



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

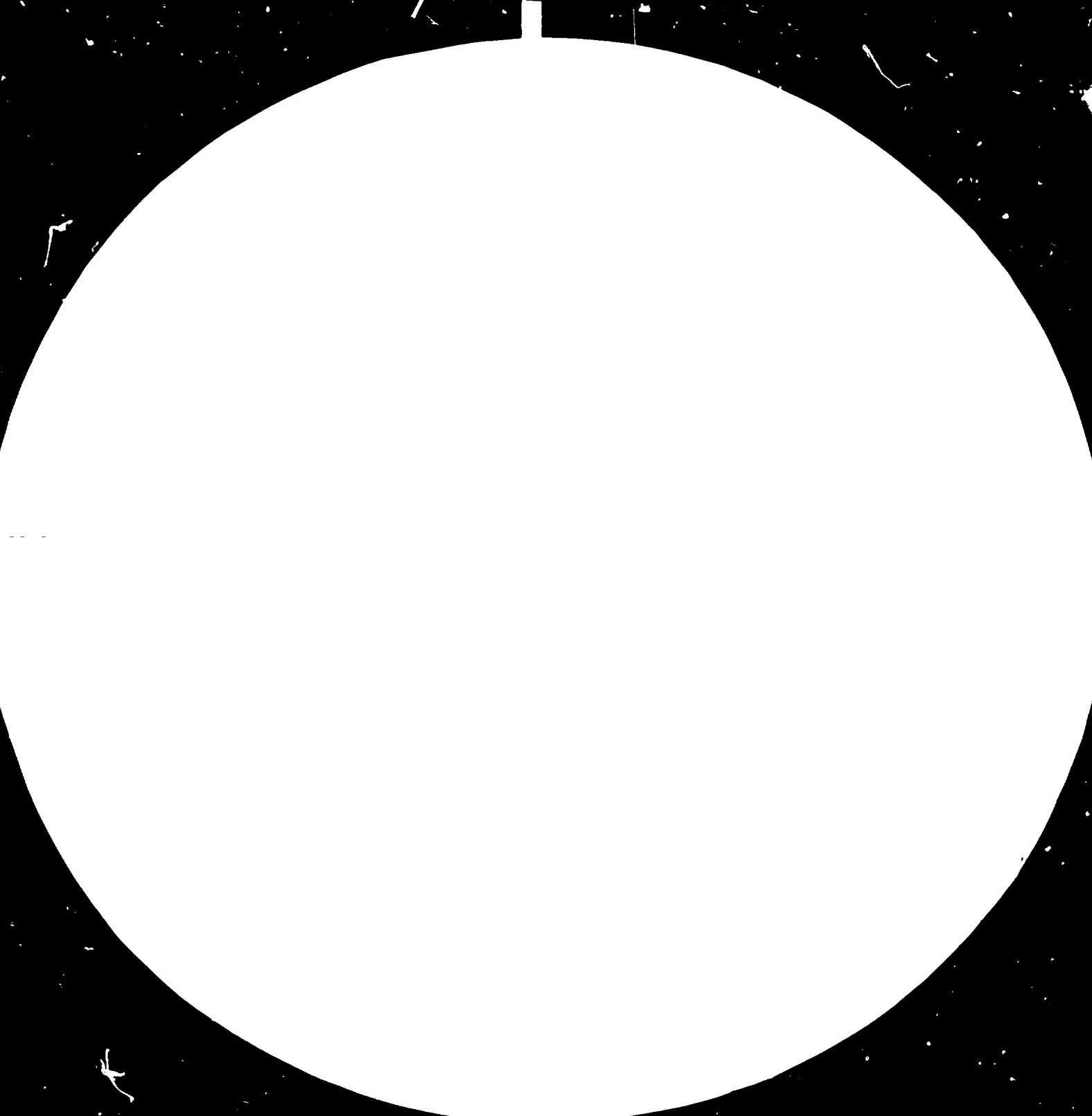
FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org





2.8



MICROCOPY REPRODUCTION OF THIS PATTERN IS AVAILABLE FROM THE NATIONAL BUREAU OF STANDARDS, Gaithersburg, MD 20899.

U.S. GOVERNMENT PRINTING OFFICE: 1978 O-274-100



11620-E



Distr.
LIMITED

ID/WG.374/3
29 June 1982

United Nations Industrial Development Organization

ENGLISH
Original: French

Third Consultation
on the Iron and Steel Industry
Caracas (Venezuela), 13-17 September 1982

Issue No. 2.

THE FINANCING OF IRON AND STEEL PROJECTS
IN THE DEVELOPING COUNTRIES */

4000 0000

00 000

*/ This document has been reproduced without formal editing.

V.82 28306

CONTENTS

	<u>Page</u>
I. THE FACTS OF THE PROBLEM	1
II. THE "PROFITABILITY" OF THE IRON AND STEEL INDUSTRY	1
III. DISSOCIATING THE RISKS INVOLVED	5
IV. THE PLACE OF FINANCING IN IRON AND STEEL INDUSTRIAL ARRANGEMENTS	7
V. NEGOTIATED INTERNATIONAL SOLIDARITY	10
NOTES	13

ANNEX

Table 1	16
Table 2	17

I. THE FACTS OF THE PROBLEM

1. The cost of financing projected new plants has been estimated at US\$100 billion in the low growth scenario. Of this sum, it can be considered that US\$70 billion are currently financed, leaving US\$30 billion to come.

