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ASSISTANCE OF THE ADVANCED COUNTRIES TO DEVELOP THE IRON AND STEEL INDUSTRIES IN THE DEVELOPING COUNTRIES

Its Forms and Organization; Long-term Credits and the Repayment of it 1/

by

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1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. The document is presented as submitted by the author, without re-editing.

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I. INTRODUCTION

1. The ability of the developing countries to take advantage of the technological advances that are taking place in the developed countries provides the means to narrow down the technological and economic gap between them. Their efforts to stimulate rapid industrialisation and economic growth will inevitably call for large inputs of steel, as it is the king-pin of industrial development. Iron and steel industry enjoys, therefore, a high priority in the economic development programmes of developing countries.

2. Investment in new iron and steel plants imposes a heavy burden on the slender resources of developing countries, and therefore, they have come to rely heavily on foreign assistance, both for finance, as well as technology. The main theme of this paper is to discuss the problems of foreign assistance to develop iron and steel industries in the developing countries. Though the problem of finance is of considerable importance, it constitutes only one of a host of other problems confronting steel development. Vital issues like the choice of technology and the building up of scientific and technological base for its effective absorption, keeping abreast with the techno-

logical explosion in iron and steel making, long-term planning for steel development, plant size, productivity and costs, etc have important bearing on the quantum and type of financial and technological assistance in any steel development programme. These crucial aspects are therefore discussed in some detail, before proceeding on to the question of foreign financial and technical assistance.

3. The observations made on the problems of steel development are mainly based on Indian experience. Though some of the problems of developing countries are similar, many of the countries are at different stages of development and vary widely in size, economic resources, technical skills, etc. While Indian experience may therefore hold good for those countries in Latin America, Asia and the Middle East which have a similar industrial base, the action points indicated may have to be suitably modified to suit the conditions obtaining in other countries.

Widening technological and economic gap

4. The widening gap between the income levels of developed and developing countries underlines the importance of accelerating economic growth in the poorer two-thirds of the world. The developing countries, it is often argued, lack the industrial tradition and basic socio-economic equipment of the west, and they cannot, therefore, hope to compress into the span of a few years, all the technological progress which had taken the western countries centuries to accomplish. This is far from correct. This oft repeated argument

ignores the possibilities of the developing countries achieving accelerated progress through democratic planning.

5. In these days of global cooperation and international efforts at transfer of technology, developing countries have the unique opportunity of taking advantage of the technological advances made elsewhere to accelerate the pace of their economic progress and to 'leap-frog' into a modern society. They can with advantage borrow the advanced techniques and creatively adapt them, adjusting them to the special local needs and circumstances, instead of pursuing the wasteful process of acquiring basic know-how by 're-inventing' things.

6. The criteria of technological growth adopted by the developed countries reflects their own experience and most of these techno-economic pre-requisites of development are either completely absent or at an incipient stage in the developing countries. Though on this analogy, most of the developing countries are not 'ripe' to receive advanced technology, or any technology for many years to come, the developing countries have set out to do precisely this. The compulsion of events and socio-economic pressures have given a sense of urgency to their rapid development. They cannot afford to stop and learn only the basic lessons of technology or adopt intermediate technologies, when the pressing need is for a peaceful and speedy technological revolution which alone would provide the essentials of good living to the masses in those countries.

II. CHOICE OF TECHNOLOGY

7. In this context, the choice of technology assumes a special significance. Technological development is both a very costly and time-consuming process. Developing countries with their limited resources and fight against time can neither afford to make the costly mistake of importing an outmoded technology nor run the risk of trying out new processes which are not commercially proved. The hazards of both the obsolescent and experimental processes are particularly frequent in an industry in which the technology is changing rapidly, as in the case of steel.

8. It is obvious that the introduction of obsolete technology, however economical it may appear, proves costly and uncompetitive. Similarly, developing countries should be careful of purchasing second hand machinery and equipment. Though the initial cost of such machinery may be cheaper and needs less foreign exchange than new equipment, it may prove costlier both in terms of costs of spares and maintenance and loss in production.

9. Developing countries have the choice of adopting the most efficient modern processes and equipment, at little extra cost. They have also the added advantage that they do not have to incur any loss from having to scrap existing machinery or obsolete factory structures. As large scale industrialization is practically non-existent in most of the developing countries, there is no fear of unemployment due to introduction of advanced technology.

10. Viewed in this perspective, the argument that developing countries should adopt labour-intensive technologies owing to the abundance of cheap labour, loses much of its force. In fact, there is every likelihood of advanced technology creating sizeable industrial employment within the country by the impetus it gives to ancillary activities. Developing countries are therefore much better placed to take advantage of advanced technology, despite the limiting factors of dearth of capital, lack of technical know-how, trained personnel and other factors.

11. It should be borne in mind that in many of the developing countries technological development remained 'arrested' owing to their political dependance, and for centuries their economies were left merely to keep the industrialised west supplied with primary raw materials. If today, these countries seek to introduce modern technology, it is with the idea of eradicating hunger and poverty, disease and ignorance, and to provide their people with the essentials of good living which are woefully lacking, and not with the objective of competing with the more opulent and technologically advanced countries.

Example of Japan

12. It is erroneous to think that industrialisation and modern technology are processes indigenous only to western countries. Given the proper economic climate and resources, the developing countries may in the course of the next few years 'catch up' with the developed countries. The emergence of Japan, an 'eastern country' differing

widely in social and cultural patterns from western industrial countries, as a major industrial nation is a case in point.

