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THE SUPPLY OF STEEL IN DEVELOPING COUNTRIES[1/]

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Geneva, Switzerland

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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Section I - The present situation of steel supply in developing countries

(a) The role of domestic production

1. Before the Second World War and in the first post-war years most of the developing countries produced very little steel, since the conditions requisite for the establishment and development of steelmaking did not exist. In many of them only the development of branches producing the raw materials required in industrialized countries was encouraged, and there was hardly any development of basic industry. At the same time, the domestic market for steel in the developing countries was limited, the transport system was poorly developed and there was no skilled labour.

2. Almost all steel requirements of the developing countries were at that time covered by imports from the industrially developed countries. It was only in the case of a few countries with a large population and a fairly capacious market which had achieved a relatively higher level of industrial development and already possessed relatively greater raw material resources that a few steelworks had been erected. The output of these works, however, was generally limited to a narrow range of simple steel products that could compete with imported steel (sometimes under tariff protection) and domestic production generally covered only a small proportion of the needs of these countries.

3. The Second World War served as a stimulus for the erection of steelworks in those countries, as it severed trading relations between the developing countries and their steel suppliers. This development was further accentuated by the post-war recovery of the economy of many of the industrialized countries and by the consequent shortage of steel of the world market.

4. Having achieved political independence, many of the developing countries

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1/ This paper is a reproduction of chapter VI of the study on "World Trade in Steel and Steel Demand in Developing Countries", prepared by the Secretariat of the United Nations'Economic Commission for Europe.

endeavoured to attain economic independence as well, primarily through a greater degree of industrialization; domestic transformation of local raw materials was started, intended not only to generate income and to provide employment, but, at the same time, to achieve foreign exchange savings through substituting domestic products for hitherto imported goods, and, ultimately even to increase foreign exchange earnings, through export of manufactured products instead of raw materials. In the solution of these general problems of industrialized development paramount importance was in many cases attached to steelmaking. However, the goals of industrialization as set out above were so far only achieved in a very few countries; the impact of establishing domestic production on steel supply in developing countries is discussed in the present chapter.

5. For the preparation of programmes for establishing an iron and steel industry in the developing countries which have started on their road to industrialization there are two basic prerequisites: (a) An assessment of the present and prospective size of the steel market inside the country concerned and in adjacent countries has to be made, and (b) the availability of supplies of raw materials and energy has to be ascertained. The problems of financing the building of the works and staffing them in future with executive and technical personnel, and with workers are, of course, also of paramount importance.

6. A considerable proportion of the funds needed for erecting the steelworks which exist now in the developing countries was obtained from foreign loans and credits. Out of these funds were defrayed the costs of preparatory operations, the salaries of foreign experts, the purchase of machinery and equipment, and the training of technical staff and skilled labour for the national enterprises. Wide use was also made of the experience already gained by the industrialized countries and of scientific and technological progress generally, thus making it possible to erect more economically-operated works in the developing countries, sometimes with relatively small capacity.

7. In many of the developing countries the principal role in setting up a steel-making industry devolves on the State which takes the initiative in erecting steel-works. It assumes the main responsibility for the construction

costs and the purchase of machinery and equipment and extends to the firms engaged in construction work various financial, fiscal, transport and other preferences or privileges. In many of the developing countries steelworks are either entirely or partly the property of the State. This follows as a result of the large amount of capital required for building and operating a steelworks. Private companies are not always ready to invest their capital in such an industry since profits can be expected to accrue only after a rather long period of time.

8. At present, nearly 40 developing countries possess steel plants and/or rolling mills. The stage of development in steelmaking achieved varies between countries because they are at differing stages of industrialization or did not meet the economic conditions essential for an earlier development of this branch of industry. From this point of view the various countries where steel works are now in operation may conveniently be divided into two groups which are, however, of unequal size.

9. In the first group, comrising nearly three-quarters of developing countries[1/], are those in which steelmaking is at the initial stage of development or in which only the first steps have been taken to start it. They are usually countries with a small population basically engaged in agriculture and which have a limited market for steel products. Raw material resources for steelmaking are lacking or have only begun to be opened.

10. The common feature of steelmaking in these countries is the existence of small firms, operating small-scale rolling mills on the basis of imported semis and producing a limited range of rolled products, principally bars and reinforcing rods which are in demand on the local market, and also light sections, tubes and wire. In recent years there has been considerable expansion in the erection of plants producing galvanized corrugated sheets, using imported coils.

11. In some cases electric furnaces have been installed in these works for smelting local iron or steel scrap into steel ingots. Since availabilities of

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1/ Algeria, Angola, Burma, Ethiopia, Ghana, Guatemala, Hong Kong, Israel, Indonesia, Kenya, Lebanon, Libya, Malaysia, Morocco, Nepal, Nigeria, Pakistan, Philippines, Singapore, Tanzania, Thailand, Tunis, Uganda, Uruguay.

scrap in developing countries are not large and since scrap is rather expensive to collect and to deliver to the consumer, the capacity of the works stands idle for a large part of the time or else is grossly under-employed. Some of the scrap needed is imported.

12. The most important expansion in rolling mills and scrap smelters has been achieved in those countries which can obtain substantial quantities of scrap from ship-breaking. However, the operation of steelworks in these countries often depends on the state of economic trends in the shipping and freight markets, which also determine the rise or fall in supplies of ship-breaking scrap. These countries are primarily those of Asia (Pakistan, Philippines, Indonesia, Singapore, etc.) and some Latin-American countries. Steel-rolling mills are to be found only in a few countries (Algeria, Burma, Hong Kong, Indonesia, Israel, Morocco, Pakistan, Singapore, etc.). There are only a few countries in which the crude steel smelters operate not on scrap but on pig-iron obtained from local iron ore or imported from abroad.

13. Electricity is the source of energy mainly used for the production of crude steel, since countries do not have other fuel resources or have so far been unable for various reasons, to make use of them.