The cost of financing the normative scenario has been estimated at US\$170 billion, of which US\$100 billion are still to be found. The funds would have to be mobilized in the next few years so that the investments required to meet the 1990 production figure can be made in good time.

2. Finance for the iron and steel industry can be secured by self-financing and local savings, by private or public bilateral loans, by multilateral loans, or by a combination of these sources. There is no specific iron and steel financial market. The iron and steel industry competes with other sectors both nationally and internationally.

The financing of projects therefore depends on the priority given to investment in the iron and steel industry at the national level, on the local resources available, and on the attractiveness of the sector for foreign capital.

3. Financing is an obstacle to the construction of new iron and steel units. However, the height of the obstacle varies according to the extent of local contributions, the general interest displayed by the requesting country, the characteristics of its indebtedness and the size and specific attraction of its iron and steel project(s).

It follows that the problem of financing iron and steel projects in the developing countries must not be viewed globally but in terms of categories of projects and groups of countries which find themselves in similar situations. This is what is attempted further on.

II. THE "PROFITABILITY" OF THE IRON AND STEEL INDUSTRY

4. The financial difficulties facing certain developed countries in restructuring their iron and steel industries and those developing countries that wish to create or to develop their own industries raise two essential and interrelated questions: is iron and steel still an attractive sector for capital investment, and can it yield an economic surplus?

5. The financial analyses made by companies in the market economy developed countries show great differences in circumstances both among countries and within them, as well as variations in the time factor. These analyses are difficult to make and to interpret. They require a transition from the measurement of profits at current prices to their measurement at constant prices (this operation is necessary if real results in countries with high inflation rates are to be assessed) and from the latter to a calculation of the monetary gains or losses due to financial charges, and finally to the calculation of net dividends after payment of taxes.^{1/} Profits and the return on capital can evolve in parallel, but it is also possible that profits in current money terms may increase while the return on capital in constant money terms falls.^{2/} The latter is the final criterion as far as the ability to attract capital is concerned.

6. In the logic of the market economy - which is predominant in most developing countries - there is no reason why capital should not continue to be invested in the iron and steel industry if, compared with other sectors, the latter is capable of yielding a comparable rate of profit. Moreover, it appears that this is clearly the case with those iron and steel industries with the highest performance levels. Nevertheless, productivity and profitability may fluctuate in the same direction or in opposite directions. They may diverge when, for example, despite productivity gains, the relative costs of inputs and outputs move in different directions in favour of the former or when, conversely, despite a fall in productivity, the "terms of trade" of the enterprise or sector improve.

7. The "profitability" of iron and steel industries must therefore be assessed in broader terms than apparent financial profitability - although the latter constitutes the essential criterion when bankers have to take a decision. In fact, in many countries the iron and steel industry is experiencing a double price squeeze from both upstream and downstream: from upstream by the raising of energy prices and from downstream by the turn-round of iron and steel markets, which are becoming buyers' markets. Part of the productivity gains of the iron and steel industry is passed on to downstream industries in the form of improved quality. That is why it would be useful to make some measurements of the economic productivity of iron and steel enterprises, measurements which - especially in a period of inflation -

should supplement financial analyses. ^{3/} These measurements are based on the establishment of price indexes for inputs and outputs making it possible to dissociate, in the profit (profitability) element, what is derived from the specific productivity of the enterprise or the iron and steel sector from what is derived from economic transfers, positive or negative, upstream and downstream, through changes in prices. When this information has been processed it is then possible to calculate the economic surplus created, whether positive or negative. ^{4/}

8. The profitability of iron and steel enterprises in developing countries depends on many factors: pricing policies for products and inputs, tax policy, dividend distribution policy, the cost of depreciation and the way in which it is calculated, the interest rate on money, and economic productivity. The aim of the latter is "to optimize the economics of the means of production", that is to say to save work time, to economize on raw materials, and to obtain maximum results as far as parts per thousand, energy and equipment are concerned with a view to achieving a maximum output of a given standard quality.

9. The "comparative advantages" which some developing countries may enjoy in the form of low energy and labour costs and the possession of iron mines may be more than offset by the difficulties involved in start-up, the absence of an infrastructure, and the cost of depreciation and of financial charges.

Thus, for example, correct start-up has a decisive effect on the economic and financial results obtained. Any apprenticeship requires an expenditure of time and money, which should be kept as low as circumstances permit. However, plants delivered to the developing countries have generally been designed to be profitable in developed countries with very high operating rates (90, 95 per cent), in conditions where the productive apparatus has been mastered or where it is surrounded by an efficient infrastructure.

Several consequences follow from recognition of these negative factors.

10. It must be realized that the prices of iron and steel products from the new units would necessarily be above world levels, even with modern and competitive plants. What is more, in the market economy developed countries domestic prices of iron and steel products are higher than export prices. ^{5/} This may lead to accusations of dumping and to law suits. Consequently, a delicate balancing act is required in the developing countries in order to

fix realistic and stimulating domestic prices for iron and steel products and to prevent them from becoming an excessive form of protection encouraging slackness and a low level of efficiency. In addition, higher domestic prices in some developing countries could be a handicap for the user industries. Indeed, in some countries the latter seem to be pressing for the importation of lower priced steel from abroad. Nevertheless, in many developing countries the metalworking sector is very weak, as are other user sectors, and there is a greater degree of freedom for the adoption of a pricing policy favourable to the iron and steel industry.