13. The technological basis of Japan's rapid industrial progress is illuminating. Japan's technical development and production technology was for the most part based on imported technology in the earlier stages, since this was the only course Japan could follow to reduce the technological gap between her and advanced countries in the shortest possible time. Japan intensified her own efforts to increase the internal resources and invested liberally in research and development. She entered into 'technical alliance' with overseas enterprises in engineering and machine-building industries. Simultaneously she developed her own technologies and in certain industries such as iron and steel, automobiles, cameras, electrical instruments, etc the progress is phenomenal.(1)

14. Japan vigorously exploited foreign skills to modernise her industrial structure, but as she paid for all this technical assistance, she was able to use it more effectively than in the case of countries who receive such technical assistance as a gift. The use of foreign personnel by Japan was only a short-term expedient, but it helped Japan to launch quickly on the path of self-sustaining growth. It is also interesting to note that the advance of technology in Japan has not been accompanied by penetration of foreign interests in her economy or by other pressures. Further, as a result of the technological progress there has been a phenomenal increase in the labour force of Japan.

Technological Challenge

15. Since last decade or so, there has been a veritable explosion of technology, and in the industrial sphere, this has been very pronounced in iron and steelmaking, where new processes have revolutionised the industry and hastened the obsolescence of older processes. These developments have presented challenging opportunities to the developing countries for the speedy development of their steel and metallurgical industries. New developments such as the top-blown oxygen (LD) process and the continuous casting of steel are fast overtaking the conventional processes at such a fast rate that they need to be given full consideration while planning new steelworks or expanding existing ones.

16. It would be interesting to review some of the important technological developments which have made large scale steel production a viable proposition. Take the blast furnace: while blast furnaces in actual operation in Japan, USSR and the United States have capacities of around 4000 tons per day, most of the blast furnaces in developing countries have capacities of less than 2000 tons. The main problems of operating such large capacity furnaces are mainly those of materials handling, burden preparation and agglomeration (sinter and pellets), and these are being successfully tackled in those countries. Again, considering the rate at which blast furnace outputs have risen in recent years, a furnace with a capacity of 10,000 tons per day may well be realised in the future.

17. This trend towards gigantism is mainly due to advantages of economies of scale. For instance, the capital cost per annual ton for a 3000-ton per day furnace would be only about half that of a 1000-ton unit. At the same time production cost of iron comes down drastically.

18. Turning to steelmaking, technological developments in this field have been even more spectacular and costs have come tumbling down. The large converter with a capacity of 250 to 300 tons is becoming the 'work-horse' of the steel industry, and 500-ton stationary vessels are being talked of. Here again, developing countries should install optimum size converters for obtaining maximum benefit of the technological developments.

19. As in so many other respects, the Japanese steel industry has eclipsed all others with a LD capacity of 47 million tons. It is estimated that LD steel capacity will overtake the open-hearth by about 1970 in the United States and by about 1980 in the USSR, whereas in Japan it has already overtaken the open-hearth three years ago. This is indeed a fine example of a late starter in the field gaining by correct utilisation of modern technology.

20. The Japanese steelmakers have exploited to the fullest extent the favourable economics, high equipment productivity, simplicity of operation and versatility of the LD process. The capital cost of LD steel is around US $ 15 to 20 per annual ton for the large converters, as against US $ 30 to 35 per annual ton for large open-hearths. The operating costs (including fixed charges) for the large LD are as

much as US $ 5 to 6 per ton lower. The Japanese steel capacity is growing by leaps and bounds, and Japan has been successfully entering steel markets of highly industrialised countries like USA and Europe as well as of such countries like India and Australia, from which Japan buys the bulk of its raw materials.

21. Continuous casting together with the use of a hot planetary mill permits production of strip on a relatively small scale. Compared to a steckel or semi-continuous strip mill, the planetary mill has the advantage of high yield and low capital investment. As it has only one stand plus a planishing stand, it requires less floor area, building space, utilities, etc, than other processes for rolling strip on a small scale. Technology has greatly extended the horizons for the small steel mill with an initial capacity of say 100,000 to 200,000 tons, but capable of producing a variety of products of high quality at competitive costs, - which is of great advantage to developing countries with limited resources and small demand.

22. As installation of new steel capacity together with development of ancillary facilities such as new mines, washeries and railways is a time consuming process, planning for steel must necessarily be done in long time spans in developing countries. The steel industry is a complex one with a vast number of 'forward and backward linkages', requiring the input of various materials and services, as well as efficient utilization of all products and by-products. Unless each

constituent in this chain of inter-related activities functions adequately, serious bottlenecks and delays, are likely to appear at various points all along the line. This has been a phenomenon of steel development in India, because the 'forward and backward linkage' had not been fully visualised and provided for.

23. It is important that this long-term planning for steel should not be undertaken as an academic exercise unrelated to the real techno-economic issues of steel development and establishment of a steel industry on sound lines. Some of the issues involved in steel development in developing countries are discussed in the following paragraphs.