14. The second group comprises ten countries (Argentina, Brazil, Chile, Egypt, Colombia, India, Mexico, Peru, Rhodesia, Venezuela) which are more industrially developed, have rich natural resources and, in most cases, a developed mining industry. In some of these countries steelworks or rolling mills were built even before the Second World War. After the war they were converted into integrated works and began to play a predominant role in the national production of steel. A large number of all the works were built and started operation during the last ten to fifteen years.

15. At the present time the countries in this group have between them about 23 integrated steelworks of various sizes, viz., six each in India and Brazil, four in Mexico, two in Argentina and one each in the remaining countries. The output of these integrated plants constitutes more than 80 per cent of total domestic steel production in these countries and covers roughly the same proportion of domestic consumption. The exceptions are a few countries (Colombia,

Peru, Venezuela and others) where the steelworks started operations recently and have - for various reasons - not yet achieved target capacity, or where capacity is insufficient to cover a sizeable part of consumption.

16. The pattern of steel production in these countries has been adapted to satisfy the priority needs of the domestic market. The biggest share of the output is accounted for by sections - about 40 per cent of the total produced. Of this quantity four-fifths are concrete reinforcing bars and light sections. Roughly the same proportion is held in countries with a more advanced steel industry (Argentina, Brazil, India, Mexico) by flat rolled steel and, especially, sheets. Among other types of finished steel the biggest proportion is accounted for by wire rods (10-12 per cent) and also steel tubes and strip.

17. The volume of crude steel output in all developing countries taken together was, in 1965, at about 17 million tons (or 3.8 per cent of total world crude steel production). The trends in crude steel output of the developing countries, and in their share of world output, are also illustrated by the data given in tables 1 and 2.

Table 1

Production of crude steel, by regions, 1937, 1950, 1957, 1960 and 1965 (1)

(in thousands of tons and percentages)

Region	1937		1950		1957		1960		1965	
	1000 t	%	1000 t	%	1000 t	%	1000 t	%	1000 t	%
Latin America	203	0.2	1,317	0.7	2,782	1.0	4,750	1.4	8,205	1.9
Africa (excl. South Africa)	-	-	34	-	80	-	101	-	120	-
Far East (excl. China(mainland) and Japan)	950	0.7	1,475	0.8	2,180	0.8	4,236	1.3	8,127	1.8
Middle East	-	-	10	-	140	-	195	0.1	525	0.1
TOTAL developing countries	1,153	0.9	2,836	1.5	5,182	1.8	9,282	2.8	16,977	3.8
TOTAL industrialized countries	136,012	99.1	188,064	98.5	282,008	98.2	318,768	97.2	427,023	96.2
TOTAL World (excl. China (mainland))	137,200	100.0	190,900	100.0	287,190	100.0	328,050	100.0	444,000	100.0

(1) Calculated from : Long-term Trends and Problems of the European Steel Industry, ECE, Geneva, 1959; and the European Steel Market, ECE, Geneva, several years.

Table 2

Annual rates of growth in crude steel production, 1950 - 1965 (1)

Region	Compound rate (%)
Latin America	13.0
Africa (excl.South Africa)	8.75
Far East (excl. China (mainland) and Japan)	12.15
Middle East	11.7
TOTAL developing countries	12.7
TOTAL industrialized countries	5.6
TOTAL World (excl.China(mainland))	5.75

It will be seen that the share of the developing countries in total world crude steel output has somewhat increased since 1950. and that the rate of growth is highest in Latin America and in the Far East (mainly through the expansion of Indian output). The development of output by country is illustrated by figures in table 3.

(1) Calculated from : Long-term trends and problems of the European Steel Industry, ECE, Geneva, 1959; and the European Steel Market, ECE, Geneva, several years.

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Table 3

Output of crude steel in developing countries
(thousands of tons)

Region and country	1937	1950	1957	1960	1965
Latin America, total	203	1,317	2,782	4,750	8,205
Argentina	2	130	222	277	1,347
Brazil	76	789	1,299	2,282	2,960
Chile	19	56	389	451	467
Colombia	-	-	114	172	241
Mexico	106	337	688	1,474	2,455
Peru	-	-	30	50	93
Uruguay	-	-	20	9	13
Venezuela	-	5	20	47	629
Far East, total	950	1,475	2,180	4,236	8,127
China (Taiwan)	-	11	89	120	262
India	585	1,461	1,742	3,252	6,360
South Korea	-	-	18	51	192
Pakistan	-	4	12	12	13
Philippines	-	-	50	65	85
Thailand	-	-	5	7	10
Indonesia	-	-	..	..	..
Burma	-	-	..	..	20
Hong Kong	-	-	..	61	80
Africa and Middle East					
Egypt	-	10	80	150	435
Israel	-	-	60	78	90
Rhodesia	-	-	65	85	90
Uganda	-	-	-	-	28
Algeria	-	-	15	16	30
Ethiopia	-	-	-	-	6

(1) Source : Long-term trends and Problems of the European Steel Industry, ECE, Geneva, 1959; and the European Steel Market, ECE, Geneva, several years

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18. It is evident from these figures that the bulk of output is indeed concentrated in a few countries, like India, Brazil, Mexico, Argentina, Venezuela, Chile and Egypt, which, taken together, provided in 1965 over 80 per cent of the output of crude steel in developing countries.

(b) The share of imports in total supply

19. Steel imports into developing countries, although growing in absolute terms, have not yet kept pace during the last ten years or so with over-all steel trade developments, so that the importance of these countries as a destination of steel exports has fallen from over 34 per cent of total trade in 1950 to less than 20 per cent in 1965. It should also be pointed out that the growth of output in the developing countries had not stimulated steel demand to an extent that steel imports would increase faster than consumption; a comparison of growth rates of consumption with those of steel imports confirms this for the developing countries taken as a whole, and for most regions.

Growth rates of crude steel consumption and of steel imports in developing countries, 1950 to 1965

(compound rate)

Region	Consumption	Imports
Total developing countries	9.2	5.1
Latin America	8.1	2.6
Africa (excl. South Africa)	5.2	5.6
Far East (excl. China (mainland))	9.5	8.9
Middle East	6.6	5.35

20. In table 4 a brief survey is given of trends in the proportion total steel imports hold in total apparent consumption of steel (in crude steel equivalents) for those countries where domestic output has reached a sizeable level.