11. Account has to be taken of the fact that in some developing countries the iron and steel industry meets the cost of establishing and maintaining the infrastructure. This infrastructure is both technical (roads, ports, electrical plant, water supply) and social (workers' housing, in particular). In the developed countries, however, this infrastructure - or at least the technical infrastructure - generally forms part of the "heritage" of society or is supported by public financing. In the developing countries the cost of constructing the infrastructure and, generally, the "external appurtenances" of the industry is transferred to the industry itself. The situation is complicated by the fact that, in international financing, the infrastructural costs associated with projects are not usually financed. It follows that a change should be made in the financial arrangements for projects so as to guarantee infrastructural financing.

Obviously, if domestic financing - in this case public - is not available for this purpose in the developing countries, the whole viability of the project is endangered, since delays in establishing an adequate infrastructure, or the absence thereof, interfere with start-up or can even stop it altogether. The profitability of iron and steel projects therefore requires the complete financing of the productive apparatus, including the infrastructure.

12. The decisive importance of manpower training must also be recognized. It is quite impossible to transfer, in a very short space of time, a large amount of knowledge to a large number of people. It must be borne in mind that it took decades of experience, of apprenticeship and of industrial tradition for the developed countries to master their present productive apparatus. Paradoxically, however, this is the most neglected part of industrial arrangements, or is even not to be found in them. The question

is so important that it constitutes Issue No. 1 submitted to the Third Consultation on the Iron and Steel Industry. However, it should also be raised in connection with the financing of industrial projects, so that manpower training is included in it as an essential component.

13. In short, the iron and steel industry in the developing countries can be both "profitable" in the financial sense of the term and "productive" in the economic sense. Productivity and profitability can go hand in hand if the prices of factors and products do not diverge too far. "Profitability" should not be considered from a narrow point of view. In a well-designed industrial strategy the establishment of an iron and steel industry is rarely an end in itself. It is a pole of development whose forward and backward linkages on other industrial sectors, particularly the metalworking industries, have to be organized.

The iron and steel industry can create an economic surplus capable of being distributed among the economic units of the enterprise and its customers and suppliers if it attains high productivity levels.

Such high productivity levels depend on the quality of project planning and implementation, on the co-ordinated construction of the infrastructure, on a systematic manpower training programme and on the existence of a social policy within the enterprise. They also depend on how well the operators co-operate with one another and on the extent to which the foreign transmitters of the technology, equipment and organization are committed to making a success of the iron and steel industry in the recipient country. That is why the way in which the industrial arrangement is "put together" is of decisive importance.

III. DISSOCIATING THE RISKS INVOLVED

14. If the preceding conditions - the provision of sufficient financing for the infrastructure and adequate manpower training - are fulfilled, some of the risks inherent in making iron and steel projects profitable would be reduced.

Moreover, project planning, plant design and project programming and implementation are essentially - and sometimes exclusively - carried out by process engineers in the developed countries. In these circumstances, the "good project" is largely determined by those who possess the technology,

the capital goods and the organization - in other words the enterprises concerned in the developed countries. This helps to reduce risks further. There remain the risks associated with changes that may occur in local policies regarding the repatriation of profits and the nationalization of invested assets - risks which are appraised by bankers on a country-by-country basis. However, risk is inherent in any enterprise and cannot be eliminated entirely. That is why the theory and practice of the "good project" tends to envisage the possibility of dissociating, at least in part, the financial risks attaching to the project from those attaching to the country.

15. A series of ratios has been established for a sample of 45 developing countries having iron and steel projects (see Dossier No. 7): these ratios cover projected iron and steel investment costs compared with the level of the country's indebtedness, debt servicing, creditworthiness, comparisons between gross national product and gross fixed capital formation, domestic savings, exports of goods and services, and official and private external credits. They are summarized in table 1 in the annex. An analysis of these factors shows great differences among developing countries with regard to their capacity to attract capital.

The situation seems particularly difficult for countries which have a number of negative ratios - for example, a high percentage of projected iron and steel investment in relation to gross national product, a high rate of indebtedness, substantial debt servicing in relation to exports, relatively low rates of savings and exports, and an unfavourable credit ratio.

In the decisions to be taken in the next few years concerning the external financing of iron and steel projects it is probable that particular account will be taken of the debt servicing ratio; this might create difficulties for developing countries where most financing is private and which have relatively large projects, even if other ratios appear to be favourable.

With regard to countries having small and very small iron and steel projects, over half of which are newcomers to the industry, out of a sample of 18 countries for which sufficient data are available, half appear to be in a rather favourable situation as far as the attraction of external financing is concerned.

With regard to countries having medium-scale projects, 10 appear to be in a favourable position and eight in an unfavourable position.

With regard to large projects, three countries seem to be in a favourable position and two in an unfavourable position.

In all, in the sample a total of 22 countries appear to be in a not too unfavourable position in respect of their capacity to attract foreign capital, both private and official, whereas 19 seem to be in a clearly unfavourable position. However, the projects of countries whose financing situation seems to be attractive represent a planned production capacity of only 35 million tonnes out of the 91 million tonnes covered by the 45-country sample, ^{6/} i.e. less than 40 per cent.

16. This finding reinforces the previous conclusion: through increased co-operation between operators in North and South, viable projects involving the minimum of risks have to be designed and implemented and, if that is done, the risks attaching to the project would have to be dissociated, at least in part, from those attaching to the country. Unless this happens it is most likely that the development of the iron and steel industry will be blocked in a number of developing countries where a poor domestic savings rate rules out self-financing. This also means considering the set of problems arising in the negotiation of financing in industrial arrangements.

