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FINANCIAL PROBLEMS AND THE DEVELOPMENT OF THE IRON AND STEEL INDUSTRY*

Prepared by the UNIDO Secretariat

* This document has been translated from an unedited original.

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PREFACE

This document has been prepared by the UNIDO Secretariat to describe the financial problems facing the iron and steel industry and, in particular, the impact of the financial crisis on the establishment of new production capacities in the developing countries. Against this background, an analysis has been made of the various sources of finance and their share in the development of the iron and steel industry in developing countries.

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1. INTRODUCTION

Achievement of the Lima targets is clearly bound up with questions of finance. The very first evaluations gave orders of magnitude which indicated the scope of the problem: the total investment for the period from 1980 to 2000 which could permit the developing countries to account for a quarter of world industrial production required financial resources of the order of $40 to 60 billion per annum between 1980 and 1990 - and between $120 and 140 billion per annum between 1990 and 2000. Some $400 billion would have to be invested in the iron and steel sector from 1976 to the year 2000.

At the beginning of the 1980s, the extent of new iron and steel projects in progress and being launched in the developing countries indicated a rapid increase in production capacity of the iron and steel industry in those countries. The scenarios proposed by UNIDO in 1982 1/ had evaluated the new capacities likely to come into production between 1980-1982 and 1990 at 63 million tons (conservative hypothesis). However, the world economic crisis, which has affected the demand for iron and steel products, and, particularly, the financial constraints imposed on developing countries have caused new iron and steel projects in those countries to be delayed, frozen or cancelled. The result is an increase in production capacity of only 39.7 million tons, that is to say 35.8 per cent less than expected. This substantial reduction will produce a deficit of about 30 million tons in 1990 in the developing countries and approximately 45 million tons if we include the People's Republic of China and the Democratic People's Republic of Korea.

2. FINANCING PROBLEMS: CONSTRAINTS AND OPENINGS

The financial constraint is not the only factor responsible for the delay, freezing or cancellation of projects and its relative importance must be examined. The financial constraint is linked to a more general situation of indebtedness affecting all new investment. However, in a general context of penury, it is important to identify the areas for which the mobilization of suitable financing is likely to produce higher yields more quickly.

2.1 The weight of the financial constraint can be identified in the case of:

- Projects in progress;
- Projects in respect of which implementation has been halted;
- Projects that have been frozen or abandoned before implementation.

2.1.1 Projects in progress

Examination of these projects reveals the important factors which have played a part in the evolution of these projects.

(a) Projects implemented as planned

CHINA STEEL CORPORATION (Taiwan Province)
KWANG-YANG (Republic of Korea)
POSCO extension (Republic of Korea)
KRAKATAU STEEL (Indonesia: cold rolling mill)
DEKHEILA (Egypt: slight delay)

1/ UNIDO "1990 Scenarios for the Iron and Steel Industry" ID/WG.374/2, 24 June 1982.

(b) Projects whose implementation is delayed

IRAN IRAQ	) political factors) in the region
COSIPA (Brazil) CSN (Brazil) MISURATA (Libya)	) delay of less than) two years, owing (partly)) to payment problems
PROJECTS (People's Republic of China)	) delays owing both to problems) of availability of foreign) exchange and also to inadequacy) of infrastructures
BELLARA (Algeria)	) delay owing both to the slowing) down of demand and to the delay) in construction of infrastructure
BHILAI (India) BOKARO (India) VIZAKAPATNAM (India)	) very serious delays owing to) equipment supply and to) financial constraints
ACOMINAS (Brazil)	) delay owing to financial constraints
DELTA STEEL (Nigeria) AJAOKUTA (Nigeria)	) delay owing to financial constraints) (connected, amongst other things, to) the construction of infrastructure)

2.1.2 Projects whose implementation has been halted

TIKA (Zambia)	) stoppage owing to design problems
SOMISA (Argentina)	) construction of the plate rolling) mill halted because of the drop in demand) and because of financial constraints
HYLSA extension (Mexico)	) stoppage owing to the indebtedness of the) group controlling HYLSA (Alfa)
SICARTSA II (Mexico)	) stoppage owing to financial constraints

2.1.3 Projects frozen or abandoned before implementation

(a) In Africa south of the Sahara, the financial constraint is often the decisive factor in the freezing or cancellation of expansion projects or projects to build new capacities: Senegal, Mali, Liberia, Ghana, Côte d'Ivoire, Cameroon, Gabon, Congo, Angola, Mozambique, Tanzania, Uganda and Kenya. The modernization plan is also ready in Zimbabwe, but its implementation poses an unresolved financing problem.

(b) In North Africa and the Middle East, the freezing or cancellation of most projects is connected with the reduction in envisaged outlets, particularly in the Gulf countries (Qatar and United Arab Emirates). However, in Morocco, the delay in the second phase of the NADOR project is connected with uncertainty regarding

markets, as well as the financial constraint. In Tunisia, where current demand already far outstrips the available production capacities, the delay in implementing expansions is due to the financial constraint.

(c) In Asia, the freezing and cancellation of projects is also the result of the financial constraint.

PAKISTAN	2nd phase of PIPRI
INDIA	) PARADIP projects) VIJAYANACAR projects) TATA expansion projects
BANGLADESH	CHITTAGONG expansion
THAILAND	Integrated project
PHILIPPINES	Integrated project
INDONESIA	) Second integrated project) pending Japanese financing
VIET NAM	) Reconstruction and expansion) of the iron and steel unit

(d) In Latin America, the freezing and cancellation of projects are the result of the reduced demand prospects, but also - and above all - of the financial constraint.

ARGENTINA (SOMISA expansion and SIDINSA)	)
VENEZUELA (ZULIA-ACELCAR)	) The reduction in demand prospects) is the main factor
CHILE	)
BOLIVIA	)
PERU (expansions)	)
COLOMBIA (PAZ DEL RIO expansion and new projects)	) The financial constraint) is the decisive factor
ECUADOR	)
URUGUAY	)
NICARAGUA	)
HONDURAS	)

BRAZIL and MEXICO are particularly important examples because they allow us to measure the future effects of the impact of the financial constraint. Given the absence of new projects in these two countries, production recovery (under way in Brazil) will be reflected:

- In Mexico, by a rapid rise in imports;

- In Brazil, either by a rapid reduction in exports or by a sustained level of exports offset by an increase in imports.

As far as COLOMBIA is concerned, it currently has to import over 50 per cent of its steel consumption, although this steel consumption is still less than 40 kg per inhabitant.

The situation is also a matter of concern in INDIA, where the State budget (1985-1986) for the iron and steel industry has just been cut by one third, from 14.3 billion rupees in 1984-1985 to 9.25 billion rupees. This should be reflected by an aggravation of the already existing delay in supply, compared with national demand, for iron and steel products over the coming years.

	1985-1986	2000
National supply	10.1	17.0
National demand	11.5	22.0

The financial constraint, which is bringing about a review and general reassessment of the projects, is therefore liable to jeopardize the future of the iron and steel industry in many developing countries.

3. EXAMINATION OF IRON AND STEEL PROJECTS IN PROGRESS, FROZEN OR CANCELLED SINCE THE MID 1970s

3.1 Africa south of the Sahara

Africa South of the Sahara is the area of the world where there is the least establishment of iron and steel industry. The iron and steel projects launched, studied, frozen or cancelled in this region are the following:

Senegal

Project for a mini iron and steel plant studied by DASTUR in 1980-1981: capacity 36,000 to 45,000 tons/year for a cost of about US$40 to 45 million (electric melting furnace and bar mills). The project is currently frozen: project too expensive considering the general slowing down of economic activity.

Mali

A feasibility study was instituted by Société Malienne de Sidérurgie on an iron and steel unit with a capacity of 30,000 tons/year based on a reduction furnace for local ore (Krupp process) in conjunction with the construction of the Manantali dam. The project has apparently been suspended.

Liberia

A pre-feasibility study had been requested from the Indian company MECON regarding a unit of about 200,000 tons/year. The study for a more ambitious project was entrusted by the Liberian Government to an American consultant. This involved, initially, a unit with a capacity of 500,000 tons/year (direct reduction) whose integrated capacity would rise to 1.5 tons/year in the second phase. These projects are currently frozen.

Ghana

Ghana has a small iron and steel unit at Tema (Gihoe Steelworks) with a capacity of about 30,000 tons/year. Preliminary study of a larger-scale project (200,000 tons/year at Sekondi) was carried out in conjunction with Krupp in 1977. Ghana then tried to relaunch the project with Indian assistance. A compensation contract is apparently currently being negotiated with Togo for the export of billets to Togo in return for the import of bar iron.

Togo

A mini iron and steel plant was established (Société Togolaise de Sidérurgie) at the end of the 1970s. Capacity (electric melting furnace and rolling mill to produce concrete reinforcements): 20,000 tons/year at a cost of about $50 million. After the complete shut down, the unit has just been leased (for 10 years) to an American company and only the rolling mill is currently in operation (8,000 tons in 1985), using billets and old imported rails.

Côte d'Ivoire

IMCI has a rolling mill (1969) with a capacity of 10,000 to 15,000 tons/year. Rolling mill expansion projects (to 45,000 and then to 60,000 tons), as well as the establishment of a steel mill, were mentioned at the end of the 1970s (Sofresid survey). In fact, the IMCI rolling mill was shut down in 1985. The American company which has taken over the STS unit in Togo is also interested in IMCI.

Nigeria

Two major iron and steel projects are currently being implemented:

(a) DELTA STEEL - This unit has a direct reduction shop (Midrex), an electric steel mill, continuous casting and a rolling mill (light sections). This unit produces billets and sections, totalling 1.3 million tons.

The unit is complete (the direct reduction shop since 1981), but it is being seriously held up by import difficulties (iron ore, spare parts) connected with the country's financial problems. In January-February 1985, the production of raw steel was 6,000 tons (instead of 41,000 tons, as in January-February 1984). The target of 400,000 tons of steel in 1985 will be hard to achieve.

(b) The rolling mills at Jos (210,000 tons/year), Oshogbo (210,000 tons/year) and Katsina (210,000 tons/year) are to operate using billets produced by DELTA STEEL. They are operating only with extreme difficulty because of the shortage of billets.

(c) AJAOKUTA - The first studies were initiated in 1958. The site was chosen in 1974 and the contracts were signed (with the USSR) in 1979. An initial stage is under construction with a production capacity of 1.3 million tons/year. This initial phase should have been completed in 1983 (rolling mills) and 1985 (steel mill and blast furnaces).