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Table 4

Proportion of imports of steel in total domestic consumption of developing countries, 1937, 1950, 1960, 1965

(Imports as percentage of apparent consumption in crude steel equivalents)

Region or country	1937	1950	1960	1965
Argentina	99.8	91.2	82.5	46.9
Brazil	82.3	35.7	14.5	5.7
Chile	86.6	64.1	15.1	22.4
Colombia	100.0	100.0	65.6	44.1
Mexico	67.5	64.6	15.0	10.1
Peru	100.0	100.0	70.8	76.7
Uruguay	100.0	100.0	92.7	79.7
Venezuela	100.0	98.9	90.8	47.6
China (Taiwan)	100.0	96.1	58.5	51.7
India	57.0	16.8	30.0	15.4
Philippines	100.0	100.0	62.0	88.2
Egypt	100.0	73.2	54.0	44.2
Israel	100.0	100.0	78.3	81.2

Source: Calculated from "Long-term Trends and Problems of the European Steel Industry", loc.cit.; and the European Steel Market, loc.cit.

Since the share of total consumption covered by imports is falling in all countries shown with the exception of Chile, Peru, the Philippines and Israel it would appear that the expansion of domestic steel production has largely been used to decrease the degree of dependency on foreign steel supply, and to substitute imports. For India and for the Latin American countries taken together imports of finished steel have even been falling in absolute terms : For India from 1.6 million tons in 1957 to 0.9 million tons in 1965 (minus 44 per cent) and for Latin America 4.1 million tons in 1957 to 3.1 million tons in 1965 (close on 25 per cent); the decreases were heaviest for the principal producing countries of the region.

21. A brief description of the product pattern of steel consumption in developing countries, - whether having domestic production of steel or not - is given in another paper presented at the Symposium on "Factors influencing steel demand and its product pattern in developing countries", so that it is not necessary to repeat it here. The main conclusion was that in the steel-producing among the developing countries, the product pattern of steel imports is changed as production expands since domestic products replace the hitherto imported steel products, while others (mainly quality products) continue to be imported, although their tonnage may remain unchanged. In many cases the total volume of steel imports is stagnating or even decreasing, due to foreign exchange shortages and other obstacles to international trade, and due to the fact that - beyond the sectors based on hitherto imported steel - there is little consumption capacity being created. For the non-producing of the developing countries the volume of steel imports may fluctuate with foreign exchange availabilities rather than with actual steel demand ; the product pattern of their imports reflects, more or less strongly, the type of economy of the importing country (e.g. agriculture, mining, petroleum).

Section II - Prospects of expanding steel production and imports

22. The industrialization programmes which are at present being formulated or implemented in many developing countries call for ever larger quantities of steel. The steel plants operating in these countries are, as has been shown above, still not in a position to satisfy the rapidly-growing demand for steel. The erection of steelworks has in a very few cases had the effect of increasing demand for steel (as and when particular types of imported products are replaced by domestic output, the imports of other articles may increase); more generally, however, the possibilities of buying steel on the world market are hampered by the continued lack of foreign currency so that imports were stagnating. For this and other reasons the developing countries continue to make considerable efforts to cover part of their domestic steel demand by products of local manufacture.

23. A feature of recent years had been the emergence of many projects for the creation or the further expansion of steelmaking enterprises. Some countries have only started to make a study or to lay plans for the first mills, while others are moving on to a higher stage in the development of this branch of industry by expanding the capacities of the enterprises that already exist or by building fully integrated works. The growth of this trend depends to no small degree on the discovery and exploitation in many developing countries of rich reserves of raw materials especially iron ore. The resources of these countries account for more than 44 per cent of world reserves of iron ores although only part has been opened for exploitation; their quality exceeds in many cases that of ore resources in the industrialized countries.

24. The advances achieved in steel technology during recent years have greatly increased the role of oil and natural gas as fuels for iron and steelmaking. In reserves of such raw materials, certain developing countries also held leading places in the world : taken together, they have 85 per cent of world reserves of oil and 48 per cent of natural gas. The utilization of oil and gas and also of their potential wealth of hydro-electric power enables some of the developing countries to make up to some extent for their shortage of coal, reserves of which are small and of low quality and which constitute no more than 6 per cent of world reserves.

The situation in specific areas

Latin America

25. The origin of steel making in Latin America dates back to 1900 when the first steelmaking firms began operations in Mexico. Following this, small-scale works were set up in a number of countries (Argentina, Brazil, Colombia, Chile); they were mainly rolling-mills, operating on local scrap and imported ingots and semis. There were few steel-smelting works. In 1938 the total output of steel ingots in Latin America amounted to 220,000 tons, of which more than half was smelted in Brazil (134,000 tons in 1939). The output from the plants could cover only a minor part of domestic consumption of these countries, and all of the remainder was obtained from imports. Imports of steel products also rose slowly, principally because of foreign exchange shortages, but also because consuming sectors made slow progress.

26. After the end of the Second World War steelmaking began to grow quickly due to growing demand and to a considerable degree, also to the existence on the continent of large deposits of raw materials, i.e. iron ore and natural gas. There are also substantial resources for the production of hydro-electric power, though at the present time little advantage is taken of them. The situation is worse in the case of coal. Although reserves of coal in Latin American countries are estimated at 94 milliard tons, there are so far only a few deposits of coking coal. Those known are of low quality and remote from consumption centres. Accordingly, most of the steelmaking concerns in Latin America are obliged to import all, or at least, a considerable proportion, of the coking coal required for consumption, which is, in some cases, no negligible burden on their balance of payments.

27. In the period 1940–1950 two integrated steelworks began operations in Latin America; in the ensuing decade six more were erected. As a result, these concerns assumed a leading role in Latin America steel production - their share in total steel output in 1960 was more than 80 per cent. In the years 1960 to 1965 the number of integrated and semi-integrated steelworks rose to about 20.

