Cairo with the iron ore deposits of the Baharia Oasis located around 350 kilometres south-west in the desert (Annex 2). Initially the project included only the rehabilitation of individual sections that were particularly run-down of around 113 kilometres in length (later termed Phase 1 of the project). The remaining sections were then renewed and a complementary measure was integrated in a Phase II.

Project objective: to restore the unrestricted operationality of the Baharia Line and to provide the necessary railroad conditions for the transport of the iron ore quantities mentioned in the overall objective from the Baharia deposit to the Heluan steelworks.
The target indicators of Phase 1 were the permanent, safe operation of the line at normal train speeds and the existence of all remaining conditions needed for the railroad to transport the ore quantities specified in the overall objective. An average speed of 50 km/h and less than six derailments per year were the targets for the completely renewed line section (Phase II). The indicators of Phase II were initially to be fulfilled from 1995 and then from 1998 after the planning was revised as a result of delays.

Overall objective: to supply the Heluan steelworks, which is operating economically efficiently, with up to 4 million tonnes of iron ore from the Baharia deposit per year.
Indicator: A volume of 2 million tonnes of iron ore per year was initially scheduled to be transported on the line by the year 1995, and this volume was to be increased to 4 million tons per year by 2000. After the plans to expand the steelworks were abandoned (see August 1997 progress review) the target figure for the freight volume to be reached from 1995 was reduced to 2.5 million tonnes of iron ore per year.

Achievement of project objective: Even though the entry into operation of Phase I was delayed by almost five years, it was possible to prevent the line from breaking down, which appeared imminent at the time of project appraisal, and to maintain the intended freight volume of 2 million tonnes per year throughout all of Phase I (start of implementation: 11/1986). The decline in the volume of freight on the line that began in the course of Phase II (start of implementation: 10/1991) did not express an insufficient achievement of project objectives but was due to the economic problems of the steelworks (see overall objective below). The maintenance of the line superstructure proved to be reliable. The intended average speed was achieved through the observance of the design speed of 65 km/h. Since completion of the line as a whole (end of 1998), there have been no more derailments and no more line closings because of sand drifts. Average travel times on the line fell from 32 hours at the time of our first project appraisal to around eight hours. On the other hand, the availability of rolling stock was at times significantly below target. Given the improved turnover times and the reduced freight volume, however, this deficiency did not represent a bottleneck at any time. Thus, the immediate project objective, which was to restore the railroad conditions for transporting the freight on this line, has so far been reached - if with a delay of several years.

There is a high risk, however, to the sustainability of the achievement of the project objectives, which was supported by the complementary measure of Phase II: while it is true that the technical conditions of the Baharia Line operation have improved, the economic conditions have not. The objective of achieving cost-covering revenues from ore transports ultimately could not be completely achieved. Insufficient tariffs and high payment arrears of the state-owned Egyptian Iron and Steel Co. (Hadisolb), which operates the Heluan steelworks, ultimately rob the Egyptian National Railways (ENR) of the financial means for ensuring long-term operation and maintenance of the line and of its rolling stock (see analysis of impacts, below). As if to aggravate the situation, this problem blocks the intended complete transfer of the commercial responsibility for the Baharia Line to the ENR: ENR, which so far has been acting as operator only, was to take over all of the line assets from its previous owner, the Ministry of Industry,

once the total line went into operation (FC covenant). This has not happened yet, with the consequence that the Baharia Line will continue without benefiting directly from other donor projects' support for ENR's freight transport, as had been expected at the time of the project appraisal for Phase II.

Achievement of the overall objective: After the freight volume had first risen to a peak of 3.05 million tonnes per year in the second half of the 1990s (1997/98), this volume then gradually fell to a low of 1.77 million tonnes a year (2000/01, see Annex 3). A temporary recovery in the year 2001/02 was followed by a consolidation to around 2 million tonnes in the 2002/03 business year. This medium-term decline in the freight volume is due to the sales problems of the only customer of the line, the Heluan steelworks. Given the continuing deterioration of the economic situation of the steelworks (see analysis of impacts), this trend is not likely to be reversed. Instead it must be expected that the project target (2.5 million tonnes per year) can no longer be durably reached in the future. For the Baharia Line, which was designed for an annual freight volume of 3.8 million tonnes, this means a capacity utilisation of only around 50% in the future.