In 1985, only the rolling mill for light sections has been completed, but there are no billets to supply it (the billets produced by DELTA STEEL are unsuitable because they have a cross-section of 120 mm instead of 75 mm as in the case of Ajaokuta). The other installations will not be completed before 1988 or 1989 since the work was interrupted between 1983 and 1985 because of Nigeria's

financial problems (in 1983, for example, the shortfall was 495 million nairas out of the 1 billion required, above all to keep up the repayments of foreign loans). Costs have doubled since 1979 because of delays. They will apparently exceed $US 7 billion, that is to say almost $US 6,000 per ton of installed capacity. 2/

Cameroon

SOLADO (Société de Laminage de Douala) has been producing rounds and small profiles since 1972 (rolling mill). The production capacity increased in 1981 from 20,000 tons/year to 35-40,000 tons/year of concrete reinforcing bars and small profiles. A small electric steel mill project (capacity 12,000 tons/year), submitted by an American company, was approved in 1980. However, it seems that this project has not been followed up.

Central African Republic

An idea for a project - a micro-unit of 10,000 tons/year (electric melting furnace and rolling mill) - was launched, but to date it has not been followed up.

Gabon

The SAGASIDER project (30 per cent Micro-Sider International, France and 70 per cent Gabon Government) included a rolling mill with a capacity of 12,000 tons/year in its initial stage (followed by an electric melting furnace fed by a direct reduction unit). Apparently, this project has not been followed up as yet.

Congo

An idea for a micro-unit project (electric melting furnace and rolling mill) with a capacity of 10,000 to 20,000 tons/year was launched when the five-year plan for 1982-1986 was drafted. There has as yet been no implementation.

Angola

There is a small iron and steel unit (electric melting furnace and rolling mill) with a capacity of about 30,000 tons/year. Plans for its rehabilitation and expansion have been put forward, but apparently have not been followed up.

Zambia

The TIKA project was launched in the mid-1970s by the Zambian Government (80 per cent) and the Yugoslav Government (20 per cent). The project (200,000 tons/year), which comprised a direct reduction unit, steel mill, continuous casting and rolling mill, was partially constructed (Energo Projekt, Demag, Swindell Dresser) and then abandoned in 1979 because of the distance from iron mines, the inadequacy of the ore and the cost of electricity. This project, which aggravated the country's debt burden, will in no event be resumed.

A new project has been under study (with the Japanese). Its first stage involves a single rolling mill (55,000 tons/year) to convert billets from Zimbabwe.

2/ Cf. Metal Bulletin, Tiers Monde Ingénieurie, Financial Times, Le Courrier de la Communauté, Revue de Métallurgie.

Zimbabwe

After DELTA STEEL and AJAOKUTA in Nigeria, ZISCO is the largest iron and steel unit in Africa south of the Sahara. It is an integrated iron and steel plant (blast furnace, LD steel mill and rolling mills for long products) with a capacity of 1 million tons/year. ZISCO is planning to modernize and expand, but this project has so far not been implemented since the domestic market absorbs less than 150,000 tons/year and neighbouring African countries less than 100,000 tons/year. At the same time, there is a problem regarding the market and financing.

Mozambique

Mozambique has one steel mill (CIFEL) with a capacity of 60,000 tons/year. Its current production level is low (14,000 tons in 1984). Projects have been mentioned regarding new capacities based on pre-reduced iron and an electric steel mill with a capacity of 200,000 tons/year (to increase subsequently to 400,000 tons/year). For the time being, these are only project ideas.

United Republic of Tanzania

A small unit at Tanga has been modernized. The renovated unit should come into production (late) in 1985: 40,000 tons/year of bars and wire rods to be obtained (in part) from billets supplied by the ALAF steel mill, which has a capacity of 20,000 tons (due to be doubled). A project for a mini-mill at Dar-es-Salaam, which was to be implemented in collaboration with Sweden, has been frozen for want of funds, since Sweden refused to provide finance. A large project (300,000 tons/year, and then 500,000 tons/year, based on a direct reduction unit) was investigated by UNIDO. The outcome of this investigation was negative, both because of the prospective markets and because of the cost (over $1 billion).

Uganda

The Jinja unit (Jinja Steelworks: electric melting furnace and rolling mill), with a capacity of 22,000 tons/year, has just been rehabilitated (by Danieli), thanks to an Italian loan of 3 billion lire, for a cost of $US 12 million. Its capacity has increased to 26,500 tons/year. Several larger projects are still in the concept or the preliminary study stage.

Zaire

The Maluku unit of SOSIDER dates from 1974. It has an electric melting furnace, continuous casting and a rolling mill. This unit (100,000 tons/year of bars plus a cold rolling mill with a capacity of 150,000 tons/year) has only operated sporadically: 11,425 tons in 1980, and 3,250 tons in 1981. It is today virtually shut down because of problems of scrap iron supply, but also because of financial and organizational problems.

Kenya

KUSCO has a semi-integrated unit at Mombasa comprising a rolling mill with a capacity of 30,000 tons/year (rounds and iron bars) and an electric steel mill with a capacity of 30,000 tons/year, with plans for continuous casting.

MADATI ROLLING MILL CO. is setting up a cold rolling unit (100,000 tons/year) in order to supply the existing galvanization units (Japanese interests).

The CHAUDARIA Group is involved in both cases.

Feasibility studies have been initiated on a project (steel mill and rolling mill) with a capacity of 300,000 tons/year, using pre-reduced ore from Swaziland. The project has apparently been abandoned.

An integrated project has been studied by AUSTROPLAN (from 1980 to 1983) for the production of flat products. Initially, imported slabs (300,000 tons in 1987) would be used and then an integrated steel mill would be installed in the second stage (500,000 tons in 1995). The financing problem is currently insoluble ($1 billion initial estimate.

Ethiopia

Ethiopia has a semi-integrated unit with a capacity (wire rod mill) of 24,000 tons/year whose maximum capacity has so far not exceeded 18,000 tons/year. There is no specific project, only general studies on the iron and steel sector.

Mauritius

There is a small unit (electric melting furnace and rolling mill) with a capacity of 15,000 tons/year. There is apparently no other project.

The position regarding the iron and steel industry and iron and steel projects in Africa may be summed up (see tables 1 and 2) under the following categories:

- Countries that have no iron and steel production capacity;
- Countries that do have iron and steel capacity, with or without new projects.

In all, the capacities installed or being installed since 1975 represent some 3 million tons/year. There has been virtually no new site opening since 1979 and none may open before 1990. About 400,000 tons of capacity are idle or are greatly under-utilized.

3.2 North Africa and the Middle East

The region composed of North Africa and the Middle East covers many oil-producing countries. The iron and steel projects launched, studied or frozen in this region are as follows:

Mauritania

SNIM has a semi-integrated unit (electric steel mill, 12,000 tons/year; rolling mills, 36,000 tons/year). This unit is currently working at a very low capacity. Major projects were mentioned in 1977: capacity of 2 million tons/year for pelletization; capacity of 600,000 tons/year for a direct reduction unit; capacity of 500,000 tons/year for an electric steel mill. This project was not followed up.

Morocco

The first stage of the NADOR (SONASID) project is practically completed. It has a rolling mill for long products (wire rod, concrete reinforcements and bar iron) with a capacity of 450,000 tons/year. The initial project (1976) related to a unit with a blast furnace and LD steel mill with a capacity of 1 million tons/year. The project was curtailed because of financing constraints.

Table 1

COUNTRIES THAT HAVE NO IRON AND STEEL PRODUCTION CAPACITY

	No project ideas	With initial idea for a project or preliminary studies not followed by implementation
SENEGAL		X
GAMBIA	X	
SIERRA LEONE	X	
GUINEA	X	
GUINEA-BISSAU	X	
CAPE VERDE	X	
LIBERIA		X
MALI		X
BURKINA-FASO	X	
NIGER	X	
CHAD	X	
BENIN	X	
CENTRAL AFRICAN REPUBLIC		X
GABON		X
CONGO		X
EQUATORIAL GUINEA	X	
SAO TOME AND PRINCIPE	X	
RWANDA	X	
BURUNDI	X	
COMORES	X	
MADAGASCAR	X	
SOMALIA	X	
DJIBOUTI	X	
	17	6

Note: That is to say 23 countries with about 80 million inhabitants.

Table 2

COUNTRIES THAT HAVE IRON AND STEEL PRODUCTION CAPACITY, WITH OR WITHOUT NEW PROJECTS

COTE D'IVOIRE	Rolling mill	Shut-down
TOGO	Semi-integrated unit	Shut-down until 1985
ZAIRE	Semi-integrated unit	Virtually shut-down
ZAMBIA	Small unit (semi-integrated) in partial operation 200,000 ton project 70 per cent built and abandoned. New 50,000 tons/year project	
GHANA	Small unit (semi-integrated); projects frozen	
ANGOLA	Small unit (semi-integrated); projects frozen	
MAURITIUS	Small unit (semi-integrated); no project	
MOZAMBIQUE	Small unit (rolling mill); project frozen	
ETHIOPIA	Small unit (semi-integrated); no specific project	
CAMEROON	Small unit (rolling mill); steel mill project	
UGANDA	Small unit (semi-integrated); rehabilitated	
ZIMBABWE	1 million ton unit; modernization project (problems of financing and markets)	
KENYA	Small units (semi-integrated). New cold rolling unit. Projects frozen (financing and markets)	
UNITED REPUBLIC OF TANZANIA	Modernized small units (semi-integrated). Major project abandoned (financing and markets)	
NIGERIA	Building of two new integrated units:	
	- one unit completed (plus rolling mills), cannot operate properly because of the restrictions on imports (capacity: 1.3 million tons);	
	- one unit not completed (first stage) because of financing problems, causing the cost to double (at least) - capacity: 1.3 million tons.	

Implementation of a second stage is envisaged with: (a) either direct reduction (coal), electric steel mill and continuous casting; (b) or a blast furnace (500,000 tons/year) LD steel mill and continuous casting (1 million tons/year). Financing difficulties make the implementation of stage (b) or even (a) very uncertain.