24. The determination of steel plant size and choice of technology for a developing country depend primarily on available raw material resources, market prospects, the capital outlay required and the profitability expected. Developing countries seeking to establish a local nucleus of steel production should give adequate thought to the problem of optimum plant size. On technological consideration large plants are indicated to realise fully possible economies in capital and operating costs. The world-wide trend in industrial countries is towards large-size plants, whereas the typical large integrated works of a few decades ago was a million-ton plant, the minimum economic size is now likely to be not less than 3 to 4 million tons of steel per year[2]. Lack of resources or the need for specialization or the factor of transport costs may, however, require that

plants be started on a modest scale with initial capacities of between 50,000 and 200,000 tons a year. The initial operations may be either integrated or non-integrated, restricted at the outset to ironmaking, or only to steelmaking, starting with scrap, or rolling based on purchased billets. This is possible today because technology is expanding the horizons for both small and large scale units, thus making both the 50,000 ton plant and the 5,000,000 ton plant viable under different conditions(3).

25. Regardless of the initial size or extent of integration at new steelworks, its layout can be planned for future expansion, and for integration both backwards and forwards. This provision in design and space adds negligibly to the initial investment but will invariably pay handsome dividends in the future. More than anything else, such planning requires conviction on the part of a developing country that the strengthening of the steel base is an essential part of the strategy of growth. The layouts evolved for the steel nuclei today must retain their flexibility and logic for generations to come.

III. PRODUCTIVITY AND COSTS

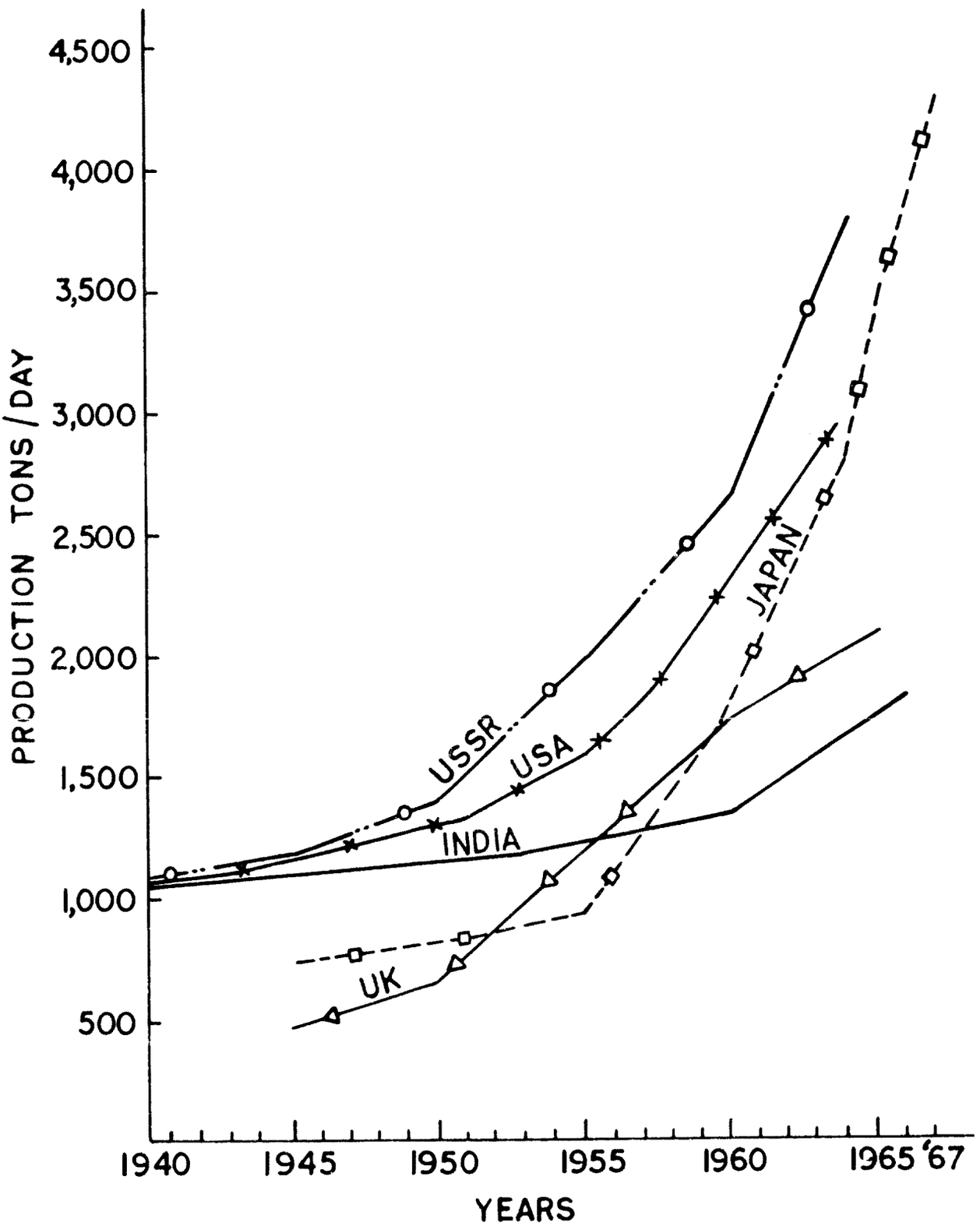
26. Steel is so fundamental that a rise in steel costs is automatically reflected in all round rise in the cost of manufactures, both machinery and durable consumer goods. The large investments in steel will not be fully effective, unless productivity is raised and costs reduced, and surpluses created for reinvestment in the economy. It is therefore not enough to install new steel capacity; this capacity must

be operated efficiently to produce a low cost and high quality product. The case of India provides an illuminating example in this respect. India could at one time produce the lowest cost steel. But this is no longer so. For instance, the works manufacturing cost of pig iron which was Rs 18 per ton in 1940 has risen to about Rs 160, while the cost of steel ingots has gone up from Rs 35 to Rs 240 during the same period. No doubt a part of this rise is due to the general increase in the cost of labour, railway transport etc. Nevertheless, India's position as a low cost producer could have still been maintained if only it had kept pace with the developing technology.