IV. THE PLACE OF FINANCING IN IRON AND STEEL INDUSTRIAL ARRANGEMENTS

17. Financing plays a central but not exclusive role in the negotiation of iron and steel arrangements. Financing is usually not the first term but the resultant of negotiations in which other factors come into play. This reduces the very real difficulties involved in financing iron and steel projects in developing countries to relative terms and introduces greater flexibility in the way negotiations between the partners are visualized.

18. Iron and steel negotiations have three dimensions: participants, types of project, and negotiable variables.

19. The participants are: the buyer (the recipient), the seller(s) or transmitter(s), and the financial sources.

- The buyers are the Governments of developing countries or private enterprises.
- The sellers fall into four groups: process engineering firms, equipment suppliers, steel fabricators, or consortium combinations.
- The financial sources are the international development banks, export credit banks, and commercial banks.

The partners enter into combination according to their strength, their interests and their respective strategies. These may depend on the general industrial situation. For example, companies which are losing money on the sale of iron and steel products may be interested in selling their technology and equipment when they manufacture it themselves.

The recipient may have a number of objectives, including the utilization of his natural resources, developing his capital goods industry, obtaining foreign exchange through exports, and building up a national technological capacity. The acquisition of technology can give rise to various strategies: "operational" when the purpose is to make a rapid transfer of production capacities and efficient management, which may imply the installation of turnkey factories and foreign management; ^{7/} "duplicative" when the purpose is to train local personnel capable of replacing, in the course of time, foreign assistance for processes that have been tried out; ^{8/} "innovative" when the purpose is to develop new production processes or to make a creative adaptation of existing processes by local engineering, ^{9/} or to go ahead with the initial introduction of production processes which have not been tested elsewhere. ^{10/}

20. The types of project are:

- Large iron and steel projects: the associated partner or partners supplies or supply all or part of the financing, equipment, technology, technical assistance, combining in varying proportions with local contributions of raw material, energy, manpower, capital goods and cash counterpart contributions.

The export of iron and steel products can serve, wholly or in part, as a means of payment. Furthermore, the destination of any exports can be agreed upon with a view to shifting competition to areas where it will not affect the parties concerned.

Generally, large projects involve high investment costs, complex technology, a substantial infrastructure, a long period of project gestation, and a high degree of dependence on external economic conditions.

- Direct reduction projects: this negotiating category may cover both large and small iron and steel projects. However, it is advisable to consider it separately. It accounts for 40 per cent of the projected production capacity, 90 per cent of which would be located in countries having their own gas, while the technical processes are in the hands of a small oligopoly of industrial companies in the developed countries.

Generally, direct reduction projects require less capital, the technology is less complex and the gestation period is shorter, but the provision of adequate supplies of raw materials and energy constitutes a critical point.

- Projects for small iron and steel units: the scale of the negotiations is more limited owing to the fact that almost all the output is intended for the domestic market, the technology is not so complex, less financing is required, and less time is needed for project implementation.
- Projects for entering the iron and steel industry: through partial vertical integration, either by beginning with end-products or by following the order of consecutive operations in the technological route selected (see Issue No. 3).

In the case of these projects and, in particular, of the large projects, the stakes for the foreign partners may involve, inter alia, access to sources of energy and raw materials in the host country and penetration of its market in general.

The counterpart contributions offered in return for financial support and the transfer of technologies may be provided outside the iron and steel sector.

21. The negotiable variables are:

- Raw materials and energy
- Capital goods
- Technical assistance
- The auxiliary infrastructure
- Financial participation.

22. There is some logic in shaping negotiations in accordance with the objectives of the participants and the interfaces between the negotiable variables and the types of project. These interfaces are briefly described in table 2 in the annex and commented on in Dossier No. 7 on "Financing". ^{10/}

The structural characteristics of the different types of project affect the position and sensitivity of the negotiable variables, which contain different degrees of uncertainty and risk. The risks can be reduced or

increased depending on the essential choices made with regard to the project, the selection of technologies and the partners. The effect of the risks on the profitability of the enterprise can be enormous. They have to be taken into account before - or at least when - the financial decision is taken. Thus the choice of a partner offering an attractive financial participation can prove disastrous if the future operational efficiency of the project depends on unattainable performance levels and entails too many risks and uncertainties. The same is true when efforts to minimize the financial burden of projects take the form of reducing the financing for infrastructural and manpower training requirements.

The advantages and trade-offs of a project therefore have to be appraised from the point of view of their cost-effectiveness and criticalities. Consequently, countries - and national enterprises under their jurisdiction - which have a minimum of bargaining power owing to their natural resources, their market or any other factor have scope for playing off different variables involved in the negotiations and for reducing the financial constraint to relative terms.

V. NEGOTIATED INTERNATIONAL SOLIDARITY

23. The implementation of iron and steel projects in the developing countries is possible only through the co-operation of the developed countries. The normative scenario is essentially that of international co-operation.

24. Apart from the problem of financing, the following substantive issues are raised:

- Is it possible - and is it desirable - in this sector to enter into a joint, organized venture having a foreseeable development which commits the iron and steel partners, the manufacturers of capital goods and the governments concerned?
- Is it desirable to help to promote iron and steel industries in the third world, where almost all projects - 110 out of 116 million tonnes - are geared to domestic markets?
- Is it desirable to give absolute priority to the reconstruction of certain national industries in the developed countries and to postpone co-operation in building new iron and steel capacities in the South until later?
- Is it possible, despite the iron and steel recession in some countries, to help with the implementation of projects in the developing countries?