Algeria

Algeria has two operational iron and steel units:

- El Hadjar, built in two stages from 1965 to the late 1970s, with capacities of some 2 million tons/year (flat and long products). It is currently operating at about 50 per cent of capacity (550,000 tons of hot rolled products, 380,000 tons of long products, 68,000 tons of welded pipes, 50,000 tons non-welded);

- Oran, where the open-hearth furnace capacity has just been doubled, from 50,000 to 100,000 tons/year of molten steel, by the purchase of two open-hearth furnaces from the United States at a cost of $US 10 million (Eximbank loan: $US 7 million).

Two projects have been abandoned:

- The major project in the West (La Macta: 5 million tons/year);

- The special steel project planned in the West (with Bofors).

One project is being implemented. It was planned in 1977-1978 for Jijel and now for Bellara. It is to produce billets to supply several rolling mills in the West from an electric steel mill supplied with imported ore.

The planned capacity has been cut from 2 million tons/year (1984) to 1 million tons/year (1985), for an estimated cost of $US 3 billion. The completion date has been shifted from 1991 to 1995.

Tunisia

The El Fouladh unit (blast furnace; LD steel mill; continuous casting; rolling mill) has been in operation since 1966. An electric melting furnace and a wire mill were added during the 1970s.

Tunisia's deficit in respect of concrete reinforcing bars and wire rod was 100,000-120,000 tons in 1984. It will probably rise to over 300,000 tons in 1985. Several projects have been mentioned:

- Direct reduction with an electric steel mill in the Gulf of Gabès;

- Joint venture with Finsider.

Furthermore, studies have been carried out with a view to the launching of a call for tenders relating to an extension of the wire rod and light profile capacities (150,000 tons/year), as well as the construction of a ministeel mill to produce 180,000 tons/year of concrete reinforcing bars. The total cost of these projects is estimated at some $US 125 million. The delay in launching the call for tenders is connected with financing difficulties.

Libyan Arab Jamahiriya

The first Libyan iron and steel unit is being built at Misurata. DASTUR (India) was asked to make a study of the complex in 1977. The calls for tenders were launched in 1978. The first stone was laid in 1979.

The complex includes: direct reduction (Midrex), electric steel mill, rolling mills for long products and rolling mills for flat products. The first-stage capacity is 1.3 million tons/year. Construction will not be completed before the end of 1986 (two years' delay). It will have cost around $US 3.5 billion. The delay is due to financial problems (payment delays).

A second stage (MISURATA II) was envisaged in collaboration with the USSR in order to raise the total capacity to 5 million tons, with a blast furnace and LD steel mill. In any event, the construction of this second stage will not occur before 1990-2000.

Egypt

Egypt has several iron and steel units:

- National Metallurgical Industry Co.;
- Egyptian Copper Works;
- Delta Steel Mill, which has increased its capacity from 70,000 to 100,000 tons/year;
- Alexandria Steel Works (re-roller), which has installed a new rolling mill (1984) for wire rod (250,000 tons/year);
- The Helouan unit, whose capacity was increased from 850,000 tons/year to 1.5 million tons/year in 1975.

There are the following projects:

- Establishment at Helouan of an electric steel mill and a rolling mill for concrete reinforcing bars (300,000 tons/year);
- Establishment of a unit at DEKHEILA with a capacity of 800,000 tons/year, with a direct reduction unit and an electric steel mill (to produce rounds and wire rod). Completion is envisaged in 1987-1988. A Japanese construction firm has a share in the capital (10 per cent), as have IFC (4 per cent) and the Egyptian Government (86 per cent).

Two other projects are more vague:

- A steel mill with a capacity of 400,000 tons/year at Sadatville;
- A "Nile Steel Works" steel mill with a capacity of 400,000 tons/year.

For the time being, it seems that these projects have not been followed up.

Finally, DASTUR has been asked to carry out a "2000" study.

Saudi Arabia

In 1975-1976, Saudi Arabia launched several projects:

- PETROMIN/MARCONA project designed to produce 3.5 million tons of pellets and 1 million tons/year of billets. The project has been abandoned;

- BHP (Australia) project for a large unit operating on Australian ore and natural gas, also abandoned.

However, the following have been implemented:

- Expansion (with KORF) of the Jeddah steel mill from 40,000 to 120,000 tons;

- Construction of the Jubail unit with a capacity of 800,000 tons/year (this unit has been in operation since 1982; the first stone was laid in 1979);

- A second stage is planned to make it possible to manufacture flats, but this project has yet to be studied in detail.

Qatar

The Qasco unit, with a capacity of 400,000 tons/year of bars and rounds (with capital holdings of 30 per cent by Japanese groups and of 70 per cent by the Qatar Government), has been operating at full capacity since the late 1970s. A plan to double it (800,000 tons/year), mentioned in 1980, has just been abandoned.

The project was studied by UNIDO: it involves a semi-integrated unit with a capacity of 70,000 tons/year (possibly using pre-reduced products). So far, this project has not been followed up.

Oman

A project for an iron and steel unit has been studied by DASTUR (India). This concerns a semi-integrated unit with a capacity of 120,000 tons/year, either in two stages (rolling mill initially, then electric steel mill and continuous casting) or in a single stage (electric steel mill plus rolling mill). There has not as yet been any implementations of this project.

United Arab Emirates - Abu Dhabi

There is a rolling mill with a capacity of 25,000 tons/year. A direct reduction project with a capacity of 400,000 tons/year (capacity possibly to be increased to 1 million tons/year) was studied in 1978 (in conjunction with India). For the time being there has been no follow-up.

United Arab Emirates - Dubai

There is one unit (Gulf Steel Mills) with a capacity of 40,000 tons/year.

Iraq

The Iraqi iron and steel industry has two direct reduction units with a capacity of 1,150,000 tons/year; four electric melting furnaces (70 tons) with a capacity of 800,000 tons/year; and one rolling mill with a capacity of 450,000 tons/year.

No new project is currently being mentioned.

Syrian Arab Republic

The capacity of the HAMA (GECO Steel) semi-integrated unit is 120,000 tons/year. There is a project (1985) to expand the capacity to 500,000 tons/year.

Jordan

The installed capacity (semi-integrated unit) amounts to 70,000 tons/year.

Lebanon

The installed capacities are as follows: a semi-integrated unit (40,000 tons/year) and several rolling mills (nearly 500,000 tons/year).

Islamic Republic of Iran

The implementation of the projects in progress has been cut back since 1979. Current work relates to;

- The expansion of the Isfahan unit (blast furnace, LD steel mill) with a capacity of 500,000 to 1.9 million tons/year;

- The reconstruction and completion of the Ahwaz unit (Midrex, HYL and Purofer direct reduction, as well as an electric steel mill) with a capacity of about 2.5 million tons/year;

- The construction of the Mobarakeh unit with a capacity of about 3 million tons/year (with Italimpianti). The state of war makes the completion dates uncertain.

The position of the iron and steel industry in North Africa and in the Middle East can be summarized (see tables 3 and 4) by looking at the following categories:

(a) Countries that have no iron and steel production capacity;

(b) Countries that have iron and steel production capacity, with or without new projects.

In total, the capacities installed or being installed since 1975 correspond approximately to production capacities of 6 million tons/year, to which could be added, in the next three to five years, 5 million - 6 million tons/year of Iranian capacity.

The only project about which it is more or less sure that construction will start between 1985 and 1990 is the Bellara project (in Algeria), with a capacity of 1 million tons/year.

Table 3

COUNTRIES WHICH DO NOT POSSESS IRON AND STEEL PRODUCTION CAPACITY

	No project ideas	With project ideas or projects
SUDAN	X	
DEMOCRATIC YEMEN		X
YEMEN ARAB REPUBLIC		X

Table 4

COUNTRIES THAT HAVE IRON AND STEEL CAPACITY, WITH OR WITHOUT NEW PROJECTS

MAURITANIA	Low level of operation: problems regarding markets and operating difficulties
MOROCCO	NADOR: size reduced because of financing problems
ALGERIA	Jijel-Bellara project delayed (after 1990) because of problems regarding markets
TUNISIA	El Fouladh expansion delayed because of financing problems
LIBYAN ARAB JAMAHIRIYA	Misurata implementation work postponed because of payment delays
EGYPT	Dekheila implementation work slightly delayed. Other projects delayed because of problems regarding markets
SAUDI ARABIA	Joint venture projects abandoned because of international situation
UNITED ARAB EMIRATES	Joint venture projects abandoned because of international situation
QATAR	Doubling of unit size abandoned because of problems regarding markets
IRAQ, SYRIAN ARAB REPUBLIC, LEBANON, ISLAMIC REPUBLIC OF IRAN, JORDAN	Delays and cut-backs connected with the state of war or political uncertainty

3.3 Asia

The iron and steel projects launched, studied, frozen or abandoned in this region are as follows:

Pakistan

Pakistan has some 60 semi-integrated units (capacity about 650,000 tons/year), as well as one integrated unit, PIPRI WORKS, with a capacity of 1.1 million tons/year (first contract 1969; first stone 1973; full production in 1985-1986), built with the co-operation of the USSR.

It is planned to double the capacity; this will probably not occur before the 1990s (the first stage mobilized 53 per cent of public industrial investment during the fifth plan).

There are some small projects (100,000 tons/year semi-integrated unit; non-welded pipe unit, 18,000 tons/year). A direct reduction project (400,000 tons/year) seems to have been abandoned, whereas the special steels unit (Special Steel of Pakistan: 40,000 tons/year) has been put up for sale after going bankrupt, no payment of interest having been made for four years.

India

The production capacities of the Indian iron and steel industry exceeded 13 million tons/year in 1985. Projects currently being implemented (apart from the modernization of Rourkela, Durgapur and Burnpur) are as follows:

- The expansion of the units at Bhilai and at Bokaro, 2.5 to 4 million tons/year respectively; these expansions have not been completed because of delays in supply of equipment (by India and then by the USSR), as well as financing difficulties. By 1990 the capacity at Bokaro should be increased from 4 to 5.5 million tons and that at Bhilai from 4 to 5 million tons;

- The construction of the Visakhapatnam unit, with a capacity of 1.2 million tons/year, of which the first stage will not be completed before 1988 (the second stage will not be completed before 1992-1994). The delay of more than four years is due, amongst other things, to financing problems;

- The PARADIP (1.5 million tons/year, first stage) awarded to DAVY, has been frozen for the time being for lack of financing, as has the VIJAYANAGAR project;

- The TATA company plans to double its production capacity from 2 to 4 million tons using its own funds. It is waiting for Government approval. What it proposes is, at least, to add 500,000 tons/year capacity by 1988. Several projects based on direct reduction, as well as several semi-integrated units, have been completed or launched - a total of around 500,000 tons/year.

