

**India: Modernisation of Rourkela Steel Plant**

**Ex post evaluation report**

<b>OECD sector</b>	32169 / Base metal industry	
BMZ project ID	1) BMZ Nr. 1989 65 436 (physical investment) 2) BMZ Nr. 1993 110 (personell support)	
<b>Project Executing Agency</b>	1+2) Rourkela Steel Plant (RSP)	
Consultant	1) M.N. Dastur & Company Ltd. Calcutta 2) British Steel Consultants (heute CORUS)	
Year of ex post evaluation	<b>2006</b>	
	<b>Project appraisal (planned)*</b>	Ex post evaluation (ac- tual)
Start of implementation	1) 07/1992 2)	1) 12/1992 2) 06/1995
Period of implementation	1) 66 months 2)	1) 88 months 2) 69 months
<b>Total Cost</b>	1) EUR 1,183.64 million 2)	1) EUR 994.49 million 2) EUR 5.99 million
Counterpart contribution	1) EUR 1,050.70 million 2)	1) EUR 851.29 million 2) EUR 1.57 million
<b>Financing, of which FC amount</b>	EUR 132.94 million** 2)	EUR 143.20 million** 2) EUR 4.42 million
Other institutions/donors involved	None	None
<b>Performance rating</b>	<b>3</b>	
• <b>Significance/relevance</b>	3	
• <b>Effectiveness</b>	2	
• <b>Efficiency</b>	2	

\* Supplementary appraisal report

\*\* Mixed financing: At project appraisal FC loan of EUR66.47 million, commercial loan of EUR 66.47 million; at ex post evaluation FC loan of EUR76.74 million, commercial loan of EUR66.43 million

**Brief description, overall objective and project objectives with indicators**

The project comprised the cofinancing of the German portion of supplies and services for the modernisation and expansion of the integrated steel plant Rourkela (Rourkela Steel Plant; RSP), which had been built between 1957 and 1970. The complementary measure was designed to support the operating and maintenance staff in the areas of technology and management in order to reinforce the competitiveness of RSP.

At the time the project was appraised, the overall objective was to overcome the shortage of steel on the Indian market which, it was feared, would reduce the country's economic growth. This shortage was caused by a lack of national production capacities and a chronic shortage of foreign exchange at the time of the appraisal, which meant that steel imports could not be financed.

The main objective of the project was adequate utilisation of the modernised equipment of the RSP. The indicators defined for this at the time of the appraisal were steel production (1.67 million tonnes) and the sale of sheet steel (1.4 million tonnes).

In retrospect, the project addresses a bottleneck that is no longer crucial to India's economic development as the overall conditions have changed as follows since the appraisal: (a) since the liberalisation of the steel market, ever more private steel producers have entered the market. Raw steel production capacities have doubled to around 35.000.000 tonnes per year since the appraisal. (b) India has developed from a steel importer to a steel exporter. (c) Comfortable foreign currency reserves of around 114 billion US dollars enable India to import steel without having to fear any significant exchange rate changes. In summary, an insufficient supply of raw steel and sheet steel products no longer represents a relevant bottleneck to the country's development. Nevertheless, from today's point of view the project would still be justifiable developmentally if the measures have succeeded in bringing about a more efficient production capacity utilisation at the RSP and if the project contributes to India's economic growth by improving the competitiveness of the steel plant (new overall objective) under the developmentally important secondary condition of safeguarding a considerable number of industrial jobs.

#### **Project design / major deviations from the original project planning and their main causes**

The extensive repair and modernisation programme at the RSP was conducted in various stages. The modernisation measures co-financed from FC funds were preceded by several other measures. The following measures were implemented in accordance with the planned design: (Stage 1) survival scheme of 1988 to 1990, which essentially contained major repairs in important areas (coke plant, sintering equipment, blast furnaces, existing Steel Plant I) of the RSP. (Stage 2) first modernisation stage (Phase 1) of 1990 to 1994 in which measures were implemented to improve the supply of raw material, raw iron production and infrastructure. (Stage 3) second modernisation stage (Phase 2) of 1992 to 1997 in which the large-scale investments for the new construction of the sintering plant II, the steel plant II and the continuous casting routes I and II, financed by KfW, and the rehabilitation of the hot strip mill and the large plate mill were implemented. German Financial Cooperation supported only the German supplies delivered under Phase II and, thus, very largely the investments made in the steel plant II.