At the appraisal of Phase II (1991) the economic efficiency of the processing of Baharia ore was again confirmed on the basis of relevant World Bank calculations in which, however, the capital costs remained unaccounted for under sunk-cost aspects. From a micro-economic aspect, the costs of the production of the Heluan steelworks (including capital costs) were below the CIF prices at the time (financial year 1987) - not least owing to the heavily subsidised energy costs and the low material cost estimates. In the 1990s the sector conditions of the Heluan steelworks and, with it, its financial situation worsened dramatically (see analysis of impacts below). Without fundamental restructuring measures the financial problems of the steelworks today pose a threat to its survival and thus constitute a further risk to the achievement of the objectives. Even assuming further operation of the existing plant – with subsidies - the economic efficiency of the project currently must be called into question.

In summary, the project objective has been achieved - if with high risks to sustainability. In the course of the implementation period of the project the overall objective was achieved at least over a certain period of time, but it must be called into question at least since the end of the 1990s, given the reduced freight volume and the declining economic efficiency of the steel production of the Heluan steelworks.

Project design / Major deviations from the original project planning and their main causes

As a result of design and construction flaws, above-average stress from heavy ore trains and impairments due to sand drifts the Baharia Line, which went into operation in 1973, suffered serious operating problems and a growing number of derailments already since the early 1980s. At project appraisal (PP) of Phase I (end of 1984) it had reached a state that threatened to disrupt this transport connection, which was important for the local steel production. The different levels of stress on the permanent way suggested a two-phase approach in which only the first phase was initially considered for an FC project. They contained the following measures:

Phase I (1986 -1992): This phase was to include the renewal of particularly degraded line sections in a total length of around 113 kilometres, the rehabilitation of a further 54 kilometres of permanent way with ballast and tamping machines and maintenance work on remaining line sections. The need for renewing the remaining permanent way (in a total length of around 235 km) within 10 years after completion of this first phase was already pointed out in the project appraisal report. Among other measures, it was recommended that the project-executing agency rehabilitate the already broken down signalling equipment and telecommunications

installations itself and that it conclude a consultant contract on the final design and supervision of construction of the ensuing renewal work on the remaining line sections already in the course of implementation of this first phase.

The scope of this project could not be fully implemented. Among other things, the repair of the telecommunications and signalling equipment turned out to be economically inefficient. The poor condition of the permanent way did not permit a rehabilitation with ballast and tamping machines, so that only more basic maintenance measures could be carried out on the line sections (54 km) on which these machines were to be used. While this reduced the total cost of the first phase this factor and the unexpected speed at which the remaining line was being worn out required the remaining line sections to be rehabilitated earlier than planned (from 1992 instead of 1997). As expected, the German side was requested to provide co-financing for this second phase as well. It was appraised by KfW in June 1991 and proposed for financing. The causes for the accelerated degradation of the line were mostly sand drifts and faulty maintenance on the ore wagons.

The start of implementation of the construction phase was delayed by around two years (see final inspection report of December 2002). The project-executing agency was scheduled to make considerable material and organizational contributions for the construction work itself, particularly in the form of procurement and transports of materials. Owing to negative experience gathered in other projects of this sector KfW had required the project-executing agency, ENR, to make these contributions ahead of the award of the contract for the construction works. It became apparent already during the planning phase that the ENR's budget was overstrained from the procurement of rail ties and rail fastenings. Accordingly, the FC funds were increased from EUR 6.4 million (DEM 12.5 million) to EUR 11 million (DEM 21.5 million) and complemented by a commercial loan of EUR 3.8 million (DEM 7.5 million) (see our progress report of May 6, 1988). The supply of rails and gravel by the project-executing agency was also delayed, so that the implementation phase could not be concluded until April 1992, that is, with a delay of 5 ½ years.

Phase II (1995 – 2003): In addition to the renewal of the remaining 232 km of line, the measures to prevent sand drifts studied under Phase I, the installation of new signalling and telecommunications equipment and the procurement of spare parts and workshop equipment for the maintenance of the ore wagons were integrated into this Phase II. In this phase the transfer of the financial responsibility for the Baharia Line to ENR was agreed in order to counteract the imminent project risks. For this purpose KfW committed the Borrower to coordinate a corresponding schedule of measures with the participating parties and implement them not later than by the time the fully renewed line was taken into operation. Furthermore, a complementary measure was introduced into the project that contained technical training components as well as measures to improve the management of the line and introduce cost-oriented transport tariffs (see below).

The line sections to be renewed in this phase were completed at the end of 1998, after a delay of four years. The final acceptance of the installation of radio-based signalling and telecommunications equipment did not take place until December 2003 because of the delay in the assignment of the radio frequency by the Egyptian authorities as well as initial technical problems. The installations are to be maintained by the supplier through a prolongation of the existing maintenance contract for a further three years (see below). This extension and the necessary spare parts procurement are to be financed from the balance of the FC Loan (around EUR 1.6 million). The project-executing agency is interested in a prolongation of the short-term consultant assignments (Deconsult) to supervise these measures. The balance of EUR 1.4 million then remaining is to be reprogrammed and the loan agreement reduced accordingly.