Burma

The 20,000 tons/year semi-integrated unit (direct reduction) has just been doubled. A second unit has been modernized, increasing its capacity from 20,000 to 48,000 tons/year.

Bangladesh

Two projects have been abandoned:

- The expansion of Chittagong Steel (from 165,000 to 265,000 tons/year), but it appears that the project is being talked about once more;

- The building of a direct reduction unit with a capacity of over 600,000 tons/year (no finance available).

Thailand

The Thai iron and steel industry comprises five semi-integrated units and more than 30 re-rolling units. Two projects have been put forward and studied since 1978:

- A direct reduction project with a capacity of 400,000-500,000 tons/year;

- An integrated project (studied by AUSTROPLAN, as well as by the Japanese) with a capacity of between 1.3 million and 1.6 million tons/year.

These projects have been abandoned for the time being for want of finance, in the context of a policy of austerity.

Malaysia

The Malaysian iron and steel industry is being expanded by means of several projects:

- Antara Steel Mills, capacity 50,000 tons/year using imported billets;

- Amalgamated Steel Mill, capacity increased from 150,000 to 400,000 tons/year;

- Trengannu, which has a direct reduction unit with a capacity of 600,000 tons/year, and a steel mill producing 560,000 tons/year of billets. Project for installation of a cold rolling mill with a capacity of 150,000 tons/year;

- Labuan (Sabah), a direct reduction unit with a capacity of 720,000 tons/year;

- There is also a project for installation of a rolling mill for rounds and bars, capacity 180,000 tons/year (Malaysia Steel Works), which should be followed by the construction of an electric steel mill;

- Finally, there is a project for a tinning unit with a capacity of 90,000 tons/year (1980-1981).

Singapore

NISM inaugurated a new rolling mill with a capacity of 250,000 tons/year in July 1984, which increased its overall capacity to about 700,000 tons/year.

Indonesia

The Krakatau unit has increased its direct reduction capacity to 2 million tons/year and its raw steel production capacity to about 2.5-3 million tons/year. This steel is either converted into billets and long products or into bars and flats. The third stage involves the construction, currently in progress, of a cold rolling mill with a capacity of 600,000 tons/year.

A second integrated project with a capacity of 2 million tons/year has been proposed for Japanese financing. If it is adopted, it should be completed in the 1990s.

Phillipines

- The Philippines Plate Mills have a production capacity of 130,000 tons/year of plate, using a second hand mill (from Japan) and an electric steel mill with continuous casting;

- The Mindanao integrated project (1 to 1.5 million tons/year) has suffered many ups and downs since 1975. This project, which has been accepted, rejected and again taken into consideration by the Japanese, has finally been abandoned for the time being because of the impossibility of finding finance.

Viet Nam

There is no information regarding progress in the reconstruction of the iron and steel unit.

Province of Taiwan

The capacity of the numerous small units has grown from 2.8 million tons in 1977 to slightly over 3 million tons/year in 1985. The China Steel Corporation integrated unit at Kaosniung is developing as planned: 1.5 million tons in 1977, 3.25 million tons in 1982 and 5.65 million tons in 1986-1987.

This last expansion is costing about $US 500 per ton of installed capacity.

A new expansion to 8 million tons was planned before 1990. It is still uncertain whether it will be implemented.

In the context of the current expansion, a CAPL installation with a capacity of 400,000 tons/year is under construction (to produce high-strength plate).

Republic of Korea

Production capacities have increased rapidly between 1975 and 1985, from 1.5 to 9.6 million tons/year for the Pohang unit and from 1.5 to 4 million tons/year for the medium and small units.

In addition, POSCO began construction in 1984 of the first stage of its new Kwang-Yang integrated unit, with a capacity of 2.7 million tons/year. Construction of this unit should be completed in 1987. The first equipment orders have already been placed for a second stage which should raise the total capacity in 1990-1996 to 5.4 million tons/year.

The cost of the first stage, amounting to $US 2.7 billion ($US 1,000 per ton installed) is covered to the extent of 65 per cent by POSCO's own resources and to the extent of 35 per cent by external credits (builders).

Finally, modernization and expansion work is continuing. This work concerns a second wire mill with a capacity of 350,000 tons/year, an electrolytic galvanization line with a capacity of 200,000 tons/year (end of 1986) and two continuous annealing lines (CAPLs, 1 million tons/year and 400,000 tons/year.

Democratic People's Republic of Korea

The information available is not sufficient to form an accurate idea of the development of the iron and steel industry in this country. Between 1975 and 1985 (approximately), production capacity appears to have risen from 4.5 to 8.5 million tons/year. The medium-term target is something like 10 million tons/year, to increase (in the long term) to 15 million tons/year. The new capacity is apparently at the Kunchaek, Hwanghai, Chollima, Songjin and Chongjin units. The long-term targets apparently include stainless steel and electromagnetic plate production capacities.

People's Republic of China

In 1984, China produced 43.7 million tons (raw steel), but imported over 12 million tons of iron and steel products.

The very ambitious iron and steel industry development plans announced in 1978, for a capacity of 60 million tons in 1985 and 100 million tons or more in 2000, have been reduced. The figure being mentioned today is a capacity of 60 million tons capacity in 1990, instead of about 50 million tons in 1984.

Construction of the first stage of the Paoshan complex (3 million tons/year), costing over $9 billion, is being completed. A second stage (3 million tons/year) has been initiated and will probably not be completed before 1990. It has also apparently been decided to build a third stage.

Expansions are in progress, relating to:

- MAANSHAN: from 1 million to 3 million tons/year;
- PANZHIHUA: from 1.75 million to 2.5 million tons/year;
- WUHAN: from 3 million to 6 million tons/year;
- ANSHAN: from 6 million to 8 million tons/year.

Furthermore, China is purchasing second-hand plants (small and medium-sized) from the United States and Europe. It is negotiating supply agreements with Australian, Swedish and other enterprises.

In all, an increase in production capacities of 10 million tons/year is likely by 1990.

The situation of the iron and steel industry in Asia can be summarized (see tables 5 and 6) under the following categories:

- Countries that have no iron and steel production capacities;

- Countries that have iron and steel capacities, with or without new projects.

In total, the capacities installed or being built since 1975 correspond to about 46 million tons (including almost 20 million tons for the People's Republic of China and the Democratic People's Republic of Korea).

Table 5

COUNTRIES THAT HAVE NO IRON AND STEEL PRODUCTION CAPACITIES

	No project ideas
AFGHANISTAN	X
MALDIVES	X
NEPAL	X
BHUTAN	X
DEMOCRATIC KAMPUCHEA	X
LAO PEOPLE'S DEMOCRATIC REPUBLIC	X
Approximately 40 million inhabitants	

3.4 Latin America

The iron and steel projects launched, studied or frozen in this region are as follows:

Argentina

As a result of the decline in domestic markets and the aggravation of the financial crisis, the ambitious 1980-1981 plans have been completely abandoned, as have:

- The new SIDINSA integrated complex (3.' million tons/year);

- The SIDERSUR direct reduction project (400,000 tons/year); in fact this project is now eliciting the interest of Brazil and Mexico;

- The SOMISA expansion (from 2.5 million tons/year to 4 million tons/year). The plate rolling mill, already partially installed, has been abandoned.

Table 6

COUNTRIES THAT HAVE IRON AND STEEL CAPACITY, WITH OR WITHOUT NEW PROJECTS

PAKISTAN	No substantial new capacity will be brought into production before 1990. The special steels unit has been put up for sale after going bankrupt.
INDIA	Major delays. The Paradip and Vijayanagar projects have been frozen. The first stage of Vizag and the expansions at Bhilai and Bokaro are subject to long delays because of problems of supply and finance. The Tata expansion is also delayed.
BURMA	Two expansions equivalent to 48,000 tons/year for a country with over 30 million inhabitants.
SRI LANKA	A small 120,000 tons/year iron and steel unit, but no plans for expansion.
BANGLADESH	All projects frozen for lack of finance.
THAILAND	Major projects frozen because of financing difficulties.
MALAYSIA	Numerous projects being implemented and completed.
SINGAPORE	Expansion project implemented for SNIM.
INDONESIA	The Krakatau project is being implemented. A new integrated project is dependent on Japanese finance (hypothetical).
PHILIPPINES	The integrated project has been frozen for lack of finance.
VIET NAM	Uncertainty regarding the reconstruction of the iron and steel unit.
PROVINCE OF TAIWAN	The projects announced are being implemented (CSC expansion, 2 million tons/year). Another expansion (2,350,000 tons/year) is planned.
REPUBLIC OF KOREA	All the projects envisaged (Pohang expansion, first stage, and already the second stage of Kwang-Yang) are being implemented.
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	It appears that the expansions of capacity are being implemented.
PEOPLE'S REPUBLIC OF CHINA	The delay in the progress of projects seems to be more linked with problems of infrastructure and implementation capability than with financing problems.

All that is now envisaged are investments to make it possible to maintain the level of technology and to provide for limited expansions (SIDERCA: 400,000 tons/year), since the available capacity seems sufficient for 1990.

Chile

There is no expansion project in Chile, where the available capacity (slightly over 1 million tons/year) seems to be sufficient. The only problem mentioned is the possible (partial) privatization of the main company CAP.

Bolivia

Bolivia does not have any iron and steel installation. Many studies have been carried out regarding the Mutun site: an integrated project (direct reduction), with a capacity of 400,000 tons/year, then reduced to 100,000 tons/year (Brazilian groups). This project has been frozen for the time being for want of finance.

Peru

The iron and steel production capacities, 600,000 tons/year, have not changed from the mid-1970s until 1985. Not only were the major projects in 1977 (400,000 tons/year in 1988) abandoned, but also the more modest expansions of SIDERPERU at Chimbote (from 450,000 tons/year to 720,000 tons/year and then to 550,000 tons/year). The decline in markets and, above all, the financial crisis are the factors behind this situation.

Paraguay

An integrated unit (blast furnace, LD, continuous casting, rolling mill for bars and light sections), with a capacity of about 150,000 tons/year, has been constructed by ACEPAR (60 per cent Paraguayan Government, 40 per cent Brazilian companies).

Uruguay

The capacity of the Inlasa unit has risen from 20,000 to 50,000 tons/year thanks to the installation of an electric melting furnace. One project in co-operation with Brazil, with a capacity of 100,000 tons/year, has apparently not been adopted.