28. Since not all the countries were building new steelworks and rates of construction varied, Latin American countries can, as regards the stage of

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development reached in steelmaking, be divided into three groups : (a) countries with a relatively developed steel industry, viz., Argentina, Brazil, Mexico, and Chile; (b) countries which have made definite progress in creating a steel industry, viz., Venezuela, Colombia, Peru, Uruguay; (c) countries which still have no steelworks. In some of the countries in the last group projects have already been drawn up and a start made in erecting small steelworks (Honduras, Trinidad, Jamaica and others).

29. According to estimates the capacity of the Latin American steelmaking industry in 1965 exceeded 12 million tons of steel per annum, of which Brazil possessed 5.1 million, Mexico 2.7 million and Argentina 1.9 million tons. The biggest concerns are the plants of the Brazilian company "Companhia Siderurgica Nacional" (1.65 million tons), the Mexican company "Altos Hornos de Mexico" (1.1 million tons), the Brazilian plants of the "USIMINAS" company (0.66 million tons) and "Belgo-Mineira"(0.6 million tons). Output of crude steel was in 1965 at 8.2 million tons, amounting to about 68 per cent of total consumption of steel in the region.

30. Generally speaking, the pattern of finished steel production in Latin America is very typical of that in all the developing countries. The largest share in output is held by steel sections which account for 35 per cent (1965). About half of the sections are accounted for by reinforcement bars, and one third by light sections. Countries in which steel-making has been established relatively recently produce almost exclusively these types of finished steel. In Colombia, for example, sections constitutes in 1965 over 50 per cent and wire rods 34 per cent of the total output; in Peru 86 per cent and 14 per cent, and in Venezuela 51 per cent and 22.5 per cent respectively. In Uruguay 86 per cent of all steel produced was sections.

31. Flat products also accounted for a large proportion of output. In 1965 they constituted roughly 43 per cent of all the rolled steel produced. Flats are only produced in five countries of the continent - Argentina, Brazil, Chile, Colombia and Mexico where steelmaking has been developed some time ago and now covers almost completely the whole range of domestic consumption of steel. In the case of flats three-fourth of the tonnage produced is sheets. About one-third of all sheets

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is made in Brazil, about another third in Mexico and roughly one fifth in Argentina.

32. Among the other types of finished steel the most important items in output of steelworks are wire rods (14 per cent), seamless steel tubes (over 5 per cent) and strips (2 per cent). The figures in table 5 show the output of various types of rolled steel in the countries of Latin America in 1965 (thousands of tons):

Table 5

Product pattern of finished steel output in Latin America, 1965

(thousands of tons)

	Total	Argentina	Brazil	Colombia	Chile	Mexico	Peru	Uruguay	Venezuela
Total:	6805.5	1536.7	2161.4	211.0	395.7	2038.2	73.8	21.5	367.2
of which:									
Railway track Material	114.2	5.4	92.3	1.7	0.3	14.5	-	-	-
Light sections	888.7	295.7	307.6	24.2	43.3	214.7	2.8	-	0.4
Heavy sections	246.0	41.0	91.5	2.6	9.2	64.7	-	-	36.2
Concrete reinforcement bars	1251.5	257.3	231.3	87.5	47.3	397.6	60.8	18.4	151.3
Wire rods	972.8	258.8	281.2	72.2	75.4	192.5	10.2	-	82.5
Strip	121.0	69.6	43.4	-	-	8.0	-	-	-
Heavy plates	668.1	54.6	281.2	-	48.2	284.1	-	-	-
Plates and sheets	2105.3	441.0	750.7	18.1	161.4	734.3	-	-	-
Electrical sheets	13.4	-	12.0	-	1.4	-	-	-	-
Seamless tubes	373.1	92.9	52.5	-	-	127.8	-	3.1	968
Miscellaneous	51.2	19.6	17.7	4.7	9.2	-	-	-	-

Source: Revista Latino americana de Siderúrgica , ILAFA, Santiago, November 1966

33. As a result of the uneven rate of progress in steelmaking in individual countries, the extent to which locally produced steel is covering the needs of the domestic market in Latin America differs widely from country to country. Most

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of them do not have domestic steel production and their steel requirements are entirely covered from imports. Others which have only more recently established steel plants cover a small proportion of consumption from domestic output. In Peru, for instance, the production of local mills meets about a quarter of total requirements, in Uruguay this share is 20 per cent; in Colombia and in Venezuela domestic production meets already much higher proportion of consumption, in 1965 56 and 52 per cent respectively. In a number of countries where industry is more highly developed than in other developing countries and which possess larger steel-making facilities and relatively more technical know-how (e.g. Brazil, Argentina, Mexico, Chile) locally produced steel covers on an average 86 to 90 per cent of total consumption.

34. If, however, supplies of particular types of rolled steel for meeting domestic requirements are considered, it will be found that there are substantial shortages in the range of products offered by local concerns. In Chile, for example, only 10 per cent of the annual consumption of railway-track material is met by domestic production, in Mexico 17 per cent and in Brazil 42 per cent. In Brazil and Argentina requirements of tubes are covered only to the extent of two-thirds and three-quarters respectively. In Argentina 30 per cent of the consumption of steel plates and 20 per cent of that of sheets also have to be covered by purchases abroad. Generally speaking, the Latin American countries which have steelworks find themselves every year facing a shortage of such rolled products as railway-track material (imports 2 to 6 times larger than total domestic output) tubes (imports constitute 51 per cent of total consumption), plates and sheets (20 per cent of consumption), strips (17 per cent of consumption) etc.

Despite its shortcomings, the product pattern of steel production as it at present exists in Latin America, determines to a certain extent the pattern and volume of finished steel imports and the direction in which the industry will develop in the future.