25. If the partners in the developed countries - iron and steel producers, manufacturers of capital goods and governments - adopt a positive attitude to iron and steel projects in the developing countries, it would be advisable to consider how, in particular, the maximum amount of capital could be mobilized for that purpose. Consideration could be given to the following possibilities:

(a) Petro-dollars might be recycled for iron and steel projects under the guarantee of the borrowing government.

(b) Countries with centrally planned economies which have assisted developing countries in implementing iron and steel projects might increase their financing, deliveries of equipment and technical assistance.

(c) Suppliers in the developed market economy countries might be interested in participating financially in projects permitting them to sell technologies and equipment, and even in associating themselves with joint enterprises. In the case of small- and medium-scale projects such funds could cover a large part of the costs.

(d) The system of buy-back agreements might be extended. The advantage of the system is that it provides a further incentive for the partners to export quality products.

(e) The iron and steel industry in the developing countries might also be given higher priority at the World Bank, whose catalytic role in financing is important.

26. One of the basic conditions for the mobilization of capital is that projects should have optimum chances of success. When these are assured, this should lead, at least in part, to a dissociation of the specific risks attaching to the project from those attaching to the country.

The "good project" is not only one in which the theoretical financial profitability will be high or in which the technological options will be sound; it is one in which, in addition, the auxiliary infrastructure required for production will have been completed and in which manpower training will have been appropriately carried out.

The profitability of a project requires that things should not be only half done and that the financing should not be only partially provided. Infrastructural and manpower training requirements must therefore also be financed.

27. The financing of the iron and steel infrastructure in developed countries is more often than not an accumulation of past achievements or is provided out of public funds.

There is little scope for this in the developing countries. Consideration should therefore be given to whether such financing can be included in the customary industrial arrangements or whether it needs other types of supplementary agreements involving the industrial partners and governments concerned.

28. The financing of manpower training should form part of the financing of industrial arrangements, of which it currently represents only a small proportion.

Training the manpower which developing countries need is one of the most noble tasks of international co-operation. Active solidarity should therefore be displayed in this field, where the contributions and counter-part inputs could be as follows:

- In the case of the developing countries: the allocation of a higher proportion of their budget to training;
- In the case of the developed countries: the assumption of responsibility for the cost of training in project financing, a reduction of unit costs, and an improvement in the quality of training.

29. International solidarity could also be displayed at governmental level in the industrial countries:

- By assuming responsibility for the costs of financing infrastructural works and training when the partners in industrial arrangements are unable to do so;
- By increasing official development aid with a view to contributing towards the implementation of small iron and steel projects in countries which plan to enter the industry and which seem unlikely to attract private capital.

These are the main points which are submitted to the Third Consultation on the Iron and Steel Industry for discussion.

NOTES

- 1/ See "How 400 companies really performed in 1981", Business Week, 3 May 1982.
- 2/ In 1981 the profits of the United States iron and steel industry increased in current dollars by 54 per cent as compared with 1930, and by 35 per cent after deflation by the GNP index; however, dividends increased by only 2 per cent in current dollars and fell by 6 per cent in constant dollars - "Inflation Scoreboard", Business Week, 3 May 1982.
- 3/ Much work was done on this subject in the 1960s. Within the Economic Commission for Europe, the measurement of productivity in the iron and steel industry gave rise to many publications. In the USSR the measurement of labour productivity in physical units led to many debates (see the works of S. Stroumiline, J. Kvacha, M. Federoykh and I. Katz, in particular). The analysis of the links between productivity measurement and wages has been the subject of research in the European Coal and Steel Community. This has led to the preparation of synoptic tables for the principal productivity formulae, their significance and field of application (see "Problèmes et méthodes de mesure de la productivité dans les industries de la communauté" by P.F. Gonod, H.C.C. Manninga and C. Vannutelli, Luxembourg, 1964). Methods of measuring the productivity of an enterprise were then prepared by dissociating the prices and quantities of inputs and outputs, by calculating an index of the "terms of trade" making it possible to separate out, in the profitability of an enterprise, the elements resulting from productivity from those resulting from economic transfers made through prices ("Rentabilité-productivité pour un diagnostic de l'entreprise", by Hubert Sainmont, CNIPE, December 1968). Interest in measuring productivity declined in Western Europe and many developing countries in the 1970s as the result of various influences, whereas interest in the subject was reborn in the United States of America under the policy of linking productivity, prices and wages.
- 4/ The economic surplus is what remains after all the factors affecting production have been remunerated. There is a surplus because the value of the products increases faster than the value of the factors, both measured at constant prices, in other words because the volume of the products increases faster than the volume of the factors. Surplus accounts establish an accountable equality between the surplus earned and the surplus assigned (see "Les dividendes du progrès, les performances des entreprises, le surplus et la théorie des jeux, les élus et les exclus, les revenus: une méthode pour une politique", by Pierre Masse and Pierre Bernard, Editions du Seuil, 1969).
- 5/ See "The Steel Strategist" by Peter F. Marcus and Karlis M. Kirsis, in World Steel Dynamics, February 1982 and, by the same authors, "Exhibits for the annual meeting of the Canadian Steel Service Center Institute", Toronto, Canada, 17 May 1982, Paine Webber, Mitchell Hutchins Inc.

- 6/ It will be recalled that in the normative scenario the new projected capacities amount to 116 million tonnes.
- 7/ The case of Qatar illustrates this strategy.
- 8/ The case of Algeria is representative of this strategy.
- 9/ The example of Mexico can be cited for direct reduction processes.
- 10/ Jack Baranscn: "Negotiating for iron and steel industries - The central role of finance", UNIDO, May 1982.