Ecuador

Ecuador has only a very small production unit (20,000 tons/year). An integrated project (using direct reduction) has been mentioned on several occasions (200,000 tons, then 400,000 tons/year). It seems that this project has currently been frozen for want of finance.

Colombia

Colombia imports a large part of its iron and steel supplies (nearly two-thirds in 1983). Expansion plans had been mentioned in the early 1980s (PAZ DEL RIO expansion from 280,000 to 400,000 and then 1 million tons/year, establishment of units using direct reduction, etc.). Currently, only the PAZ DEL RIO expansion has been implemented by replacing two basic Bessemer converters with LD converters.

Venezuela

In the past ten years, the Venezuelan iron and steel industry has undergone considerable expansion as SIDOR has been brought into production. The production capacity has risen from 1.4 million tons to 5.3 million tons/year. However, the ZULIA project (1.1 million tons/year) and the ACELCAR project (special steels: 320,000 tons/year) have been frozen for a long time because of the lack of prospective markets and financing.

Trinidad and Tobago

In the mid-1970s, a major export-oriented integrated project (based on direct reduction) had been launched by ESTEL (Netherlands) and KAWASKAI (Japan). These two companies having withdrawn, a smaller project has been implemented (ISCOTT), entirely financed by the Trinidad and Tobago Government. The installed capacity is equal to 800,000 tons of sponge iron a year and 600,000 tons of steel billets and bars. No expansion is envisaged because the unit is in difficulties and is seeking external assistance.

Brazil

The severe crisis which affected Brazil in 1980 has been reflected by both a surge in exports and a reduction in the medium-term prospects for expanding production capacity. The targets of 40 million tons, or even 33 million tons a year of capacity by 1988 have been abandoned.

Since 1980-1981 the fourth stage of USIMINAS (from 3.5 to 5 million tons/year) has been abandoned because of a refusal on the part of the Japanese shareholders to provide financing.

The latest expansions by CSN (from 3.8 to 4.5 million tons) and CASIPA (from 3.5 to 4.2 million tons) have been delayed and will not be completed until 1986.

The USIBA expansion (from 300,000 to 600,000 tons/year) has not been implemented.

Whereas Belgo-Mineira and Mannesmann have modernized their installations, increasing their respective capacities from 900,000 to 1 million tons/year each, the Mendes-Junior project has been reduced from 2 million to 1 million and then to 720,000 tons of pre-reduced products and 340,000 tons/year of billets.

Finally, the ACOMINAS project, launched in 1977, t yet complete. This unit with a capacity of 2 million tons/year was to hav a first stage, followed by a second stage (4 million tons) and then a d stage (10 million tons). Only the first stage will be executed. In 1985, despite the official inauguration only a few shops are in operation. It will be necessary to wait until 1987-1988 for the unit as a whole to go on-stream. It is not certain that the rolling mill for rails and heavy sections will ever be installed although the equipment has been on site since 1979 (value: over $US 800 million).

Because of successive delays, the estimated cost of $US 1.8 billion for 1976 will probably exceed $US 7 billion in 1985 (from $US 900 to $US 3,500 per ton of installed capacity). These delays and this excess cost are due in particular to financial difficulties (payment delays) which started in 1980 (Minas Gerais Government, Siderbras, NEDB) and have since worsened.

Mexico

Large-scale plans for the expansion of the iron and steel industry had been launched in 1979-1980, relating to a tripling of production capacity of about 8 million to 25 million tons/year. Financial difficulties have forced a drastic curtailment of these plans.

A HYLSA expansion of 600,000 tons/year was stopped because of the extent of the indebtedness of the Alfa group (owner of HYLSA) estimated at $US 2.6 billion.

The second stage of SICARTSA (direct reduction, electric steel mill, continuous casting, plate rolling mill), with a capacity of 1.5 million tons/year, was stopped in mid-1985, when it was already two years late. This decision was taken because of the suspension by SIDERMEX of contracts with local enterprise (for want of financing). However SIDERMEX is continuing to make payments owed to foreign suppliers. The work will probably not begin before the end of 1987.

The only work being completed is that on the construction of the CARDINAS pipe plant (300,000 tons/year), which must import because plate is not available locally (SICARTSA II).

Cuba

The Cuban iron and steel industry has an integrated unit (open-hearth furnaces) with a capacity of about 350,000 tons/year (current consumption is 1 million tons/year of rolled products). There are the following modernization projects:

Modernization and expansion in two stages of the capacity in respect of long products:

- 500,000 tons/year (two electric melting furnaces);

- 500,000 tons/year (two electric melting furnaces).

Establishment of a unit for producing flats (electric steel mill, Steckel rolling mill, cold profiling), with a capacity of 200,000 tons/year.

It seems that the first modernization operation will be implemented by 1990.

Dominican Republic

There is a capacity for the production of raw steel. It was planned to increase the capacity to 250,000 tons (bars, wire rod and light sections).

Nicaragua

There is a project for a semi-integrated unit (100,000 tons/year) in co-operation with the Democratic People's Republic of Korea.

Honduras

An integrated project (blast furnace using charcoal, steel mill, LD) is currently frozen.

The situation regarding the iron and steel industry in Latin America may be summed up (see tables 7 and 8) under the following categories:

- Countries that have no iron and steel production capacity;

- Countries that have iron and steel capacity, with or without new projects.

In all, the capacities installed or being installed since 1975 represent some 18 million tons/year (including 10 million tons/year for Brazil).

Table 7

COUNTRIES THAT HAVE NO IRON AND STEEL PRODUCTION

	Project ideas	No project ideas
BOLIVIA	x	
GUYANA		x
SURINAME		x
HAITI		x
BELIZE		x
SMALL CARIBBEAN ISLANDS		x
JAMAICA		x

4. PROJECTS IN IMPLEMENTATION

4.1 Africa south of the Sahara

The number of projects is very small:

Togo

The unit in Togo, comprising an electric steel mill and continuous casting (20,000 tons/year) and a rolling mill for concrete reinforcing bars (40,000 tons/year), which had been completely shut down, has just been leased by an American company which has restarted only the rolling of imported billets (partly from the Tema unit in Ghana). This company, which hopes to produce 8,000 tons of rounds in 1985, is interested in the Côte d'Ivoire rolling mill (IMCI) and is establishing relations with Ghana (supplies), as well as other neighbouring countries. The plant, the cost of which has been borne by the Togolese Government, 3/ has benefited from exporter credits and bank credits which are to be repaid as part of the general settlement of the Togolese debt.

3/ The Société Togolaise de Sidérurgie is 100 per cent State financed.

Table 8

COUNTRIES THAT HAVE IRON AND STEEL CAPACITY, WITH OR WITHOUT NEW PROJECTS

PANAMA	Small unit
GUATEMALA	Small unit with cpacity of 50,000 tons/year
PUERTO RICO	Unit with capacity of 150,000 tons/year
EL SALVADOR	Two units: capacity of slightly over 100,000 tons/year
HONDURAS	Small unit with capacity of 10,000 tons/year, other projects frozen (finance, political situation).
COSTA RICA	Two small rolling mills
NICARAGUA	Project for 100,000 tons/year (financing problems and political situation).
ARGENTINA	All projects frozen (except SIDERSUR). The only investments are those designed to make it possible to maintain the level of technology.
CHILE	No expansion project: problems regarding markets and financing
PERU	All expansion projects have been cancelled: problems regarding markets and financing
PARAGUAY	Completion of the ACEPAR project
URUGUAY	The only new project has been abandoned (markets and financing)
ECUADOR	The only new project has now been abandoned (financing problems)
COLOMBIA	All expansion projects have been frozen except for the first PAZ DEL RIO expansion (financing problems)
VENEZUELA	After the completion of SIDOR all new projects have been abandoned (financing problems)

TRINIDAD AND TOBAGO	ISCOTT is in difficulties - no new project
BRAZIL	The COSIPA and CSN expansions are delayed. USIMINAS - stage IV has been abandoned (financing), as well as the USIBA expansion. The Mendes-Junior project has been reduced from 2 million tons to 340,000 tons/year (billets). Finally, the first stage of ACOMINAS (2 million tons/year) launched in 1977, has not been completed (it will be completed in 1987 or 1988). Furthermore, stages 2 and 3 of this project have been definitively abandoned. Delays and abandonments are due principally to financing difficulties
MEXICO	The expansion of the HYLSA unit has been stopped and the SICARTSA II [illegible]rk has also just been stopped. In both instances, th[illegible] is because of financing difficulties
CUBA	The modernization and expansion plans scheduled for several years have been delayed.
DOMINICAN REPUBLIC	Implementation of the expansion project is uncertain
NICARAGUA	Implementation of the project is uncertain: financing difficulties
HONDURAS	Implementation of the project is uncertain: financing difficulties.

Nigeria

The WARRI Steel (or DELTA Steel) project, with a capacity of 1.3 million, has been completed. It comprises a MIDREX direct reduction unit, an electric steel mill, continuous casting and a rolling mill for long products (capacity - 300,000 tons/year). The billets produced are intended for the unit's own rolling mill and for three rolling mills with a capacity of 210,000 tons/year each (rounds and bars) located at Jos, Oshogbo and Katsima.

The complex, built by consortium of German and Austrian companies, cannot operate properly because of import difficulties (iron ore and spare parts). This is the reason for the very low production level.

The Jos rolling mill has been taken over by KOBE Steel, while the Katsina rolling mill, constructed by Demag, received a loan from First Chicago Bank for $US 40.4 million in 1981.

The AJAOKUTA project (first stage: 1.3 million tons/year) has been in construction for over six years. It comprises a blast furnace (German Democratic Republic), an LD steel mill (USSR), a rolling mill for light sections and for wire rod and a rolling mill for medium sections. Only the latter rolling mill has been completed. The other workshops will be completed between 1987 and 1989. 4/

Work was halted but started up again after lengthy negotiations with the USSR, on the one hand, and with the public works companies responsible for the infrastructure, on the other hand. All this has caused the cost to shoot up, making it increasingly difficult to honour the due dates. It must be said that the infrastructure costs are a great burden, particularly the cost of constructing a railway line 52 km long linking the mine and the plant. The plans for this line were apparently only completed in 1985.

Uganda

The rehabilitation of the Jinja unit is nearing completion. This involves the modernization of the electric steel mill (increase in capacity from 22,000 to 26,500 tons/year) and the rolling mill, together with the construction of a continuous casting unit.