27. The general productivity at India's steelworks in the early 40's was comparable to the best elsewhere. For instance, in May 1941, the 'A' furnace at TISCO plant, Jamshedpur set a monthly record with an output of 37,721 tons. Twenty-five years ago, the average productivity of the Indian blast furnaces was 0.97 tons per cu m of useful volume as compared to 0.84 in USSR and 0.76 in Japan at that time. To-day, on the other hand, while productivities of 2.0 tons per cu m (national average 1.49) has been achieved in the USSR and 2.33 tons per cu m (national average 1.40) has been recorded in Japan, the best annual performance in India has been 1.19 tons per cu m (national average still lower at 0.9) obtained on a single furnace in Bhilai during 1963-64 - that is, today the productivity of the largest furnace in India is less than half of that in other countries, as will be seen from Fig 1(4). This clearly shows that while other countries have taken advantage of advances in technology, India has stagnated for the past twenty years or so.

Figure 1

Maximum production of single blast furnace in selected countries
(1940 to 1967)



28. No wonder then that the leadership and cost advantage which Indian steel industry once enjoyed have now been lost largely owing to the neglect of Indian achievements and by almost complete reliance for the large steel expansion since independence on foreign expertise on the plea that India was forced to accept whatever was offered under the 'tied' aid arrangements. The inevitable consequences of this were increase in project costs, import of technology unsuited to Indian conditions, or as it has happened in several cases, import of inferior or even obsolete technology. The initiative to develop and/or adopt technology most suited to India's needs and conditions was thus lost, leading to the present unhappy state in the industry.

29. To achieve the objective of producing steel at low cost, the process of 'cost-consciousness' should commence right from the planning and design stage, through the engineering and construction of the plant to finally the operating stage. Wrong choice of layout, technology and design mistakes are usually permanent and add both to capital and production costs, which cannot be remedied when plant operations commence. This vital aspect of cutting down product costs should receive utmost attention in developing countries.

30. The higher capital cost of a modern plant should not be made an excuse to explain away higher production costs in new steel plants in developing countries, which directly result from design mistakes and inefficient operation. In fact, modern developments in iron and steel technology have brought about economies and efficiency in plant

operation and boosted productivity to such an extent that despite the higher interest charges and depreciation on new plants, it is now possible to produce iron and steel at a lower cost than in the older plants.

31. Increase in productivity cannot take place overnight; it depends for its success on the steady and continuous application of proven techniques and sound operational procedures and practices, as well as systematic training and motivation of labour, and the employment of qualified managers and modern management techniques. Adoption of management tools such as 'operations research' help in optimising the use of available resources. A systematic method of choosing the best set of values is available in the technique of linear programming. This technique has been developed in recent years for solving complex problems of optimisation involving combination of a number of interacting factors to produce the desired maximum or minimum result. Applied to industry, linear programming is a technique for determining the optimum allocation of use of limited resources (capital, plant capacity, etc). Lately, interest in employing linear programming for control of technical processes has been developing in practically all fields of science and technology.

IV. FOREIGN CAPITAL REQUIREMENTS OF DEVELOPING COUNTRIES

32. Having discussed the technological issues involved in steel development, a brief mention may now be made of the overall foreign capital requirements of developing countries, before turning to the problems of finance for steel development.

33. Various estimates have been made of the foreign capital requirements of developing countries based on different assumptions of capital/output ratio, income/growth rates and the 'absorptive capacity' of developing countries. One such study, estimates the 'developmental' capital requirements of developing countries at about $ 7.0 billion per annum during 1960-69, based on 2 per cent rise in the annual per capita income and projection of foreign trade over a ten-year period.(5) Another study(6) based on an annual per capita growth income of 2.2 per cent and on the 'absorptive capacity' of developing countries, estimates the annual foreign capital requirements during 1967-71 at $ 5.7 billion; and assuming a 2.5 per cent annual per capita growth in national income, $ 4.8 billion during the period 1972-76. Though these estimates do not claim to provide an accurate statistical measure of the external capital requirements of the under-developed countries, they indicate the magnitude of the problem of capital aid.

34. There has been no appreciable change in the total net inflow of capital to all developing countries during the last few years. According to an UNCTAD study, against a gross inflow of $ 10.1 billion to the developing countries during 1965 there was net inflow of only about $ 6.6 billion. It is estimated that the net inflow of foreign funds to developing countries during 1970 will be reduced to $ 4.0 billion and to $ 3.6 billion in 1975 on the assumption that the gross inflow will be maintained at least at the level of 1965. Thus it will be noted that the level of net inflow will progressively decline. It is believed that the developmental effort will be severely hampered

unless the 1965 level of net inflow of $ 6.6 billion is maintained. In order to sustain this minimum required inflow of $ 6.6 billion, the gross inflow would have to be raised to around $ 15.6 billion in 1975 in view of the increase in charges for debt servicing after 1965.(7)

35. Private foreign investment can under suitable conditions play an important role in the development process but by its very nature and motivation, it responds only to normal profit opportunity. The bulk of flow of private capital from developed countries is however, directed to other developed countries, and the share of developing countries, especially in Asia and Africa, is very meagre, except in Latin America, where direct investment by private capital is considerable. Moreover, most of the developing countries, who have only recently emerged from centuries of colonial rule, are chary of unrestricted entry of private foreign capital, lest it should get control of strategic sectors of the economy.