ANNEX

Table 1

FINANCIAL RATIO FOR A SAMPLE OF DEVELOPING COUNTRIES WITH IRON AND STEEL PROJECTS

Country	EIS GDP	DOD GDP	DS EXP	GDI GDP	GDS GDP	EXP GDP	CRED RAT	CROSS FLOW	
								%	
								OFFICIAL	PRIVATE
Group 1: 1-100 (100 T)									
* Bolivia	5.6	37.6	26.0	21	15	19	21.9	36.8	63.2
Burma	1.5	14.0	17.6	15	11	6	-	72.6	27.4
Cameroon, United Republic of	1.1	24.6	6.9	22	16	27	-	55.6	44.4
* Central African Republic	4.1	24.3	3.5	22	7	18	-	53.2	46.8
* Congo	3.4	70.1	9.7	22	-1	40	15.3	67.0	33.0
* Gabon	4.9	45.8	10.4	65	59	52	35.3	20.6	79.4
* Honduras	6.5	33.8	12.8	24	17	36	-	65.3	34.7
Ivory Coast	1.2	32.3	10.5	26	23	39	44.2	19.7	80.3
* Paraguay	4.4	17.9	10.8	26	19	14	46.0	57.8	42.2
* Senegal	3.5	25.2	7.8	19	6	34	25.4	54.0	46.0
Togo	6.9	45.8	10.6	34	11	32	-	40.3	59.7
* Yemen, Democratic	-	39.2	0.7	-	-	-	-	100.0	-
* Zambia	3.6	54.1	15.0	27	23	39	16.3	54.5	45.5
Group 1 Total	3.9	35.6	10.9	27	17	30	29.2	53.6	46.4
Group 2: 101-250 (1000 T)									
* Bahrain	-	-	-	-	-	-	-	100.0	-
Ghana	45.9	10.1	4.8	-	-	-	-	97.8	2.2
Jordan	25.8	32.9	3.5	43	17	46	47.9	61.5	38.5
* Oman	-	21.4	5.5	-	-	-	-	46.7	51.7
Singapore	0.4	13.4	1.2	38	28	160	78.6	27.6	72.4
Tanzania, United Republic of	21.6	29.0	7.2	21	12	18	16.8	97.2	2.8
Tunisia	4.8	33.4	9.2	31	23	32	48.3	56.9	43.1
Zaire	3.7	60.5	10.3	24	15	29	6.8	42.9	57.1
Group 2 Total	17.0	28.7	6.0	31	19	57	40.0	67.0	33.0
Group 3: 251-600 (1000 T)									
Bangladesh	1.2	30.4	12.5	8	2	6	-	96.2	3.8
Chile	5.3	44.2	41.6	11	11	20	54.4	15.1	84.9
Colombia	8.1	16.9	12.8	21	21	16	59.1	39.2	60.8
Equador	7.6	17.6	11.8	26	26	26	52.3	15.9	84.1
Kenya	10.2	21.1	6.2	22	18	30	42.5	62.5	37.5
* Liberia	75.8	-	-	-	-	-	-	21.0	48.0
Malaysia	7.3	16.1	5.5	24	30	51	72.7	24.5	75.5
Morocco	10.3	32.2	10.6	26	11	19	39.7	37.0	63.0
Peru	4.2	38.0	29.0	16	14	18	-3.4	-2.6	57.4
Philippines	7.3	23.2	18.3	30	24	19	44.4	36.3	63.7
Syrian Arab Republic	31.4	20.5	10.9	30	12	21	32.2	90.5	9.5
Trinidad & Tobago	17.8	8.5	2.6	24	34	49	56.5	14.3	85.7
Group 3 Total	15.4	24.4	14.7	22	18	25	47.1	43.8	56.2
Group 4: 601-1100 (1000 T)									
Algeria	19.7	42.1	16.6	49	40	32	57.4	10.3	89.7
Argentina	11.7	8.6	19.9	24	27	12	63.4	12.9	87.1
Brazil	14.4	22.3	47.6	24	19	7	49.7	11.2	88.8
Egypt	11.6	51.9	20.7	27	13	21	36.0	69.4	30.6
Nigeria	26.0	3.4	1.9	30	30	30	55.8	15.0	85.0
Pakistan	28.7	42.5	13.9	18	7	10	22.1	90.4	9.6
Thailand	13.8	11.1	12.8	27	22	21	52.2	54.5	45.5
Group 4 Total	18.0	26.0	19.1	28	23	19	48.1	37.7	62.3
Group 5: 1101-3500 (1000 T)									
India	14.9	13.8	10.8	22	20	6	50.0	92.2	7.8
Indonesia	8.6	27.6	10.6	21	23	24	57.1	41.7	58.3
Korea, Republic of	6.3	27.0	11.6	29	25	33	55.4	27.2	72.8
Mexico	34.6	24.2	43.4	25	23	10	71.4	7.3	92.7
Venezuela	23.7	13.1	6.6	34	36	32	69.3	3.4	96.6
Group 5 Total	18.0	21.1	16.6	26	25	21	51.6	34.4	65.6

* Newcomer country

- EIS/GDP = Estimated investment costs of iron and steel projects up to 1990 in % of GDP 1975/79.
- DOD/GNP = Total debt outstanding disbursed in % of GNP, 1975/79
- DS/EXP = Total debt service in % of exports, 1975/79
- GDI/GDP = Gross domestic investment in % of GDP, 1975/79
- GDS/GDP = Gross domestic savings in % of GDP, 1975-79
- EXP/GDP = Exports of goods and services in % of GDP, 1975-79
- CRED RAT = Ratio of credit-worthiness 1981, published by Institutional Investor
- OFFICIAL FLOWS = Share of official flows in total external gross flows, 1975/79
- PRIVATE FLOWS = Share of private flows in total external gross flows, 1975/79
- Groups of countries by average capacity per project (total of 45 countries)