This rehabilitation, carried out by DANIELI, received an Italian loan of 3 billion lire.

4.2 North Africa and the Middle East

There are also few projects in implementation in this region.

Algeria

The Bellara project (in the east of the country, about 100 km from the port of Jijel) has been studied for more than eight years, initially by Tractionel (Belgian) and then by Nippon Steel (1981). This project, based on direct reduction (process still not chosen) is meant to produce billets which will be converted by

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4/ The Nigerian iron and steel industry is financed by State capital.

three rolling mills spread over the west of Algeria. The latest information indicates a capacity of 1.1 million tons/year of steel, a production start-up between 1981 and 1995, and an estimated cost of $US 2 to 3 billion.

Among other things, this project necessitates the construction of a gas pipeline and a railway line to make it possible to carry the imported iron ore from Jijel.

Libyan Arab Jamahiriya

The Misurata unit (1.2 million tons) is still under construction, with a delay of at least two years owing, among other things, to payment problems. The work is being co-ordinated by DASTUR. Misurata comprises:

- 1 MIDREX direct reduction unit, 55 x 2 = 1.1 million tons;
- 3 Krupp 90-ton electric melting furnaces;
- 2 continuous casting units for billets;
- 2 continuous casting units for slabs;
- 1 rolling mill for bars and wire (400,000 tons/year);
- 1 rolling mill for profile (120,000 tons/year);
- 1 hot rolling mill for broad strips (580,000 tons/year);
- 1 cold rolling mill (120,000 tons/year).

The overall cost is about $US 3,000 per ton of installed capacity.

The complex also includes a harbour, an electricity generating plant, a seawater desalination plant and 8,000 housing units. Kobe Steel has been awarded a technical assistance contract for operation of the plant, covering a six-year period.

Egypt

The construction of the Dekheila project is under-way. It should be completed in 1986. This project, based on direct reduction (MIDREX process) should produce 750,000 tons of long products: bars and wire rod (425,000 tons/year of bars, 320,000 tons/year of wire rod). The Nippon Kokan and Kobe Steel companies are responsible for the building work:

- Direct reduction, 716,000 tons: Kobe Steel;
- Four electric melting furnaces 70-ton capacity: Nippon Kokan;
- Three continuous casting units: Kobe Steel;
- Rolling mills: Kobe Steel.

The cost is around $US 700 million (slightly less than $US 1,000 per ton installed).

The capital is shared between:

- the Egyptian Government: 87 per cent
- Nippon Kokan: 5 per cent
- Kobe Steel: 3 per cent
- Toyo Menka: 2 per cent
- SEI (World Bank Group): 3 per cent.

The financing has been provided by, amongst others, loans from the Japan Overseas Economic Co-operation Fund:

- $US 168 million (30 years);
- Eximbank in Japan, $US 210 million;
- World Bank, $US 163 million;
- International Finance Corporation (World Bank Group), $US 102 million.

This project is interesting in that it is supported by both Japan and the World Bank.

Islamic Republic of Irar

There is no precise information on Iranian projects that are in implementation. These are:

- The Isfahan project: expansion of the iron and steel plant constructed by the USSR, using the cast iron process, intended to increase the capacity from 550,000 to 1.9 million tons/year;
- The Bandar Abbas project transferred to Mobarakeh, implemented with the collaboration of Italimpiante, comprising:
- A direct reduction unit, HYL III: 1.5 million tons,
  MOREX: 1.5 million tons,
- 8 electric melting furnaces (180 tons),
- 1 continuous casting unit,
- 1 wide-strip rolling mill,
- 1 cold rolling mill;

This project could be completed in 1987-1988;

- The Ahwaz project, which comprises both a MIDREX (Korf) direct reduction unit, with a capacity of 1.2 million tons/year, and a HYL direct reduction unit, with a capacity of 1 million tons/year. The future of this unit seems very uncertain.

4.3 Asia

India

The following projects are in implementation:

- The Bhilai and Bokaro expansions will increase their respective capacities from 2.5 million tons/year to 4 million tons/year;

- The Bhilai expansion includes, in particular:

  - A steel mill;
  - A rolling mill for medium sections (750,000 tons/year);
  - A plate rolling mill;

- The Bokaro expansion comprises:

  - A new blast furnace (No. 5);
  - Two 300-ton LD converters;
  - A wide-strip rolling mill;
  - A new cold rolling mill.

These two expansions should have been completed at the end of 1981; in fact they will be finished in 1986-1987 (or 1988). This is due, firstly, to delays by the Indian equipment suppliers, who had to rely on Soviet suppliers and, secondly, to delays and inadequacies in financing of the plan, since the Indian Government hold the use of external credits to a minimum.

- The Vizakapatnam project was undertaken with Soviet co-operation (consultants MECON and DASTUR). The first stage, with a capacity of 1.2 million tons, comprises a blast furnace, LD steel mill, continuous casting and rolling mill for long products. It has received a Soviet credit and is also covered by a "buyback" contract, whereby the Russians undertake to take part of the production (100,000 tons/year). The first stage will not be completed before 1988 because of the slowness in setting up credits.

Indonesia

The third stage of Krakatau Steel comprises the construction of a cold rolling mill with a capacity of 600,000 tons/year (PT.CRM Indonesia). The capital is shared by:

- The Indonesian Government: 40 per cent;

- Krakatau Steel: 40 per cent;

- Cipuira Group: 20 per cent.

This project has received "export" credits amounting to $US 355 million linked to the supplies by Creusot-Loire and Tecnidas Reunidas, and also a loan of $US 205 million from the Asia Pacific Capital Corporation. The project should completed in 1986.

Province of Taiwan

China Steel 5/ is currently going ahead with its second expansion, increasing its capacity from 3.25 to 5.65 million tons/year (first expansion completed in 1982, from 1.5 to 3.25 million tons). The expansion comprises:

- A third blast furnace, 6,400 tons/day, a sintering installation and a coking plant;
- Two 240-ton LD converters;
- A continuous casting (slabs) plant, 2.4 million tons/year;
- Expansion of the wide-strip hot rolling mill;
- A continuous annealing line, 400,000 tons/year.

The builders involved are: DAVY, DEMAG, IHI (Japan) and KAWASAKI. The cost of the expansion is $US 1,120 million, that is to say about $US 500 per installed ton. An appreciable part of the financing is being provided from the company's own funds.

Republic of Korea

The Kwang Yang project on the southern coast of Korea has been under construction since 1984. It belongs to the firm POSCO (majority public holding). Since the Japanese initially refused to participate in the construction, POSCO approached European interests, who immediately agreed. As a result the Japanese also agreed to participate.

For the first stage, the capacity is 2.7 million tons/year. The unit comprises the following:

- A sinter plant (Voest-Alpine);
- A blast furnace (diameter-13 m, DAVY);
- 250-275 ton LD converters (Voest-Alpine);
- A continuous casting unit for slabs (DEMAG, Hitachi Zosen, Itoh);
- A wide-strip rolling mill (Mitsubishi);
- An oxygen plant (Air Liquide).

The construction should be completed in 1987. The overall cost is $US 2.7 billion, that is to say $US 1,000 per ton of installed capacity. The finance is provided by:

- Foreign credits: 35 per cent;
- Equity from large cash flow generated by the first POSCO unit (at Pohang): 65 per cent;

5/ The capital is distributed as follows: State - 95 per cent, private - 5 per cent.

- The Pohang expansion (the Pohang unit has a capacity of 9.6 million tons/year). This involves installation of:

  - A second wire rod rolling mill with a capacity of 350,000 tons/year (Mannesmann Demag-Sack);

  - A continuous annealing line with a capacity of 400,000 tons/year (Mannesman Demag);

  - A continuous annealing line with a capacity of 1 million tons/year (Kawasaki, HI).

Democratic People's Republic of Korea

The expansions currently being carried out concern: 6/

- The Kimchaek unit (installation of a third steel mill);

- The Hwanghai unit (installation of a third converter and a bar mill);

- The Chollima unit (installation of a steel mill).

People's Republic of China

The largest undertaking in China is currently implementation of the Pao-Shah project (near Shanghai).

The building of the first stage (3 million tons), begun in 1978, was halted and then recommenced. This stage comprises:

- One sinter unit and one coking plant;

- One blast furnace (Acffon Steel);

- Two 300-ton LD converters (Nippon Steel);

- One blooming slabbing unit (Nippon Steel);

- One 4-million-ton wide-strip hot-rolling mill (Mitsubishi);

- One 2.1-million-ton cold-rolling mill (Schloemann Siemag);

- One 200,000-ton galvanization line (Wean Limited);

- One continuous annealing line (560,000 tons) (Nippon Steel).

In 1981, the cost of this first stage was estimated at about $US 9 billion ($US 3,000 per installed ton). Today it is probably far higher. The building of the second stage (3 million tons) has been started, but there is a dispute with the Japanese (who are reticent) regarding the building of a non-welded pipe plant with a capacity of 500,000 tons/year.

It also seems that a positive decision has been taken regarding the building of a third stage, raising the total capacity to 10 million tons/year. Expansions in progress concern:

6/ Metal Bulletin, 12 November 1985.

- Maanshan: from 1 to 3 million tons/year;

- Panzhihua: from 1.75 to 2.5 million tons/year;

- Wuhan: from 3 to 6 million tons/year (uncertain);

- Aushan: from 6 to 8 million tons.

4.4 Latin America

The projects currently in implementation are the following:

Argentina

The only investments now being continued are those to keep the existing capacities in working order and on a level with world technology.

Brazil

Completion of the following expansions:

- CSN: from 3.8 to 4.5 million tons of capacity;

- COSIPA: from 3.5 to 4.2 million tons of capacity (this concerns the construction of a plate rolling mill);

- ACOMINAS: capacity of 2 million tons/year (construction is several years behind schedule). This unit comprises a blast furnace, LD steel mill, continuous casting, rolling mill for light sections and rolling mill for heavy profiles (rails).

The building of this unit (by DAVY and by French companies) from the outset encountered financial problems which have only grown worse, so that loans have been taken out against production that is yet to materialize.

The Minas Gerais Government, Siderbras and NEDB have holdings.

Mexico

The HYLSA expansion (with a capacity of 500,000 tons/year) has been halted because of the debt burden of the Alfa Group, which controls HYLSA (more than $US 2.5 billion of debts).

The second stage of SICARTSA (Las Truehas-Cardenas): work also halted since the middle of 1985 because of the inability of the company (public capital) to honour its debts with local contractors.