35. In the countries of the region which have already iron and steel plants, considerable efforts are being made at present to increase production capacity. Many evlauations are available for the growth of demand for steel products in Latin America, and these are being constantly amended and checked; they cannot, therefore, be regarded as definite. A recent study prepared by the Economic

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Commission of Latin America[1] gives a possible production of crude steel for 1970 at 16.25 million tons. The distribution of output by main producing countries is estimated to be as follows (million of tons):

Argentina	3.2	Mexico	3.4
Brazil	6.3	Peru	0.5
Chile	0.7	Uruguay	0.2
Colombia	0.8	Venezuela	1.2

The figures in the table provide an impression of the product pattern of demand and supply, as estimated by the Secretariat of ECLA (thousands of tons of crude steel equivalents):

Table 6

Estimated demand for and production of finished steel products in Latin America, 1970[2]

Country	Flat products			Others than flat products		
	Demand A	Output B	Difference B-A	Demand D	Output E	Difference E-D
Total	8761	8020	- 741	9846	8230	- 1616
Brazil	3351	3700	+ 349	3490	2600	- 890
Argentina	1638	1500	- 138	1847	2160	+ 313
Chile	447	450	+ 3	503	600	+ 97
Colombia	399	350	- 49	449	250	- 199
Mexico	1831	1800	- 31	2064	1750	- 314
Peru	262	220	- 42	295	130	- 165
Uruguay	76	-	- 76	114	40	- 74
Venezuela	521	-	- 521	719	700	- 19
Others	236	-	- 236	365	-	- 365

(1) La Economia Siderurgica de America Latina, prepared by the Secretariat of the Economic Commission for Latin America for the Latin American Symposium on Industrialization, Santiago, 1966, p. 271

(2) La Economia Siderurgica de America Latina, Loc,cit.

36. It will be seen that the principal Latin American producing countries intend to approach self-sufficiency in the field of flat products or have even a surplus at their disposal for export within the region, like Brazil; for the region as a whole a deficit of flat products is, however, expected to continue to prevail. For bars and sections, and for other products (rail, tubes wire rods, wire) the remaining deficit is even bigger; only Argentina and Chile hope to have a surplus at their disposal. The over-all import requirements of steel for the region are expected to fall from 32.4 per cent of total consumption at present to 12.7 per cent; the absolute tonnage of imports is to drop from 3.9 million tons (crude steel equivalent) to 2.4 million tons.

Far East

37. The growth of the market in the countries of the Far East has in general been governed by similar factors as in the developing countries of the other regions. There are, however, a number of specific circumstances which reacted to a certain extent on the movements and pattern of the market. The size of population; the distance from industrially developed countries; their location along a seaboard; the fact that some of the countries possessed supplies of the basic raw materials for steelmaking, i.e. iron ore and coal and also oil. On the other hand, as suppliers of industrial raw material for the industrialized countries the countries of the Far East play a less important role than the other developing countries, except for rubber.

38. At present, most of the countries in the area, except Laos, Cambodia, Afghanistan and a few others, possess steelworks of varying sizes. India is the only one, however, which has integrated works with a total capacity of over 6 million tons (one has a capacity of 2 million tons and thre others - over 1 million tons each). At present, India covers about 85 per cent of its consumption of iron and steel from domestic output.

39. The procedure widely followed in most of the remaining countries has been to set up rolling mills of different types which operate mostly on imported ingots, semis and coils of flat products, or re-roll old material. As a rule, the feature of these countries' steelworks is their low capacity and efficiency, and , because of the shortage of raw materials and semis, the capacities are often not fully

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utilized. According to the information available, Pakistan has the largest number of (mainly re-rolling) works, 115 to 132 with a total capacity of 120 to 275,000 tons of rolled steel per annum (estimates vary), chiefly steel sections and bars and, to a smaller extent, sheets and tubes; Hong Kong has about 25 to 30 plants with an annual capacity of about 150,000 tons of sections, bars and tubes.

40. In almost each of the countries of the Far East there are one or more plants producing crude steel, equipped in most cases with electric furnaces, operating mainly on scrap. Adequate statistical information about the volume and pattern of production in these works and also about their capacity is lacking. Judging from the figures published, Singapore has one works with an annual capacity of 100-120,000 tons of crude steel, Burma has also one works with a capacity of 22,000 tons, and there is one works in Pakistan capable of producing about 20,000 tons of crude steel per annum, etc. Crude steelmaking in these countries began in 1952 at a level of about 25,000 tons and by 1960 had risen to 350,000 to 400,000 tons.

41. Generally speaking, it can be taken that the existing plants even if operated at full capacity, would be unable to ensure sufficient supplies of ingots for the rolling mills. Secondly, the output of rolled steel in almost all of the countries of Far East covers only a small part of domestic consumption. Thirdly, the production of a narrow range of steel products, in small quantities, with high overhead costs can hardly compete with imported steel.

42. As a result of steelmaking being developed in this manner the steel requirements of the countries of the Far East have to a large extent been covered and are still being covered by imports. Furthermore, the domestic production of steel in the countries of the area has little impact on the volume or pattern of imports (the only exception is India).

43. Before the Second World War and in the first post-war years, up to a third of all imports of steel consisted of sections, about one-fifth was plates used in shipbuilding and roughly one-tenth of imports was steel tubes and fittings, which were used not only in the oil industry but also for irrigation and water mains. Railway-track material also formed a relatively large import item since fairly rapid progress was made in the building of railways from the sources of raw materials, exported to the industrialized countries, to ports of shipment. /...

The remainder was accounted for by those types of rolled steel which are utilized mainly for packaging export consignments of agricultural produce - tinplate, wire and strip, amounting on an average to 8-12 per cent of total imports.

44. A special feature of the import pattern in the early post-war years was the comparatively large share in imports of steel ingots and semis - over 8 per cent in 1950 as compared with 0.5 per cent in 1938. This pattern of steel consumption and imports continued to prevail with minor variations up to recent years when several countries in the area embarked on more active industrial development. After the years 1957-1959 when a number of small steelworks were built in several countries, certain trends towards change became observable in the pattern of import demand. In the period from 1959 to 1964 there was a rise in the share of sheets, steel ingots and semis in total imports - nearly as much as 40 per cent in 1964. This was connected primarily with the activation of work on existing rolling mills or the beginning of operations on new rolling mills. As previously, the share of sections was high, while that of other finished steel products shrank. To particularize, during the period 1960-1964 the share of tinplate in imports decreased from 9.3 per cent to 8 per cent, of tubes from 8 per cent to 7 per cent, of railway-track material from 9 per cent to 1.5 per cent and of wire from 8 per cent to 5 per cent respectively.