The FC-financed measures were essentially implemented as planned at the time of appraisal. However, the implementation period was longer than planned, primarily as a result of the considerable complexity of modernising an ongoing operation, and owing to problems with the local suppliers.

In 1994 it was agreed that a comprehensive basic and advanced training measure should be implemented to qualify the management, operating and maintenance staff of the RSP. The training measure was implemented in accordance with the implementation proposal and contributed significantly to eliminating deficits in the qualifications, particularly among maintenance personnel.

### **Key results of the impact analysis and performance rating**

As a result of the project measures, the raw steel production capacity of the RSP rose to 1.83 million tonnes per annum. Until 2000, the year of the final inspection of the project, the investment and modernisation measures had not yet impacted the steel production and the financial situation of the RSP. Driven by the improving situation on the world steel markets, however, the production of raw steel increased significantly since the final inspection. Within the overall programme of the RSP, the modernisation measures and the training measure financed from FC as well as the commercial loan extended to the steel plant made an important contribution to this improvement. Operations improved as the availability of blast furnace increased significantly and steelworks operations improved continuously, particularly in steel plant two, in the areas of the continuous casting plant (98% yield and rising), the hot strip mill (total capacity utilisation since 2000 has risen by around 10% to 73%), and the large plate mill (capacity utilisation since 2001 has risen by around 20% to a total of 75%). Progress was also made in conserving energy. Total energy consumption was reduced from 10.6 Gcal/t of raw steel (1999/2000) to 8.55 Gcal/t of raw steel (2004/2005), which had a positive impact on profitability. Productivity in relation to total employees increased from 42 tonnes per employee per year (final inspection) to 70 tonnes per employee per year (2004/2005). In structural terms (parallel units and the diversity of the units for the production of final products), however, the RSP will not reach the productivity of modern integrated large steel plants in the future either. The modernisation measures have significantly reduced the overall dust emissions of the RSP. Waste water quality has improved and freshwater consumption has dropped noticeably thanks to increasing recirculation. We consider the environmental impact of the operation of the steel plant to be acceptable. With the exception of the coking plant, the plant essentially meets Indian emission standards.

The project made a tangible contribution to improving the operation of RSP as a whole, which was illustrated by the high internal and economic rate of return of 11.86% and 11.67%, respectively. The RSP is also expected to perform well in the liberalised Indian steel market. The overall objective can be considered as having been achieved. Steel production at the RSP rose from 1.19 million tonnes per year in 1999/2000 to 1.6 million tonnes in 2004/2005. Capacity utilisation is currently at 87.4% (76% at project appraisal). According to the production statistics which have been submitted to us, the steel plant is likely to have surpassed the production target of 1.67 million tonnes considerably in 2005/2006. At 1.56 million tonnes the sale of flat steel already exceeded the target indicator of 1.4 million tonnes in 2004/2005. The main project objective has been fulfilled.

Given the highly qualified and motivated personnel, the high capacity utilisation of the plant and machinery and the good financial position of RSP we believe the steel plant meets the preconditions for sustainable operation of the production facilities. Numerous measures implemented in the area of preventive maintenance have significantly increased the availability of the plant. The staff are well trained and have extensive operating experience. Expenditure on maintenance, upkeep and repairs amounted to around Rp 2.9 billion (around EUR 55 million) in 2004/2005. This represents 9% of the overall costs, which we consider reasonable. No substantial technical or operational risks to sustainable operation of the steel works can be identified.

In an incremental analysis "with and without the project", the modernisation measures have led to a good internal rate of return of 11.86%. However, this evaluation credits returns to the project in the form of avoided investment and operating expenses against the situation without the project which do not directly affect payments. The profitability analysis performed at the appraisal of the project should be complemented by a solvency analysis for the RSP as a whole. In a simplified approach, applying the cashflow generated in the basic variant to the overall investment volume yields an internal rate of return of around 6%, which we consider satisfactory. Variations in future steel prices will considerably affect this rate of return. Assuming a 100%

capacity utilisation and a 10% decline in sales prices against their long-term average real-term value, the cash-flow related rate of return will drop to around 4%.

The modernisation improved the profitability of RSP and, thus, safeguarded the production location of Rourkela. RSP is by far the most important employer in a radius of around 150 km. Average per capita income in the district of Sundargarh, in which Rourkela is located, is around one third higher than that of Orissa state overall. The poverty rate in the district of Sundargarh declined from 78% in 1983 to 36% in 2000. The steel plant has contributed decisively to the positive development of the region. Around 1000 industrial enterprises are currently registered in and around Rourkela. Besides, numerous trade companies have settled which benefit directly from RSP. The supplier industry alone creates approximately 2 million workdays of employment, even for low-skilled workers. In the last five years RSP has awarded contracts in an average amount of around Rs 500 million per year (around EUR10 million) to small local enterprises. The improved employment opportunities in the immediate vicinity of Rourkela also benefited the hinterland.