The work involves the construction of a HYL direct reduction unit, an electric steel mill (four electric melting furnaces), a continuous casting unit and a plate rolling mill (1.5 million tons/year).

On the other hand, the building of a large-diameter pipe plant with a capacity of 300,000 tons/year is being completed. The construction is financed by Nacional Financiera, Sidermex and the Japanese companies administered by Sumitomo.

Because of the delay in building SICARTSA II, it will be necessary to import plate from abroad (Japan, Republic of Korea and Brazil) in order to manufacture the pipes.

Table 9

SUMMARY

List of projects in implementation

AFRICA SOUTH OF THE SAHARA	TOGO	STS restart (L)
	NIGERIA	- Delta Steel: difficult production increase (L) - Ajaokuta: construction showed (L)
	UGANDA	Rehabilitation of a mini-steel works (L)
NORTH AFRICA	ALGERIA	- Bellara: preliminary stage (L)
	LIBYAN ARAB JAMAHIRIYA	- Completion of the first stage of Misurata (delayed) (L and F)
	EGYPT	- Construction of DEKHEILA with excellent financial arrangements (L)
	ISLAMIC REPUBLIC OF IRAN	- Isfahan: expansion (USSR) (L) - Mobanakeh: in progress with Halumpianh (F) - Ahwaz: construction and reconstruction (F)
ASIA	INDIA	Bhilai and Bokaro expansions: - At least 5 years' delay (USSR) (F) - Vizakapatnam: first stage construction slowed because of financial problems (L)
	INDONESIA	- Krakatau Steel: cold rolling mill, 600,000 tons/year (L)
	PROVINCE OF TAIWAN	- Third stage of China Steel Corporation (2.4 million tons). Excellent financial subsidy (F)
	REPUBLIC OF KOREA	- Kwang Yang (Posco) (2.7 million tons/year) excellenc financial situation (F) - Pohang expansion (L and F)
	DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	Several projects
	PEOPLE'S REPUBLIC OF CHINA	- Pao Shan, first stage - 3 million ton/year (F) - serious delay - Maanshan - Wuhan (L and F) - Panzhihua - Aushan

LATIN AMERICA	BRAZIL	Expansion of: CSN (F) COSIDA (F) ACOMINAS: Completion, 2 million tons/year (L), slowed because of the financial problems
	MEXICO	Expansion of HYLSA (F) and SICARTSA II (F) halted because of financing problems. Construction of capacity of 300,000 tons/year welded pipe.

(F) flat products

(L) long products

5. NEW PRODUCTION: CAPACITIES 1982-1990

This review gives an overview of new capacities installed since the beginning of 1982 and those which will come into production up to 1990.

Table 10

NEW PRODUCTION CAPACITIES 1982-1990
(in million of tons of raw steel.

	1982-1990	1985-1990	Including capacity of delayed projects 7/	Total for 1982-1990
AFRICA SOUTH OF THE SAHARA	1.7	1.3	(1.3)	3.0
NORTH AFRICA AND MIDDLE EAST	1.4	5.9-8.9	(5.9-8.9)	7.3-10.3
ASIA	4.0	13.0	(5.0)	17.0
LATIN AMERICA	5.4	7.0	(6.0)	12.4
SUB-TOTAL	12.5	27.2-30.2	-	39.7-42.7
PEOPLE'S REPUBLIC OF CHINA AND DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA				19.0
TOTAL				58.7-61.7

7/ Projects which were to come into production before 1985.

In comparison with the forecasts included in "1990 Scenarios for the Iron and Steel Industry" 8/ and, taking as point of reference the "low growth" scenario, this examination indicates the following pattern:

Table 11

1982 SCENARIOS AND 1985 SITUATION
(HORIZON 1990)
(in millions of tons of raw steel)

	New capacities 1982-1990 (Examined 1985)	New capacities 1982-1990 (1982 Scenarios)	Difference
AFRICA SOUTH OF THE SAHARA	3.000	3.000	- 0.200(-6.6%)
NORTH AFRICA AND MIDDLE EAST	7.300	9.700	- 2.400(-24.8%)
LATIN AMERICA	12.400	28.100	-15.700(-55.8%)
ASIA	17.000	22.400	- 5.400(-24.1%)
TOTAL	39.700	63.400	
ROUNDED OFF TO	40.000	63.000	-23.000(-36.5%)

The region most affected (principally because of financing problems) is Latin America, where the reduction exceeds 50 per cent, followed by North Africa, the Middle East and Asia. The small discrepancy relating to Africa South of the Sahara is not significant in so far as the projects are small in scale and were launched before 1982.

Under these conditions, the production capacities available in the developing countries in 1990 will amount to:

- Installed capacities at the beginning of the 1980s: 76.0 million tons;
- Installed capacities by 1990: 40.0 million tons.

In all, this makes 116 million tons, excluding the People's Republic of China and the Democratic People's Republic of Korea, which would make it possible to obtain (assuming an average operating rate of 80 per cent) a production level (raw steel equivalent) of:

116.0 x 0.80 = 92.8 million tons, compared with an apparent consumption level (IISI hypothesis for 1990) of: 122.0 million tons.

8/ UNIDO: "1990 Scenarios for the Iron and Steel Industry", ID/WG.374/2, 24 June 1982.

This would mean a deficit of about 30.0 million tons, to which would be added the deficit in the People's Republic of China and the Democratic People's Republic of Korea, which is likely to rise from 12.0 million tons in 1984 to 15.0 million tons in 1990, assuming that the People's Republic of China and the Democratic People's Republic of Korea equip themselves by 1990 with 12.5 million tons of additional production capacity (which is rather optimistic) and that consumption in those countries, between 1984 and 1990, grows at an average annual rate of about 4 per cent (which is, on the contrary, rather pessimistic).

One thing is therefore clear: the developing countries will continue to have a deficit and they will continue to import iron and steel products (about 40.0 million tons in 1990). There is little likelihood that this situation will be reversed, despite the export achievements of some developing countries.

The dynamism of the developing countries in the iron and steel sector is a fact. However, at the moment it is severely hedged about by difficulties primarily connected with financing.

6. PROJECT COSTS AND FINANCIAL CONSTRAINTS

The increase in cost per installed ton has been rapid. In 1965, the average cost per installed ton for an integrated unit was about $US 350. In 1975, the cost of an integrated unit on a virgin site was in the region of $US 800 per ton. In 1978 the average cost of new installations for the Brazilian iron and steel industry was $US 1,460.00 per ton. 9/ At the beginning of the 1980s, $US 1,700-1,800 per installed ton was a minimum in the case of integrated plants ($US 1,000 in the case of units based on direct reduction and electric steel mills).

In 1985, we find that the increase in costs is continuing, but at very different rates from country to country.

6.1 Africa south of the Sahara

The costs per installed ton are generally very high:

- TANZANIA project (frozen) evaluated by UNIDO: $US 4,000 per ton;
- UGANDA project (semi-integrated): $US 3,500 per ton;
- NIGERIA project:
  - DELTA STEEL (completed) - about $US 2,000 per ton;
  - AJAOKUTA (in progress) - about $US 6,000 per ton; (including very high infrastructure investments).

6.2 North Africa/Middle East

The costs are not as high:

- BELLARA (Algeria) - forecasts $US 2,000-3,000 per ton; (including extensive infrastructure construction);
- EL FOULADH (Tunisia) - expansion of 80,000 tons/year; (cost estimated at $US 600 per ton);

9/ IBS Congress - April 1980.

- MISURATA (Libya) - cost estimated in 1981: $US 2,700 per ton;

- DEKHEILA (Egypt) - estimated cost: about $US 1,000 per ton.

6.3 Latin America

The costs are of the same order of magnitude:

- MEXICO: SICARTSA I (1976): $US 850 per ton;
  SICARTSA II - estimated cost (1982): $US 2,000 per ton;

- BRAZIL: The estimated cost for possible expansions of existing units equals $US 500 per ton.

  - ACOMINAS: Cost estimated in 1976: $US 900 per ton
    Cost estimated in 1979: $US 1,200-1,700 per ton
    Cost estimated in 1985: between $US 3,000 and $US 4,000 per ton.

6.4 Asia

There are very sharp disparities in the costs per installed ton:

- PAKISTAN - PIPRI: Cost estimated in 1979 - $US 1,900 per ton;

- INDIA - VIZAKAPATNAM: Cost estimated in 1985 - $US 3,000 per ton;

- TATA EXPANSION: Cost estimated (1985) - $US 1,000 per ton (from 2.0 to 4.0 million tons/year);

- PEOPLE'S REPUBLIC OF CHINA - PAOSHAN: Cost estimated $US 3,000 per ton First stage (30 million tons).

- PROVINCE OF TAIWAN - CSN - KAOSHIUNG:

  - First stage (1978): $US 430 per ton,
  - Second stage (1982): $US 700 per ton,
  - Third stage (1986): $US 500 per ton.

- REPUBLIC OF KOREA - POSCO (POHANG) completed in 1982 (9.6 million tons) average cost: $US 422 per ton;

- KWANG YANG: First stage: 2.7 million tons
  estimated cost: $US 1,000 per ton;

- KISCO (special steels) expansion, cost per ton: $US 850.

The unit costs given above reflect extremely wide discrepancies: between $US 300 and 1,000 per ton in the case of expansions and between $US 1,000 and 6,000 per ton in the case of integrated units.

There are several reasons for these discrepancies, including:

- The magnitude of the infrastructure costs: These are very heavy in the case of the Nigerian Ajaokuta project (railway line), but they are not taken into account in the case of the Korean Kwang Yang project (harbour construction);

- The impact on the cost of delays in progress in the work: It has in fact been calculated that a single month's delay means an excess cost of 1.5-3 per cent on top of the total cost, 10/ that is to say an excess cost of 18-36 per cent for one year. This explains the cost of ACOMINAS (Brazil), VIZAG (India) and AJAOKUTA (Nigeria);

- The cumulative effect of financial difficulties and delays: A delay causes the cost to rise, which aggravates the financial problems, which results in new delays, etc.;

- The advantage of having an equipment production capability and also national capabilities for construction and control over the running of large sites: This is what permitted the Korean POSCO unit to be completed several weeks ahead of schedule;

- The relation between the high unit cost and the extent of foreign financing: On the one hand, we have the example of the mini iron and steel plant in Togo with a capacity of 20,000 tons/year, financed to the extent of almost 100 per cent by external credits costing over $US 2,000 per ton; on the other hand, we have the example of the Korean Kwang Yang integrated unit, costing $US 1,000 per ton and financed to the extent of 65 per cent by equity or Korean credits and to the extent of 35 per cent by foreign supplier credits.