45. Thus, while the commissioning of new steelworks in the region did somewhat change the product pattern of imports, it had no substantial impact on its volume since the extent to which domestic consumption of steel in the different countries was covered by domestic production hardly changed. In India the situation was different, as a result of the erection of several integrated steelworks after 1955-1956; about 80-90 per cent of home consumption began to be covered by the products of local manufacture.

46. Imports of sections and flat products into the countries of the Far East rose from 1.4 million tons in 1938 and 1.2 million tons in 1950 to 4.3 million tons in 1964. In the period 1950-1964, the biggest buyers of foreign-produced steel were India, Pakistan, Hong Kong and the Philippines. Their share in total imports

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of rolled steel into the countries of this area amount to 58 per cent on 1950 and 67 per cent in 1964, of which India accounted for 18.5 per cent and 25 per cent, Pakistan for 14 per cent and 21 per cent respectively. Each of the countries mentioned, moreover, increased its purchases abroad during this period by 2 to 5 times. In the other countries of the area the requirements of an expanding economy, in conjunction with a less developed or completely underdeveloped steel-making industry, led to a marked increase in imports - for instance, ten fold in Burma and Afghanistan.

47. At present many countries in the area have started to expand existing and to build new steelworks. Among the various current projects mention should be made of the proposed expansion of the capacities of the Indian State-owned and private integrated steelworks, viz., at Bhilai and Durgapur from an annual 1 million to 3.5 million tons each; at Rourkela from 1 million to 2.5 million, of the "Tata Iron and Steel Works" from 3 to 4 million and "Indian Iron and Steel Corporation" to 2 million tons. In the case of the State-owned firms this expansion would be carried out with the financial and technical aid of the countries which built the works in question - the USSR, the United Kingdom and Western Germany. As a result, the total capacity of these concerns would increase to 9 million tons. Simultaneously, under a project drawn up by the USSR and with its financial and technical assistance, a sixth integrated steelworks is to be built at Bokaro with an ultimate capacity of annually 5.5 million tons of crude steel. These plans would have brought the country's crude steel capacity to about 16.5 million tons in 1970-1971 and production would have been at 14.5 million tons. However, recently it has been announced that the greater part of expansion plans has been postponed; only the Bokaro plant is to be built, and Bhilai is to have a further blast-furnace.

48. In Indonesia there are plans for the building of two integrated steel plants, one with a capacity of 100,000 tons of crude steel and 80,000 tons of finished products, and a second plant for producing 250,000 tons per year. Both are being erected with the help of the USSR, and a considerable part of the equipment has been delivered; there appear, however, to be difficulties, so that it is uncertain when these plants will come into operation.

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49. In Malaysia a works is being built to produce 140,000 tons of crude steel and 120,000 tons of flats, starting up in 1967 and reaching target capacity in 1972. In 1968 it is planned to complete the construction in the Philippines of a plant capable of producing 350,000 tons of crude steel and 275,000 tons of flats per annum. Two integrated steelworks are also to be built in Pakistan - at Chittagong (150-250,000 tons of crude steel per annum - to be subsequently expanded to 1 million tons) and at Karachi (capacity 350,000 tons of crude steel - possibly to be raised to 500 -575,000 tons per annum). In the countries where there is at present only a limited market for steel products, it is planned to expand chiefly the rolling mill capacity.

50. Thus, when all projects have been carried out, the countries of the Far East will dispose of 16 to 18 large-scale integrated steelworks with a total annual output capacity of over 21-22 million tons of steel. It is, however, unlikely that this will occur before 1975.

Middle East

51. The Middle East is one of the areas where steelmaking has only lately achieved considerable expansion. One of the reasons for this was that little was known of the area's natural resources (the total reserves of iron ore are at present estimated to be 0.9 milliard tons; coal reserves are 0.4 milliard tons), that the level of industrial development was low and the market restricted. The availability and exploitation in these countries of large reserves of crude oil (27 milliard tons or 67 per cent of world reserves) and gas (5 trillion cubic metres or 28 per cent of world reserves) made it possible for some of them to obtain considerable revenues (in most cases these represent a share in the profits arising from the operations of the foreign oil companies working on the territory of these countries) and to use this revenue to pay for imports of steel.

52. At present there are steelworks only in three of the eight countries, Egypt has ten plants, many of which use scrap to produce crude steel and process the steel in small mills into semis. There is one integrated steelworks with an annual capacity of 250,-300,000 tons of steel which was built with the help of the Federal Republic of Germany, and extended with the help of the USSR; its further extension

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to larger-scale dimensions has not yet been completed. The output capacities of Egyptian steelworks are sufficient at the moment to cover a considerable part of the country's requirements of steel. For various reasons, however, (shortage of scrap, high production overheads, transport difficulties) only 50-60 per cent of the capacity is employed. Consequently, Egypt resorts to large imports of steel products to cover between a third and a half of its requirements.

53. In Israel there are three enterprises: One with a capacity of about 120,000 tons crude steel, and an annual production of the order of 100,000 tons of steel ingots and 60-70,000 tons of rolled steel; and two tube mills of a capacity of 40,000 tons and 50,000 tons output per annum respectively. Domestic output covers to one-third of the country's requirements.

54. Lebanon has three steelworks producing structural steel and forgings, with a total capacity of up to 100,000 tons (at the end of 1965) whereas its consumption is estimated to be at 130-150,000 tons of steel per annum. These companies, however, face keen competition from imports and therefore do not operate at full capacity, so that they supply not more than half of the country's requirements. More recently, steps are being taken in Lebanon to provide tariff protection for the national steelworks. Generally speaking, all the plants mentioned can satisfy no more than a third of the area's steel requirements.