36. Foreign private capital investments in developing countries earn relatively higher level of profits than in their home country. According to a study by the Reserve Bank of India, American firms were earning an average of 13.5 per cent of net worth in 1953 and 12.8 per cent of net worth in 1955 after taxation, compared with 10-12 per cent at home in both years. British firms earned 11.9 and 9.5 per cent in the two years compared to about 8 per cent at home. Profits earned by foreign firms were 6 to 35 per cent higher in India than at home, some of which were operating in both countries.(8)

The large transfers of profits and dividends abroad and repatriation of capital create balance of payments difficulties to the developing countries. Most of the developing countries have, therefore, adopted national policies and guidelines to regulate the entry of private foreign capital.

37. It would appear that the bulk of the capital requirements of developing countries will have to come from loans and grants from international agencies and governments. Multilateral institutions like the IBRD, IDA etc can be particularly effective in supporting sound development programmes because they are in a position to take an objective view of such programmes and to base their decisions primarily on development needs.

38. It is axiomatic that the inflow of capital to developing countries should assist in the development of resources, and in the long run stimulate import substitution and export promotion. In due course, the inflow of capital should generate foreign exchange earnings or savings necessary to service the debt. Unfortunately, owing to the adverse terms and conditions of 'aid' programmes and increasing pressure of development needs, the balance of payments difficulties in most developing countries are mounting. The interest and repayment obligations are building up faster than the capital inflow reducing the volume of resources available for development.(9) These disturbing trends emphasise the need for drastic changes in the pattern and terms of foreign aid as well as the borrowing policies of developing countries and improvement in aid utilization.

Terms of 'Aid'

39. The terms and conditions of foreign loans often vary according to the lending agency and from loan to loan. For instance, an analysis of the loans by various agencies during 1965 indicates that the bilateral loans granted by DAC countries (of the O.E.C.D.) to the developing countries carried interest at rates ranging from 1.0 per cent to 6.5 per cent, and the period of maturity 3 to 40 years, with a grace period of 2 to 10 years. The same study showed that IBRD-IFC loans were for a period of 22 years (with a grace period of 5 years) and carried an interest of 6 per cent, per annum, while IDA's lending rates were 0.8 per cent per annum, for a period of 50 years with a grace period extending to 10 years.(10) Early in 1966, the World Bank raised its lending rate from 5.5 per cent to 6 per cent. The loans granted by socialist countries bore an interest of 2.5 per cent or less and were for a period of 12 years with a 4 year grace period; interest is charged only on the amount actually drawn (net of repayments) and repayments begin one year after the delivery of goods or completion of the project financed by the credit.

40. Recent data available show that in the year 1966, debt service charges of developing countries absorbed about 45 per cent of gross official bilateral lending, thus resulting in substantial diminution of the funds available for development.(11) There is a strong case for softening the terms and conditions for foreign loans which is the only practical solution for maintaining the net resources flow needed by developing countries. Despite UN resolution and DAC recommendations

that at least 80 per cent of the loans to developing countries should be in the form of grants or long-term low interest loans, the overall aid picture is not satisfactory, though some of the aid giving countries have complied with the objectives of the resolution. There is urgent need for implementing the resolution fully. Possibilities of wider use of interest-free loans already initiated by Canada, Denmark and the United Kingdom should be seriously considered.

Finances for steel development

41. A major problem of the development of iron and steel industry in developing countries is the paucity of finance. An integrated steel plant of say one million tons annual capacity would require about $ 300 million. Investment of this magnitude in a single plant is clearly beyond the capacity of most developing countries. Since the machinery and equipment for the most part has to be imported and the costs of installation are comparatively high, the huge outlay cannot be met by internal resources alone. The initial investment will have large import content ranging from 20 per cent in the case of a country like India to 70 per cent or more in the case of other developing countries with little indigenous equipment manufacturing capacity. Even the operation of the plants call for continued foreign exchange expenditure to service borrowed capital, to pay for services of foreign personnel, maintenance imports and operating supplies. For example, the proportion of foreign exchange in total production costs was estimated at 44 per cent to 57 per cent for seven locations studied by the Economic Commission for Latin America in 1954.(12) In the case of India too, the foreign exchange costs of imported spares and operating supplies, and foreign technical personnel have been high.

42. According to ILAFA estimates, Latin American Steel industry would require some $ 2,500 million for expansion plans of the existing plants and new projects between 1965-70.(13) For the developing countries of ECAFE region, on the basis of current plans of development for individual countries, the estimated requirements are about $ 1,800 million between 1963 and 1970.(14) In Africa and the Arab countries, where the steel industry is comparatively still underdeveloped, the estimated expenditure would be roughly about $ 2,900 million for iron and steel projects planned for 1965-70. Thus the total financial resources required for steel development in all developing countries would be about $ 7,200 million during 1965-70,(15) of which the foreign exchange component would be about $ 4,500 million.