On the basis of the experiences of Phase I the following complementary measures were added to the project:

1) A maintenance service for the new signalling and telecommunications installations
2) Training measures to improve the maintenance on the ore wagons
3) Support measures to improve the accounting for the ore transports on this line
4) Introduction of a profit centre organisation for the transports on the Baharia Line

To (1) The maintenance service for the telecommunications and signalling installations was created as the installations were being installed. The ENR personnel were given the necessary knowledge of the technology which they needed for the instruction to be provided by the supplier (Siemens). Trained ENR engineers, although in insufficient number, participated in the subsequent maintenance work carried out by Siemens, which was covered by a two-year maintenance contract (up to the end of 2003). Given that ENR was scheduled to take over the maintenance on its own responsibility at a later stage, KfW recommended on the occasion of its final inspection that the project-executing agency have its personnel participate more strongly in the Siemens activities. Their instruction could be continued in the course of the scheduled three-year prolongation of the maintenance contract (up to the end of 2006).

To (2) The training measures to improve maintenance on the ore wagons were successful. In connection with the spare parts supplies financed under FC, the availability of the wagons could be improved temporarily to 85% (target: 80%). The subsequent decline of this availability to 55% was due to a high wear of the wagon wheels. New wheels were procured from own resources, halting this worrying trend in the year 2003, again improving availability to 75% (300 wagons). The temporary unavailability did not hamper ongoing operations because of the shorter turnover times and the reduced freight volumes. The same applies to the reduced number of locomotives available for ore transports. It fell from an initial 29 to 16 locomotives, which in principle is sufficient for the current freight volume, however. The necessary general overhaul of 10 of these locomotives, however, had to be supported with around EUR 2 million from the balance of the project funds for four locomotives. It is to be expected that external donor aid will continue to be necessary to ensure a durably satisfactory availability rate of rolling stock in the future as well.

To (3) and (4) Owing to the unfavourable sector conditions the ENR generally could not be expected to earn cost-covering tariffs in its freight transport, as they were sought by the World Bank at the time of our appraisal of Phase II. Actually, ENR's rate of cost recovery, which was just under 80% of running costs (without interest) at the time of appraisal of Phase 2, fell to nearly 60% in the 1990s (without earnings from other operations) because the approval of necessary tariff adjustments was denied. If maintenance expenses that were necessary for operation but neglected for lack of funds are included, this rate was sometimes only as little as 50%. Despite a "strategy plan" presented in 1999 and the measures introduced since then the ENR was not able to achieve any significant improvement of its results in recent years either (2000/1 – 2002/3).

Given these circumstances KfW had already considered the complementary measures mentioned under (3) and (4) on the occasion of the appraisal of Phase II. Their purpose was to strengthen the organisational and financial independence of the Baharia Line and, in addition to the transfer of its assets to ENR, they were based on the enforcement of the existing right to pass the costs which ENR incurred from its ore transports in full to the Heluan steelworks. The support given to the cost accounting for the Baharia Line (Part 3) served the purpose of determining corresponding, cost oriented tariffs. The introduction of a profit centre organisation (Part 4) was designed to combine the responsibilities for the Baharia Line that were distributed

over several departments under a single management and to establish adequate financial autonomy for this centre against the loss-making ENR.

The above organisational form was introduced (Annex 4), but a financial basis for its efficient operation could not be created because the cost-oriented tariffs of EGP 27/to – 33/tonne which were determined under the complementary measure could not be enforced for lack of operational profitability of the offtaker (see below). The tariff of EGP 25,-/to which was agreed at the end of 2002 after a delay of several years is only insignificantly higher than the previous tariff (EGP 24.-/tonne). On the other hand, the also agreed monthly payment of the total amount invoiced is likely to improve the liquidity situation of the Baharia Line, to the extent it can be sustained over a longer period of time. To date the latter has suffered particularly under the high payment arrears of Hadisolb, which, with reference to its economic situation, for years made only part payments of approximately one third of the amounts due. The remaining payments were negotiated over several years. Against this background the ENR itself so far has also failed to consistently go ahead with the transfer of the assets of the line.