The increase in unit costs means that investing in the iron and steel industry requires an enormous outlay which is hardly compatible with the financial possibilities of many developing countries.

The increase in unit costs also has repercussions on the industry's operating costs. It is estimated that depreciation and financial costs represent more than 10-15 per cent of the cost per ton installed. 11/ We can measure the benefit of an installation costing less than $US 1,000 per ton (420 in the case of POSCO), compared with an installation costing $US 3,000 or more per ton. As a result of the increase in the amount of depreciation and interest, these tend to become a decisive factor in the costs, while a reduction of a few dollars in operating costs requires an intense and long-lasting effort.

A low unit cost, relatively large share of equity (or national credits) and favourable external financing terms are the conditions that ensure the viability and even the possibility of investments in the iron and steel industry.

7. FINANCING SOURCES

Finance may come from national, regional or international sources. It is made up of loans granted on commercial or preferential terms or even grants. It may take new forms, for example by including compensatory elements.

World Bank group. Its intervention is considered by other lenders as a guarantee. The group intervenes by means of direct holdings taken out by the International Finance Corporation. The IFC has participated in the capital of MEXINOX (Mexico), COSIGUA (Brazil), DALMINE (Argentina) and AHWAZ (Iran). It also

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10/ Ben Bouali UNIDO, November 1980.

11/ 17 per cent according to J. Astier, SEAISI Quarterly, fourth quarter, 1980.

has a holding in the DEKHEILA (Egypt) and CARAJAS (Brazil) projects. Although a few years ago it participated exclusively in the capital of private groups, it has since broadened its participation to companies dominated by public capital (AHWAZ and DEKHEILA). The group also intervenes by means of loans granted by the Bank. These loans were relatively numerous between 1970 and 1980, but they are tending to become rather more exceptional. Dekheila (Egypt) and Carajas (Brazil) have received a loan from the Bank. According to a representative of the World Bank, very few new iron and steel projects are today likely to satisfy reasonable criteria of economic profitability. 12/ In any event, World Bank loans go to a limited number of countries: Brazil, Mexico, Turkey, Islamic Republic of Iran and Egypt. The current trend is not towards diversification of recipients.

The regional banks. The regional banks in Latin America, Africa or Asia have been scarcely or not at all involved in financing iron and steel projects. No changes appear to be emerging in this area, except possibly in Latin America, where the strength of the links established between the iron and steel makers in the region could enable them to make an effective approach to the Inter-American Development Bank.

The commercial banks. These are generally withdrawing because of the dual risk connected, firstly, with the global debt situation and, secondly, with the uncertain profitability of iron and steel projects. Commercial credits are nowadays structured under the aegis of national guarantee and insurance agencies within the framework of financial arrangements where an injection of bilateral aid makes it possible to propose preferential terms. The commercial credits are thus incorporated in "packages" organized and selected in accordance with national export strategies (England, Japan, France, Germany, etc.). These selective policies are advantageous to the new industrial countries or countries where the markets are considered as decisive for economic or strategic reasons.

In a context of scarcity, commercial credits are strictly circumscribed within State policies, both in the western industrialized countries and in the CMEA countries.

The USSR has long been practising a policy of active co-operation in the field of iron and steel (major integrated projects):

- ISKENDERUN project (Turkey);
- HELOUAN project (Egypt);
- EL HADJAR project (Algeria);
- PIPRI project (Pakistan);
- BOKARO project (India);
- VIZAKAPATNAM project (India);
- AJAOKUTA project (Nigeria).

Financing agreements with the USSR have the special feature that, in certain cases, they allow for partial reimbursement of loans in kind from the production of the plant itself.

12/ JWP Jaffe - IISI Congress, October 1977.

Soviet loans used to be granted under very favourable terms: for example, in the case of PIPRI (Pakistan, 1979), a loan of $US 450 million reimbursed after a 12-year period of grace, with an interest rate of 2.5 per cent. However, paradoxically, the terms of preferential loans granted by the western countries are close to these exceptional terms, be it with regard to the preferential interest rate (3.5 per cent), the period of grace (7 years) or the maturity (25 years).

In most cases, this is advantageous to of a small number of recipient countries that are stakes in exacerbated international competition.

Compensation agreements. These have developed rapidly in recent years, particularly in South/South relations. These agreements do apply to the iron and steel industry but, in reality, they apply more to the circulation of the products of the iron and steel industry than to the building and financing of the iron and steel installations themselves. The Brazilian iron and steel industry is entering into several compensation agreements envisaging, amongst other things, the exchange of Brazilian iron and steel products, generally in return for oil:

- Agreement between Brazil and Iraq (1985);
- Agreement between Brazil and Malaysia (1985);
- Agreement between Brazil and Nigeria (1985).

Compensation as an instrument for financing iron and steel projects is practiced by the USSR (Vizakapatnam project in India). It is also being used in the case of the Brazilian TUBARAO unit where the holdings in the capital taken out by KAWASAKI and FINSIDER were partially offset by the provision of rolled slabs. However, it does not seem that this approach is finding general acceptance.

National banking systems. External credits are designed to cover costs in foreign exchange. On average, they represent at least 50 per cent of the overall cost of a project, sometimes less (35 per cent in the case of Kwang Yang in the Republic of Korea) and sometimes far more. Since the equity of the contracting iron and steel companies is generally limited, there is a place for national credits and for national systems of financing (banks and specialized agencies). We find that, in some cases, the inadequate intervention capability and coverage of national financing systems is reflected by a - theoretically not indispensable - recourse to foreign financing. Hence, failure to give sufficient attention to promoting a national financial system may contribute to aggravating the external debt of the iron and steel companies, as well as the countries to which they belong.

8. TERMS AND CONDITIONS OF FINANCING: INFRASTRUCTURE AND TRAINING

There is a great gulf between the conditions of financing for the Dekheila (Egypt) unit, with holdings in the company capital by IFC and Japanese companies, as well as loans from the World Bank and from Japan (maturity: 30 years) under favourable terms, and the conditions for the completion of ACOMINAS (Brazil), where short-term loans linked to future production of billets must be negotiated with commercial companies and banks. 13/

As a general rule, we find that financing conditions have tended over recent years to become more severe, but also more selective. Interventions by the World Bank in the iron and steel industry concern and have concerned only a small number of countries: Brazil, Mexico, Turkey, Egypt and the Islamic Republic of Iran.

13/ Metal Bulletin, 23 July 1980 and 8 October 1985.

The same can be said of preferential bilateral credits 14/ ("mixed credits" where a portion of bilateral aid makes it possible to reduce the interest rate and to extend the period of grace and maturity), which are systematically oriented towards a small number of countries and sectors: a mere dozen countries benefit from more than 75 per cent of this kind of credit. In the case of France, these credits are destined for a few countries, including Brazil, India, the People's Republic of China, Indonesia, Morocco and Tunisia. In the case of Japan, 85 per cent of preferential credits arranged thanks to the participation of the Overseas Economic Co-operation Fund goes to 11 countries, all in Asia (except Egypt). These selective arrangements have a view to promoting the exports of the major industrialized countries and take account of the following:

- The level of risk incurred in the various categories of developing countries (the countries in Africa south of the Sahara are mostly systematically ill-considered or excluded);

- International competition, which is becoming more acute in connection with the projects and markets considered as being the most promising, leading to, for example, a period of grace of 7 years, a maturity of 25 years and an interest rate of 3.25 per cent on a recognized capital market in Indonesia;

- The risk of a boomerang effect on the international market of the starting up of a new iron and steel unit. This is why Japan is holding back its agreement regarding the financing of a new unit in Indonesia and why it only agreed to participate in the construction of Kwang Yang in the Republic of Korea as a result of pressure and constraint by international competition (Germany and Austria).

The favourable and preferential financing of iron and steel installations has become a highly selective instrument for the major industrialized countries, through the procedures for using assistance to improve credit terms.

Until now, the financing of training, as well as that of the building of infrastructure has not escaped these general conditions. The various studies carried out into these matters 15/ show that the credit systems of the major industrialized countries were set up in order to promote exports of capital goods, as well as to create or to maintain jobs. Consequently infrastructure and training are only seen in terms of overall systems, which are essentially made up of machines and equipment.

The use of preferential credits for the construction of infrastructure connected with a new iron and steel unit is possible, provided that it is very restricted: not more than 15 per cent of credits covered by a guarantee (EC GD), in the case of the United Kingdom. Over and above this 15 per cent level (and it does seem that this is a general rule) it is necessary to have recourse to bilateral or multinational "aid", without reference to a specific procedure for the iron and steel industry.

14/ See "Developments in the financing of industrial projects in developing countries since 1982", Joan Pearce, UNIDO Consultant, July 1985.

15/ "The use of mixed credits in the United Kingdom for the financing of industrial training and infrastructure", Kenneth Windsor, August 1984. "Policies of export credit agencies in financing of training component in industrial projects", Joan Pearce, UNIDO/PC/54, 28 September 1982.

The use of preferential credits for training operations is beginning to receive greater attention from exporters. Training is considered by some exporters as an important feature in an "export package" likely to constitute a sales argument. While export credits covered by guarantee may be granted for training, it is generally on condition that the training is an integral part of a "package" focusing on the export of capital goods.

A trend is emerging to look upon training as a service which all the more deserves to be considered in its own right since it may in time lead to sales of equipment and, moreover, it is becoming an asset in international competition. This is, for example, the very prudent attitude of the British authorities. The French agencies (BFCE-COFACE) prefer to provide finance and export guarantees in respect of capital goods and machinery units. They are more reluctant to provide guarantees in respect of the export of services. In Germany, on the contrary, it is possible to finance (KFW) and to guarantee (HERMES) the separate export of training services. Japan (EXIMBANK) is now looking in the same direction, but this is restricted to major projects in the case of new industrial countries. 16/

The question of preferential financing for training operations is thus still topical and unresolved, particularly in the case of projects and countries which are not stakes in the larger picture of international competition. Without doubt, awareness of the importance of training is relatively recent. It will therefore undoubtedly require increased pressure by purchasers and by exporters for more appropriate solutions to be developed in this area.

16/ J. Pearce, op. cit.