43. A number of iron and steel plants in the developing countries have been built with foreign assistance. In several countries in Latin America, European interests made large investments in steel plants, in the course of their combined commercial and industrial operations as in Brazil and Argentina, for instance. In recent years, however, foreign assistance has largely come in the form of sale of equipment and licenses to government-operated or supported enterprises, with the participation by financial groups or international organizations like IBRD, IFC, IDB and others.(16) In India and other countries of Asia, Africa and the Middle East, a number of steel plants have been built, or are being constructed with the financial and technical assistance of the Soviet Union, U.K., Germany and other European countries, USA and Japan, mostly in the form of government to government loans for the supply of equipment and know-how.

Forms of Assistance

44. The 'assistance' of the developed countries can come in many ways, namely, financial assistance and collaboration, technical collaboration, supply of plant and machinery, patents and process know-how, supply of technical experts, training of personnel etc. The financial and institutional arrangements between aid-giving countries and developing countries are varied, but they can be broadly classified into two categories: i) direct equity participation, either on a majority or minority basis; and ii) loans and deferred payment arrangements for the import of machinery and equipment.

45. Broadly speaking, financial collaboration can be in the form of

a) foreign collaborator subscribing in cash to share capital;

b) foreign collaborator investing in kind, i.e. supplying the capital equipment, plant and machinery, layouts and specifications, etc, the cost of which is paid in the form of shares in the project, and

c) foreign collaborator supplying technical know-how and services and being allotted capital in lieu of royalty.

46. Equity participation should be distinguished from deferred payment or arrangement to supply required plant, machinery etc to an enterprise in the developing country on credit, the payment to be made in easy instalments with interest over a period of years. In this arrangement, the foreign agency has no stake in the ownership of the company. The commercial risk involved in extending credit is invariably covered by guarantee by the Government of aid-giver.

V. FOREIGN AID AND COLLABORATION - ITS IMPLICATIONS

47. Foreign aid and technical collaboration have wide implications, but expressed in simple terms, they encompass the supply of money, machinery, materials, men as well as know-how (through patents, drawings, etc). The right approach for developing countries would be to determine precisely what the country requires, evaluate what it already has, identify where the gap exists and then proceed to import only what is needed and in the most beneficial manner, without frittering away the costly aid on wasteful and often unnecessary projects. As noted earlier, a variety of financial and institutional arrangements between aid-giving countries and developing countries is possible and upon the choice of arrangement will depend the effectiveness of the transfer of know-how, its cost, adaptation and utilization as well as the development of local skills and ultimately of local expertise.(17)

48. There is nothing against foreign collaboration agreements as such, and no one questions the usefulness of foreign collaboration when judiciously employed. Even the most advanced countries find foreign collaboration beneficial for supplementing their know-how and equipment needs. What is deprecated is the restrictive aspects of collaboration agreements which hamper the technological progress of developing countries, and the pressures and unwarranted interference in domestic policies to which the developing countries are often subjected to. In their anxiety to obtain foreign aid, the general tendency of developing countries has been to accept eagerly any offer of collaboration by aid-giving countries, irrespective of the fact

whether the project is necessary or whether the country can afford it. This has led to the over-import of capital in some sectors of industry, while other sectors are starved of resources.

49. A study undertaken by the All India Association of Industries, Bombay[18] revealed that the working of a large number of foreign collaboration ventures in India were far from satisfactory, and cited the following reasons:

i) Insistence on the use of high cost imported raw materials, components, tools, etc, even though suitable indigenous substitutes are available, leading to disproportionately high cost of production;

ii) Supply of plant and equipment, and know-how at inflated prices, very much higher than the prevailing international prices, particularly in cases where the collaboration is 'tied' to such supply;

iii) Supply of obsolete and sub-standard plant and equipment and out-dated technology and 'static' know-how;

iv) Insistence on technical control and management, due to an exaggerated notion of the technological backwardness of the country;

v) Lack of export promotion, and

vi) Poor encouragement to the development of indigenous know-how.

50. The study has also brought to light instances of over-import of capital and know-how, duplication in the same field, reluctance to impart technology, restrictive provisions and extra-territoriality in

many of the foreign collaboration agreements. Michael Kidron, in his study of foreign investment in India, has drawn pointed attention to these harmful aspects of the working of foreign collaboration in India.(19) Latin American experience of over-dependence on imported technology has been similar.(20)

51. Foreign aid, all said and done, is commercial credit and both the principal and interest on it will have to be paid sooner or later. During the past decade or so, there has been a substantial rise in the external debt outstanding of developing countries. According to the latest available IBRD figures quoted in the UNCTAD study mentioned earlier,(21) the debt outstandings (disbursed and undisbursed) of ninety-five developing countries of $ 10 billion in 1956 had risen to $ 39.2 billion in 1965. Interest and amortization payments alone had increased from $ 0.8 billion in 1956 to $ 3.6 billion in 1965. Difficulties in meeting debt-service payments have already necessitated rescheduling or consolidation of external debt in the case of a number of developing countries. It is felt that instances of this type will tend to multiply in the years to come. Since the loans are rarely convertible, and more often than not, 'tied', the burden of servicing the debt will increasingly fall upon the export earnings of the developing countries concerned. The over-all ratio of interest and amortization payments to export earnings has more than doubled in the last decade and rose from less than 4 per cent in 1956 to 9 per cent in 1965. The ratio is much higher for a number of developing countries, and in the case of Latin America, it was about 16 per cent. It is estimated that the

interest and amortization payments are likely to absorb an over-all average of 18 to 23 per cent of the export earnings of developing countries in 1975.(22)

Criteria for foreign collaboration

52. Indiscriminate purchase of technology has often rendered foreign collaboration and aid exhorbitantly expensive and also ineffective. Foreign collaboration agreements should be therefore entered into where absolutely necessary, and must be based on well-defined principles. Firstly, purchase of technology must be on a highly selective basis, only after full consideration has been given to the technical skills already available within the country.