Table 2
TRADE-OFFS AND CRITICALITIES, COSTS AND RISKS

Negotiable variables	Type of project		
	Large and complex	Direct reduction	Small-scale
Raw materials and energy	Resulting cost, quality of iron ore and reducer (source of energy) critical for the viability of the project.	Quality (percentage of impurities in the iron) critical. Possibility of using gas when coking coal is rare.	Risks relating to costs and efficiency when low-grade iron ore is used and coking coal is used as a source of energy.
Capital goods	The possibility of obtaining the required capital goods locally depends upon the stage of development of local industry.	The tolerance for locally produced equipment varies from process to process.	A greater possibility of using local sources of equipment and components.
Technical assistance (production and marketing)	Substantial trade-off between the cost of efficiency and the risks and the need to develop local manpower training programmes. The marketing of special steels can be critical in the case of high performance levels.	Moderate trade-offs between the cost of efficiency and risks and the need for training. Possibilities of South-South assistance. Training generally tied to an experienced iron and steel producer in the case of a particular process.	Technical assistance is critical for the design, construction and execution stages of operations. Possibilities of technical assistance from experienced developing countries. Possibility of mastering the technological route step by step.
Auxiliary infrastructure	Critical role of the infrastructure, including transport and social services for the workers. Financial institutions affected by the implementation periods, increases in costs, loss of income due to sluggishness in attaining operational efficiency.	In some cases the source of electric power is the critical point. The critical points depend on the size and complexity of the project.	The reduction in size and complexity lowers the cost of the infrastructure, but when a small-scale iron and steel unit is being introduced in a country for the first time a minimum infrastructure is required.
Financial participation	The critical problem of foreign financing over a long period. A minimum participation of the foreign supplier is important to ensure adequate performance.	Foreign participation probably tied to production results and sales. The inclusion of a buy-back clause can help to ensure high quality and operational efficiency. Financial requirements less tight than in the case of large and complex projects.	In the case of untested technology, financing may be difficult to obtain. The absence of a foreign stake in the project increases the performance risks. The financial requirements are generally less than for other projects.



with
11620-E



Distr. LIMITED

ID/WG.374/3/Add.1
2 August 1982

Original: ENGLISH

United Nations Industrial Development Organization

Third Consultation
on the Iron and Steel Industry
Caracas (Venezuela), 13-17 September 1982

Issue Paper No.2

THE FINANCING OF IRON AND STEEL PROJECTS
IN THE DEVELOPING COUNTRIES

Addendum *

* This document has been reproduced without formal editing

V.82-29251

Table 2. Trade-offs and criticalities, costs and risks (continued 1)

Negotiable variables	Type of project	
	Long products	Flat products
Raw materials and energy	<ul style="list-style-type: none"> - Lower energy input required (less energy-intensive). - Raw materials input varies with process. 	<ul style="list-style-type: none"> - Higher energy requirement than long products (more energy-intensive). - Raw materials input varies with process.
Capital goods	<ul style="list-style-type: none"> - Capital equipment required less sophisticated than for flat products (less capital-intensive). - Greater opportunity for local procurement and sustained demand from downstream industries. 	<ul style="list-style-type: none"> - More sophisticated capital equipment required (more capital-intensive). - Less opportunity for local procurement and sustained demand from down-stream industries.
Technical assistance (production and marketing)	<ul style="list-style-type: none"> - Foreign technical assistance somewhat less critical (varies with process chosen). 	<ul style="list-style-type: none"> - Foreign technical assistance somewhat more critical (varies with process chosen).
Auxiliary Infrastructure	<ul style="list-style-type: none"> - Adequate infrastructure critical to project viability. - Infrastructure requirements vary with process/product chosen. 	<ul style="list-style-type: none"> - Adequate infrastructure critical to project viability. - Infrastructure requirements vary with process/product chosen.
Financial Participation	<ul style="list-style-type: none"> - Finance requirements somewhat less stringent. - Foreign equity participation unlikely. 	<ul style="list-style-type: none"> - Finance requirements somewhat more stringent. - Foreign equity participation possible.

(continued)



with
11620-E



United Nations Industrial Development Organization

Distr. LIMITED

ID/WG.374/3/Add.1/Corr.1
7 September 1982

ARABIC, ENGLISH and
SPANISH ONLY

Third Consultation on the Iron and Steel Industry
Caracas (Venezuela), 13-17 September 1982

Issue Paper No.2
THE FINANCING OF IRON AND STEEL PROJECTS
IN THE DEVELOPING COUNTRIES

Addendum

Corrigendum

Page 3, table 2, entry for capital goods, second column

The first sentence should read Sophisticated EAF technology (including furnace improvements to reduce energy consumption and increase productivity) offers little possibility for local procurement.