Key Results of the Impact Analysis and Performance Rating

At the time of the appraisal of Phase I (1984) the economic efficiency of the steel production of the Heluan steel works was based on the foreign-exchange savings achieved from the utilisation of local iron ore against imported ore. The developmental significance of the project resulted from the role of the Heluan Steel Works as the country's largest steel producer, which was covering approximately 56% of its ore needs from local production and employed at 24,000 people at the time. The 1.3 million tonnes of installed production capacity of the Heluan Steel Works was arithmetically sufficient to cover around 80% of local demand. Despite the low iron content of the Baharia deposit the economic cost of steel production was significantly lower than the cost of alternative imports, which not only justified the rehabilitation of the Baharia Line but also the rehabilitation of the steelworks (supported by the World Bank and FC), which was producing only 0.5 million tonnes per year at the time (1980). Besides, the capacity of the Heluan Steelworks was to be expanded to accommodate 4.0 million tons of iron ore per year from 2000.

The expansion of private national production capacities which set in in 1986 (particularly the joint venture "Alexandria National Iron and Steel"– ANSDK) and the liberalisation of foreign trade encouraged by the World Bank and the IMF worsened the economic conditions for state-run steel production in a decisive manner. The Heluan Steelworks was exposed to competitive pressure which it was unable to withstand because of its obsolete technologies, severe overstaffing and, accordingly, low productivity. Decision-makers responded to this by abandoning the above expansion plans, so that KfW lowered its indicator for the achievement of the overall objective to a freight volume of 2.5 million tonnes per year on the occasion of its August 1997 progress review. The growing sales problems of the steelworks were accompanied by further reductions in steel production which led to a durable reduction of the freight volume of the Baharia Line to below its new target value from 1998.

Egypt's steel supply, which in the meantime has increased to 5.9 million tonnes per year (2002) is now around 95% produced by the private sector, while the state sector contributes only about 5% to local production. The Heluan Steelworks now covers only around 1% of the total local demand for profiles and roughly one third of the significantly lower demand for steel sheets. Restoring the competitiveness of the Heluan steelworks would require changes in production and considerable investment. The political decision on preserving the steelworks - with or without investment - is still pending, but the government has reiterated its will to do so with a view to the more than 20,000 employees still remaining at the steelworks. Even if the

investments were to be carried out (with private sector participation, if appropriate) it will likely take several years before production picks up and, hence, the freight volume on the Baharia Line increases again.

On the whole, the chosen project conception was fraught with considerable risks which, however, were known and deliberately accepted because of the significance of the Heluan Steelworks at the time, the looming breakdown of its transport connection and the lack of appropriate alternatives. From today's perspective, the greatest risks were in the economic and commercial efficiency of the steelworks, on which the economic justification as well as the commercial viability and, thus, the sustainability of the project depended. Today the financial problems of the Heluan Steelworks are threatening the survival of the works itself and, thereby, the sustainable achievement of the overall objective (economically efficient processing of local iron ore resources). These problems are also affecting the upstream Baharia Line in the form of payment arrears, insufficient tariffs and under-utilised freight capacities. This way they jeopardise the sustainable achievement of the pogramme objective (the unrestricted operationality of the Baharia Line - even if the steelworks were to continue operating on subsidies.

In summary, in the course of its two implementing phases, which already served to achieve the project objective and the overall objective, the project initially had a satisfactory effectiveness, developmental relevance and significance. The developmental relevance is generally still given (foreign currency savings through the use of local raw materials obtained at low prices). However, from the present viewpoint the sector conditions (loss of market share) of the downstream steelworks have brought about insufficient project significance and called its effectiveness into question. Given the above imponderables regarding the remaining utilisation of the physical investments, it does not appear to be helpful to evaluate the overall economic efficiency of the project on the basis of a comparison between the economic benefits thus far achieved and yet to be expected (foreign currency savings) and past and future costs (of extracting and transporting iron ore from Baharia). Since the risks to sustainability are currently very high and the effectiveness and significance of the project in the meantime has diminished noticeably, however, we assume that its developmental effectiveness is no longer sufficient and therefore assign the project to **category 4**.

The project itself produces no additional environmental damage, but the downstream steel production of the Heluan Steelworks, which is based on obsolete technology, is likely to emit comparatively high pollution. It has no immediate impacts on poverty and no gender-specific impacts.

General Conclusions applicable to other Projects

The project draws its developmental justification from the soundness of promoting the downstream steel industry. In this sense the largely negative experience which German FC has acquired with investment projects in Egypt's state-owned industry sector can also be applied to the project in question.

In addition, the project confirms the insight gained in other FC projects in the same sector that the unfavourable conditions of Egypt's railroad operations harbour unacceptably high risks to sustainability. Already since the end of the 1990s German Financial Cooperation drew the conclusion of withdrawing from the railroad sector and reprogramming funds already committed to other projects of this sector.

Legend

Developmentally successful: Ratings 1 to 3	
Rating 1	Very high or high degree of developmental effectiveness
Rating 2	Satisfactory degree of 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 a project's "developmental effectiveness" and its classification during the final 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 conception)?
- 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.