53. Secondly, where feasible, foreign know-how should be obtained from whatever part of the world that offers the most economic and appropriate processes. There is an inherent danger in a 'tied' project that the recipient is likely to get a 'mixed bag' of technology, because no single country is equally advanced in all departments of say steel plant technology and equipment. There is thus a clear case for shunning 'turn-key' arrangements and buying only the best available process after a thorough study of the techno-economic factors involved by a competent agency.

54. Thirdly, a serious handicap of new industries in developing nations with foreign collaborators is that many of the techniques peculiar to the aid giving country are transferred wholesale to the new industry through 'turn-key' contracts. During the construction and early operational stages, almost complete control of the project

is vested in the foreign collaborators who insist on this as a pre-condition for giving technical guarantees. In the later stages of operation, the burden shifts from the foreign collaborator to the unprepared local manager. It is not surprising that under such conditions, the local managers fail and the developing countries have therefore to rely perennially on the import of managers for routine plant management.

55. Finally, the purchase of technology must be channelled through a local technical agency which can make it available to other enterpreneurs in the field, rather than allow the same type of know-how to be purchased again and again from different countries by different enterpreneurs, and at recurring expenditures of the country's hard earned foreign exchange. This will prevent the proliferation of collaboration agreements with different agencies in the same field.

56. Numerous examples can be cited of proliferation of collaboration agreements and repetitive purchases of technology in the same field, in India. A recent analysis of over 1880 collaboration arrangements in 11 major fields of industrial activity in the private sector in India during 1961-67[23], has revealed some interesting facts in this respect. The author cites 18 industrial items where as many as 188 collaboration agreements were entered into in the same field.

57. This is equally true of a number of public sector undertakings. India's four public sector steel plants provide a classic example. Again, in the field of mining and ore development, India has accepted

aid from almost every foreign country. This, in spite of the fact that India has a sixty-year old steel and mining industry. The practice of getting things done through foreign collaborators has not only displaced local scientists and engineers, but killed all initiative.

58. The creative adaptation of technology can best be done by local engineers and technologists, who have intimate knowledge of local conditions and 'national perspective', and who are therefore in a better position to choose a technology most suited to the country's specific requirements. This will pave the way towards the building of a technological base in the developing countries, and gradually diminish their dependence on foreign know-how.

59. A self-generating economy cannot be established without simultaneously establishing a strong scientific and technological base in the country. As the late Dr Homi J. Bhabha has pointed out, "Indian industrial development has so far proceeded almost exclusively on the basis of setting up plants and industries with foreign collaboration. Our experience makes it quite plain, however, that this method can never lead to a self-generating industry.

60. "When the Government decided to establish a steel plant in the public sector at Rourkela, a German consortium has to be asked to undertake the job. For the next steel plant at Bhilai the same course was followed, this time with Russian technical collaboration. The third

public sector steel plant at Durgapur had similarly to be set up with the help of a British consortium and the same method is being followed even with regard to the fourth public sector steel plant at Bokaro. Thus, the construction and operation of a number of steel plants has not automatically generated the ability to design and build new steel plants."(24)

61. These observations are very true of a country or region of the size of India or Latin America where a large number of steel plants have to be set up. A nucleus of design and engineering capacity is therefore necessary at an early stage to supervise steel development programmes with a full understanding of specific local conditions. The development and use of local expertise and technical skills should be a continuous exercise, and part of the developing country's deliberate national effort to establish a strong scientific and technological base in the country.

Cost of 'tied aid' and turn-key contracts

62. It is the general experience that technology and equipment purchases on a competitive international basis results in considerable savings in project costs. Above all, this sound practice ensures that the equipment and technology obtained are the most suitable and that the terms and conditions are reasonable. But in cases where this procedure is abandoned for the illusory benefits of 'turn-key' contracts or for 'tied aid', the supply of technology and equipment is narrowed down to one source only, and the economies that flow from competitive

bidding become non-existent. The inevitable consequences are increase in project costs and import of technology unsuited to local conditions.

63. According to recent UNCTAD study[25], at least three-fourths of the total official bilateral assistance from developed countries is subject to restrictions on the source of procurement in one form or another. This tying of aid includes all practices at restricting the recipient country's freedom of action in spending aid funds on imports from countries other than the aid source. As a consequence of the restrictions, the recipient incurs 'excess costs' on the aid project and thus the value and usefulness of aid to the recipient is reduced by the tying of aid.