55. As in most of the other developing countries, steel is used in the Middle East mainly in construction and in the mining and extracting sectors of the economy. This is also the factor determining the import pattern that has established itself. Steel sections account for nearly half of all steel products imported by the countries of this area; their share at the present time exceeds 40-50 per cent (in pre-war and the early post-war years - 40-41 per cent). The second major item are steel tubes and fittings, used in the oil and gas branches of industry; their share in imports does at present not exceed 16-19 per cent, as compared with 22 per cent in 1938 and 29 per cent in 1950. In the last three years sheets have begun to be imported - their share in imports in 1964 rose from 8 per cent in 1960 to 13 per cent. The greater part of all imported steel goes to countries with a developed or fast-growing oil or gas industry. Thus almost half of all steel supplied in 1964 went to Iran, Iraq, Kuwait and Lebanon (57 per cent

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in 1960.) However, the share of these countries in total imports has markedly declined in recent years as a result of an increased trend towards industrial development in the other Middle Eastern countries, especially Egypt.

56. Clearly, one cannot expect substantial changes to occur in the immediate future (up to 1970) in the pattern and volume of rolled steel imports into the countries of the area. This is also evident from the simple fact that the rates of industrial growth in these countries will presumably not greatly increase; the domestic resources in industrial raw materials in most of them have still not been sufficiently investigated, or have only been superficially surveyed, and the projects proposed for building steelworks are generally unsatisfactory and less significant than those which exist in other areas (except Egypt). According to the information available, in most of the countries of the area the projects for the immediate future envisage the erection only of small enterprises, whose production is intended to cover only part of the requirements of domestic markets (capacity not exceeding 70-120,000 tons a year). Only in Iran a project recently has been approved for the construction of an integrated plant by the USSR, capable of producing 500-600,000 tons of steel, the preliminary work to be completed in 1968; the plant is laid out for subsequent expansion to produce up to 1.2 million tons.

57. Egypt occupies a special place among the Middle Eastern countries since, in addition to the plants already operating and being expanded, a further integrated works is being built in Aswan, with assistance from the USSR; its initial capacity is to be 300-350,000 tons of crude steel and 300,000 tons of rolled steel, to be subsequently expanded to 1.5 million tons of crude steel per annum. When this is built, it would be possible by 1970-1972 not only to satisfy fully the requirements of the domestic market but a surplus for export may also emerge. The expectation is that, after the above-mentioned plants have been completed, the range of finished products will be considerably widened. In particular, for 1970-1972 it is expected to have an output of 1.6 to 1.8 million tons of rolled steel, including over 600,000 tons of steel for construction, over 500,000 tons of cold and hot-rolled sheets, over 300,000 tons of plates and roughly 400,000 tons of heavy sections.

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58. In the remaining countries, more especially in those where an oil- and gas-producing industry has been developed, which represents the major consumer of steel products and which supplies foreign exchange to pay for imports, the steel needs of the economy, will throughout a number of subsequent years, be covered mainly by imports.

Africa

59. The industrial backwardness of the African countries exerts a restraining influence on the creation of a steel industry and on the expansion of a market for steel products. The consumption of steel per head of the population in African countries is at present almost the lowest in the world. In recent years it amounted to about 8 kg, throughout the whole continent (as compared with about 115-120 kg. average world consumption); in most of the African countries, however, this average figure of 8 kg. is not reached. In a considerable number of countries of East and West Africa steel consumption per head does not exceed 6 kg.

60. The low level of industrial development led to the emergence of small consumers, principally building and repairing or maintenance enterprises. On an average, building operations in African countries consume roughly 40 per cent of all steel products; about one-third is used for making packaging for agricultural produce and the rest is accounted for by tubes or pipes for the oil or gas industry and for irrigation purposes. In certain countries the mining industry is an important consumer of steel; it had previously developed mainly in the easily accessible coastal areas.

61. At present, there are practically no large-scale works in African countries; the integrated plant in Rhodesia, with an annual capacity of 120-130,000 tons of steel cannot, at the present-day level of steelmaking development, be regarded as a big plant. In Algeria, Tunisia, and Morocco there are a few steelworks operating or projected, using the pig-iron produced from local iron ore. In most of the other African countries small ellectric furnaces have been built and are operating on local scrap as well as rolling mills producing principally semis; in a number of cases these countries utilize imported ingots and semis. Plants of this kind exist in Algeria, Morocco, Tanzania, Uganda, Ethiopia, Ghana , and in other countries.

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62. There has been a certain development in recent years in the building of rolling mills for the production of galvanized corrugated sheet from imported sheets. Mills of this kind are at present operating in Kenya, Tanzania, Uganda and Nigeria.

63. As the existing plants dispose only of low-efficiency equipment producing small tonnages of steel, their products are expensive and cannot compete with imported products. To keep these plants in operation considerable assistance from the State is required, which is extended in varying forms (subsidies, tax exemption for protracted periods, favourable tariff treatment for imported parts and material, etc.). Even so, a certain number of small steelworks in Africa operate much below capacity, primarily because their products cannot compete with imported steel.

64. In general, it can be said that steelmaking enterprises, at present existing in Africa do not play an important role in supplying the requirements of the whole African market or even of the markets of the few producing countries. Accordingly, in practice all the needs of the economies of the developing countries of Africa (with the exception of Rhodesia, where more than half the consumption is met from the output of local plants) continue as previously to be covered by imports.

65. Imports of semi-finished and finished products into the countries of Africa rose from 0.4 million tons in 1938 to 0.9 million tons in 1950 and about 2 million tons in 1965. Throughout the pre-war and especially the post-war period heavy and light sections formed a considerable proportion (30-40 per cent) of African imports of rolled steel. Rolled sheets and railway material accounted for one-fifth of imported supplies respectively; about 10 per cent of imports were steel tubes and fittings. The remaining products purchased consisted of wire rods, wire, tinplate, wheels, tyres and axles (about 2-5 per cent each).