When the project was appraised it was expected to pose a considerable strain on the environment, but the measures that have been implemented have brought about considerable improvements. With the exception of the coking plant, the Indian environmental standards are being mostly complied with. The project does not have the potential to improve gender equality. No such impacts have been identified. It was not aimed at improving governance and participation. Being a typical industrial project, its impacts in the area of poverty reduction must be seen primarily in the general effects on economic growth.

In summary, we assess the developmental efficacy of the project as follows.

The project objectives of achieving raw steel production of 1.67 million tonnes per annum (2004/2005: 1.6 million tonnes) and an annual sales volume of 1.4 million tonnes of flat steel products (2004/2005: 1.56 million tonnes) were generally achieved and are expected to be exceeded significantly in the ongoing business year. Capacity utilisation was noticeably higher than expected at the time of project appraisal. The secondary objectives of production increase, lower pollution levels and energy consumption per tonne of raw steel have been met. The steel plant was modernised for the future and its location thereby secured for sustainable operation. The sustainability of the implemented measures appears to be ensured over their economic and technical lifetime. The risk of insufficient plant utilisation is low. The risks to sustainable operation are low (good technical management, good financial position, professional preventive maintenance and upkeep). Overall, we rate the effectiveness of the project measures as satisfactory (**sub-rating 2**).

The original overall objective of preventing steel supply bottlenecks for the Indian market as a consequence of insufficient domestic production and the impossibility of importing steel due to the chronic lack of foreign exchange, which gave rise to fears of reduced economic growth, no longer exists. The developmental impacts therefore must be evaluated on the basis of the changed overall objectives. With regard to the relevance of the project, the assumption that technically and economically appropriate utilisation of the financed steel production capacities contributes to enhancing economic growth, provided it occurs under competitive conditions, is generally plausible. With regard to the significance of the project it can be assumed that the contribution to the modernisation of the RSP was justified given the internal and overall economic rates of return that have been achieved. The considerable regional employment impacts, which make a positive contribution to the economic development of the district of Sundargarh, must also be rated positive. Indirect employment impacts in downstream industries have also been achieved, although they cannot be quantified precisely without undue effort. The significance of the project was reduced by the fact that the capacity effects achieved ultimately were not very important to India's steel production after the liberalisation of the steel market and in

view of the improving situation of the steel sector. In the meantime, private enterprises have greatly expanded their capacities in the liberalised steel market. The capacities created under the project initially were not sufficiently used, which demonstrates that it did not make a significant contribution at the start of this liberalisation. Overall, we evaluate the overall relevance/significance of the project as sufficient (**sub rating: 3**).

The project essentially contributed to improving productivity. At the same time, it has reduced energy consumption per tonne of raw steel and pollution. The desired effects, however, did not set in until a few years after completion of the project. The investment costs of the measures that were put in place are acceptable (production efficiency). The internal rate of return of RSP overall responds comparatively sensitively to changes in the steel price and is noticeably lower than that of the project, which achieves a good internal and economic rate of return. Given the healthy state of the steel sector there is nothing to suggest that the price of steel will fall noticeably in the foreseeable future. Overall, we rate the efficiency of the projects as satisfactory (**sub-rating 2**).

Having weighed these individual criteria, we rate the developmental efficacy of the project as being sufficient overall, as we attach particularly high importance to the criterion of significance/relevance in this case.

**General conclusions and recommendations**

For projects in which the sector conditions change fundamentally during implementation, calling into question the original developmental rationale, it should be examined critically whether their continuation can be endorsed under an alternative but still developmentally convincing system of targets and objectives.

As a result of the mostly negative experience gathered in the past, German FC has not financed any state-owned industrial projects for quite some time. Irrespective of the positive evaluation of this project the direct support of state-owned industrial enterprises is questionable from the aspect of regulatory policy, as discrimination of private suppliers, market distortions and an inefficient factor allocation with resulting economic efficiency losses cannot be ruled out.

**Assessment criteria**

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

**Criteria for the Evaluation of Project Success**

The evaluation of the "developmental efficacy" 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 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, organisational and/or technical support has come to an end.