64. Country studies on the costs of tied aid initiated by UNCTAD Secretariat have indicated that the tying of aid entails significant direct excess costs for recipient countries, ranging on an average from at least 10 to 20 per cent. In the case of Chile, for instance, on a very conservative estimate, the average excess costs of 15 credits covered by the study was about 12.4 per cent[26]. The excess cost of aid on six projects studied in Iran was about 15 per cent, but later in 1966/67 since the majority of aid projects had been subjected to international tenders, the excess cost of total tied economic assistance was considerably lowered to about 10 per cent[27]. Owing to a relatively comfortable foreign exchange position, Iran was also able to switch sources of imports in some cases and to purchase from the most economical source. In Tunisia, the direct excess cost of tied aid projects was about 20 per cent on a very conservative basis[28].

65. In addition to direct excess costs, there were substantial indirect excess costs in the form of higher prices for spare parts, purchase of equipment not suited to the requirements, higher development costs, high cost of foreign technical personnel, etc particularly in the case of Iran and Tunisia.(29)

66. The tying of aid also adversely affects the interest rate on loans, from the view point of the developing country. As the developing country does not receive 'full value' for the money borrowed in the case of tied aids, there is an element of 'concealed' extra interest paid by the borrowing country. While the 'nominal' rate of interest may be lower, the 'effective' rate of interest is raised, which varies according to the tying cost.(30)

67. The conclusions arrived at by these country studies, have received corroboration by two earlier independent studies by Ul Haq(31) and Bhagwati.(32) On the basis of a sample of twenty development projects, by comparison of the lowest bid from the tied source to the lowest international bid, Ul Haq has reached the conclusion that the excess cost resulting from the tying of aid can be as high as 51 per cent compared to international bids. He states that in the case of Pakistan the tying of aid had raised the average procurement price by about 12 per cent. The study by Bhagwati relates to estimates of potential 'excess costs' and his conclusions are equally revealing. On the basis of IBRD and IDA data and by calculating the spread of bids on IBRD contracts, he has arrived at the conclusion that in the case of over 31 per cent of the value of the contracts awarded, the

potential excess cost was over 50 per cent; while for 62.9 per cent of the value of contracts awarded, the potential excess cost was over 30 per cent. These high excess costs of tied aid will perhaps find greater corraboration in the country studies on tied aid for India and other countries now in progress.

'Watch-Dog Agency'

68. Having set out on the road towards industrialisation, the developing country has to be wary of many pitfalls. The right technology has to be selected and the most appropriate financial arrangements have to be made.

69. The experience of India in the matter of foreign assistance for developing its steel industry should provide valuable lessons to other developing countries who are striving to build up a steel industry. Difficulties have arisen due largely to the handling of aid negotiations and collaboration arrangements by bureaucrats without any technical experience. If the expertise already available in the country had been allowed to participate in the contract negotiations as well as in the subsequent design and engineering work, some of the mistakes and delays could have been avoided. In the absence of proper technical scrutiny from the Indian end, an Indian steel plant today costs approximately twice as much that of comparable capacity built elsewhere in U.K, Europe or Japan.

70. This is not to say that the aid-giving countries themselves were entirely blameless. Contrary to what one hears about 'aid without strings', a good deal of political pressures continue to be exerted

in one guise or other by the aid-givers, be they from the capitalist bloc or from the socialist countries. Hitherto these countries have been known to insist that feasibility studies and detailed project reports are prepared by an agency within the aid-giving country itself even when the requisite expertise exists in the developing country. This has obvious dangers for the developing country. There is nobody to safeguard its interests, and to ensure that the most suited processes and costs are adopted rather than those which are more suited to the aid-giving country and designed to enhance the aid-giver's image rather than the recipient's interests.

71. On the other hand, a number of developing countries today have specific experience of aid and collaboration negotiations with both western and socialist countries. Having made mistakes themselves they are now in a position to advise others on avoiding such pit-falls. The time may well have come when on overall aspects of collaboration, process selection, plant layouts and costs, experts of developing countries could render more competent and impartial (therefore, more useful) advice to another developing country.

72. A panel of experienced persons from the developing countries, perhaps under the aegis of UNIDO, could well be called upon to serve as the 'watch-dog agency'. This agency would carefully scrutinise the aid offers and agreements, their terms and conditions, to ensure that aid is obtained only where necessary and the terms are reasonable; and that the recipient country fully benefits by the aid.

VI. CONCLUSIONS

73. The emphasis placed on steel in the economic progress of developing countries hardly requires explanation. Steel development is essential for industrial growth. Assured availability of steel encourages the establishment of fabricating and processing industries, widening the range of import substitution and export capability, and generating large income and employment.

74. Rapid growth of steel demand is a characteristic of developing countries, making it worthwhile therefore to take advantage of the economies of scale and plan in terms of production units of optimum size. The socio-economic conditions in developing countries vary from country to country. The decision on size in each case must of course depend on a combination of circumstances obtaining in a specific situation, namely, the perspective of demand, the cost and availability of capital, and the raw materials position. In the development of a steel industry, physical resources may be less of a limitation than the lack of correct, forward-looking policies and appropriate action by the national governments of developing countries towards effective utilization of foreign aid.

75. Foreign aid is scarce and costly. It is therefore not enough just to obtain foreign aid; it is essential to see that it is properly utilised.

76. The technological developments that have transformed iron and steel industry during the past decade or so, present a challenge to planners and engineers in developing countries. Undoubtedly, there will be problems that arise out of these technological developments in setting up iron and steel works in developing countries. These are however not beyond the ingenuity of the developing countries to tackle, with the enlightened support of the developed countries. But better these difficulties, rather than the problems of poverty, disease and hunger, which are symptomatic of many of the developing countries with low-level technologies.

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