66. This type of import pattern remained unchanged for a long time. In the last two or three years, however, there has been an increase in the share of steel tubes and sheets in African imports of steel. The reasons for this are the start made in exploiting new deposits of oil and natural gas, the intensification of building

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activity and the manufacture of household steel wares and also the erection of plants for producing galvanized corrugated sheets. The share of these two types of rolled steel in imports is continuing to rise and now constitutes 20-25 per cent and 18-20 per cent, respectively, of the total. The increased share of tubes and sheets in imports was partly also the result of a fall in the share of railway material and other types of rolled steel. More recently, however, purchases of railway material abroad have again risen, as new deposits of valuable minerals continue to be opened up in Africa, thus entailing the expansion of transport facilities. In 1964 the share of railway track material in the total imports of African countries amounted to almost 28 per cent (or 490,000 tons).

67. As has been pointed out, the product pattern of steel imports described above is generally typical for the whole continent of Africa. There are, however, differences in different countries caused by the influence of specific factors. For instance, in Ethiopia, East Africa, Rhodesia, and several other countries the share of flat products was as high as 40-50 per cent. In Libya the proportion of steel tubes amounts to 70-80 per cent of total imports, a feature connected with the growth of the oil industry. In Liberia and Mauritania, in latter years, imports of railway material have risen in connexion with the contruction of railways for the export of iron ores.

68. The steel requirements of African countries are rising, concurrent with the start or progress of industrialization in many countries of the continent. According to certain estimates, in the post-war period starting from 1950, the average annual rates of growth in steel consumption in the developing countries of the world amounted to about 7 per cent, and in Africa (excluding the UAR) they also did not rise above 7 per cent. Between 1953 and 1963 the consumption of rolled steel in the countries of Central and East Africa rose from 350,000 to 570,000 tons, in North Africa[1/] from 450,000 to 1,070,000 tons and in West Africa from 220,000 to 530,000 tons[2/]. The largest consumers were Algeria (400,000 tons), Zambia, Malawi and Rhodesia (164,000 tons), Nigeria (154,000 tons) and Morocco (103,000 tons).

1/ Including Egypt (roughly 420,000 tons in 1963). 2/ "The Iron and Steel Industry in Africa", Economic Commission for Africa and Centre for Industrial Development-Symposium on Industrial Development in Africa, Cairo, 27 January to 10 February 1966.

Consumption of rolled steel in Africa[a/]

(thousands of tons)

Years	North Africa	West Africa	Central Africa	East Africa	Total
1953	450	220	180	170	1,020
1955	670	250	230	350	1,500
1958	820	310	150	320	1,600
1960	1,130	360	90	380	1,960
1961	1,100	450	110	420	2,080
1962	1,050	500	110	430	2,090
1963	1,070	530	140	430	2,170

a/ Including small quantities of cast-iron products chiefly cast-iron pipes

Source: "The Iron and Steel Industry in Africa" Economic Commission for Africa and Centre for Industrial Development - Symposium on Industrial Development in Africa, Cairo, 27 January - 10 February 1966

69. On an average, during the period 1961-63, some 18 per cent of the African countries' requirements of finished steel were covered by domestic production, viz. : North African countries - about 300,00 tons (chiefly by Egypt and Algeria), West and Central Africa, each 10,000 tons (by Nigeria and the Democratic Republic of the Congo respectively), East Africa - 65,000 tons (by Rhodesia 50,000 tons and Uganda and Ethiopia 15,000 tons). Nevertheless, the possibilities for most of the countries in the area to increase import purchases of rolled steel are generally restricted by the persisting shortage of foreign currency. There is no possibility of expanding steel production on the basis of using scrap, since reserves of scrap are small and, in most countries are already exhausted; the use of imported scrap is, in most cases, not profitable.

70. In these circumstances, there has been a tendency in African countries to set up and to further expand their own steel plants in order to satisfy, wholly or partly, domestic demand, and to serve as a basis for the development of processing and other branches of industry. Domestic production of steel would enable the African countries which dispose of the raw materials to diminish their dependence on outside sources and to economize on foreign currency.

71. For the accomplishment of this aim there are a number of favourable circumstances : In certain areas of Africa there are abundanet reserves of

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high-grade iron ore which constitute some of the world's largest, richest and purest. The continent has also a wealth of potential hydro-electric power resources which are at present being utilized only to an insignificant extent. 1/ Proven reserves of oil - though the deposits are unevenly distributed - are sufficiently large, amounting to nearly 1.7 milliard tons (0.8 milliard tons in Algeria and 0.6 milliard tons in Libya). The total reserves of natural gas amount to 1,500 milliard cubic metres and there are also coal deposits, though generally of a low grade and of non-coking quality (except Rhodesia where there are large reserves of coking coal). This coal can only be used when blended with imported coal, or directly in electric pig-iron furnaces.

72. The problems which African countries have to solve as a first priority implementing schemes for building steelmaking plants are the lack of capital and a trained labour force. At present many plans for the erection of steel plants are already in existence or are being implemented in African countries. In particular, the building of steelworks is nearing completion in Algeria, Morocco and Tunisia, and in a number of other countries (Nigeria, Ethiopia, Senegal and others) plans have been made, or work begun, on building medium-sized plants with annual capacities of the order of 100-250,000 tons of crude steel, based on the use of local raw material and fuel. There are also plans for building two integrated steelworks in West Africa with an annual capacity of 700,000 and 350-400,000 tons respectively, to be set up jointly by a number of countries. However, so far no steps have been taken for the implementation of these plans.

73. It would appear that the projects known at present or carried out may somewhat increase the extent to which African countries can rely on domestic production for meeting their steel requirements. This, however, will apparently not occur before 1970-1975, when all the plants are expected to have started production and will operate at target capacity. Until that time, all of the growing steel requirements of the countries in Africa will, as previously, have to be met from imports.

1/ The hydroelectric power potential is estimated at present to amount to 684,690 MV, including 176,677 MV with a load capacity of 95 %. Installed capacity does not exceed (including South Africa and Egypt) 3,185 MV ("Africa and the Aluminium Industry" 28 October 1965, Cairo Symposium on Industrial Development in Africa).

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