Table 2. (continued 2)

Negotiable variables	Production integrated forward from:	
	Pelletization plant using imported/local ore	EAF using imported ore/scrap to make poured pencil ingots
Raw materials and energy	<ul style="list-style-type: none"> - Large water supply requirement limits choice of site. - Delivered cost and quality of iron ore critical to commercial viability of project. - Supply of fuel (coal) and/or additives (limestone, clay) important depending on process selected. 	<ul style="list-style-type: none"> - Delivered cost and quality of imported ore/DRI and scrap critical for project viability. - Risk of instability in long-term supply of imported scrap. - Minimal additional raw materials and energy required for future plant integration forward.
Capital goods	<ul style="list-style-type: none"> - Opportunities to procure required capital goods locally a function of stage of indigenous industrial development. - Required technology relatively unsophisticated. - Sustained demand for local capital goods industry unlikely unless forward integration follows. 	<ul style="list-style-type: none"> - Sophisticated EAF technology (including furnace improvements to reduce increase productivity) offers little possibility for local procurement. - Ingot-casting technology widely available, yet inefficient versus continuous casting when future integrated rolling mill is considered.
Technical assistance (production and marketing)	<ul style="list-style-type: none"> - Moderate trade-off between cost/efficiency/risk and phase-in of indigenous personnel. - Technical assistance widely available, including possible South-South assistance. - Product marketing critical (strong international competition) to commercial viability. 	<ul style="list-style-type: none"> - Extensive foreign technical assistance required during design/construction/start-up ensures high-quality and high value-added product but long learning curve for local personnel. - Possible inefficiency of higher quality product than needed for local market, requiring foreign marketing assistance.
Auxiliary infrastructure	<ul style="list-style-type: none"> - Extensive transport and handling facilities required for ore imports and/or pellet exports. - High initial cost of infrastructure versus simplified forward integration once it is in place. - Moderate social infrastructure requirements. 	<ul style="list-style-type: none"> - Stable electric power supply critical. - Extensive transport and handling facilities required for ore/scrap imports and/or ingot exports. - High initial cost of infrastructure versus simplified forward integration once in place. - Moderate social infrastructure requirements.
Financial Participation	<ul style="list-style-type: none"> - Finance requirements of plant alone are moderate, but when added to infrastructure costs may require significant government and/or foreign participation. - Foreign participation in form of product buy-back agreement possible, may help ensure operational efficiency and quality. - Generation of significant financial resources for future plant integration difficult, given low value-added product. 	<ul style="list-style-type: none"> - Relatively stringent finance requirements may necessitate significant government and/or foreign participation. - Foreign participation in form of product buy-back agreement possible, may help ensure operational efficiency and quality. - Generation of significant financial resources for future plant integration possible.

(continued)

Table 2. (continued 3)

Negotiable variables	Production integrated backward from:		
	Wire-drawing mill using imported wire rods	Re-rolling mill using imported billets	Cold rolling mill using imported hot rolled coil
Raw materials and energy	<ul style="list-style-type: none"> - Cost and stable supply of imported wire rod critical to project viability. - Integration backward to steel and/or iron-making requires significant increase in raw materials and energy supply, with quality of each critical depending on process selected. 	<ul style="list-style-type: none"> - Cost and stable supply of imported billets critical to project viability. - Integration backward to steel and/or iron-making requires significant increase in raw materials and energy supply, with quality of each critical depending on process selected. 	<ul style="list-style-type: none"> - Cost and stable supply of imported coil critical to project viability. - Integration backward to steel and/or iron-making requires significant increase in raw materials and energy supply, with quality of each critical depending on process selected.
Capital goods	<ul style="list-style-type: none"> - Relatively unsophisticated technology required. - Good possibility of local procurement and sustained demand for local capital goods industry. 	<ul style="list-style-type: none"> - Moderately sophisticated technology required. - Possibility of local procurement and sustained demand for local capital goods industry from downstream industries. 	<ul style="list-style-type: none"> - Relatively unsophisticated technology required. - Good possibility of local procurement and sustained demand for local capital goods industry from downstream industries.
Technical assistance (production and marketing)	<ul style="list-style-type: none"> - Foreign technical assistance requirement minimal, short learning curve for local personnel given effective training. - Possible South-South assistance. - Requirement for domestic product marketing assistance minimal. - Benefit of experience with foreign technology supplier for future plant integration. 	<ul style="list-style-type: none"> - Foreign technical assistance requirement moderate, relatively short learning curve for local personnel. - Possible South-South assistance. - Requirement for domestic product marketing assistance minimal. - Benefit of experience with foreign technology supplier for future plant integration. 	<ul style="list-style-type: none"> - Foreign technical assistance requirement minimal, short learning curve for local personnel given effective training. - Possible South-South assistance. - Requirement for domestic product marketing assistance minimal. - Benefit of experience with foreign technology supplier for future plant integration.
Auxiliary infrastructure	<ul style="list-style-type: none"> - Stable electric power supply required. - Social infrastructure requirements moderate initially, with incremental build-up possible for future plant integration. 	<ul style="list-style-type: none"> - Stable electric power supply required. - Social infrastructure requirements moderate initially, with incremental build-up possible for future plant integration. 	<ul style="list-style-type: none"> - Stable electric power supply required. - Social infrastructure requirements moderate initially, with incremental build-up possible for future plant integration.
Financial participation	<ul style="list-style-type: none"> - Moderate finance requirements. - Foreign equity participation unlikely. - Product buy-back agreement may help ensure quality, operational efficiency. - Relatively high value-added product may generate financial resources for future plant integration. 	<ul style="list-style-type: none"> - Moderate finance requirements. - Foreign equity participation unlikely, buy-back agreement possible. - Product buy-back agreement may help ensure quality, operational efficiency. - Relatively high value-added product may generate financial resources for future plant integration. 	<ul style="list-style-type: none"> - Moderate finance requirements. - Foreign equity participation unlikely. - Product buy-back agreement may help ensure quality, operational efficiency. - Relatively high value-added product may generate financial resources for future plant integration.

