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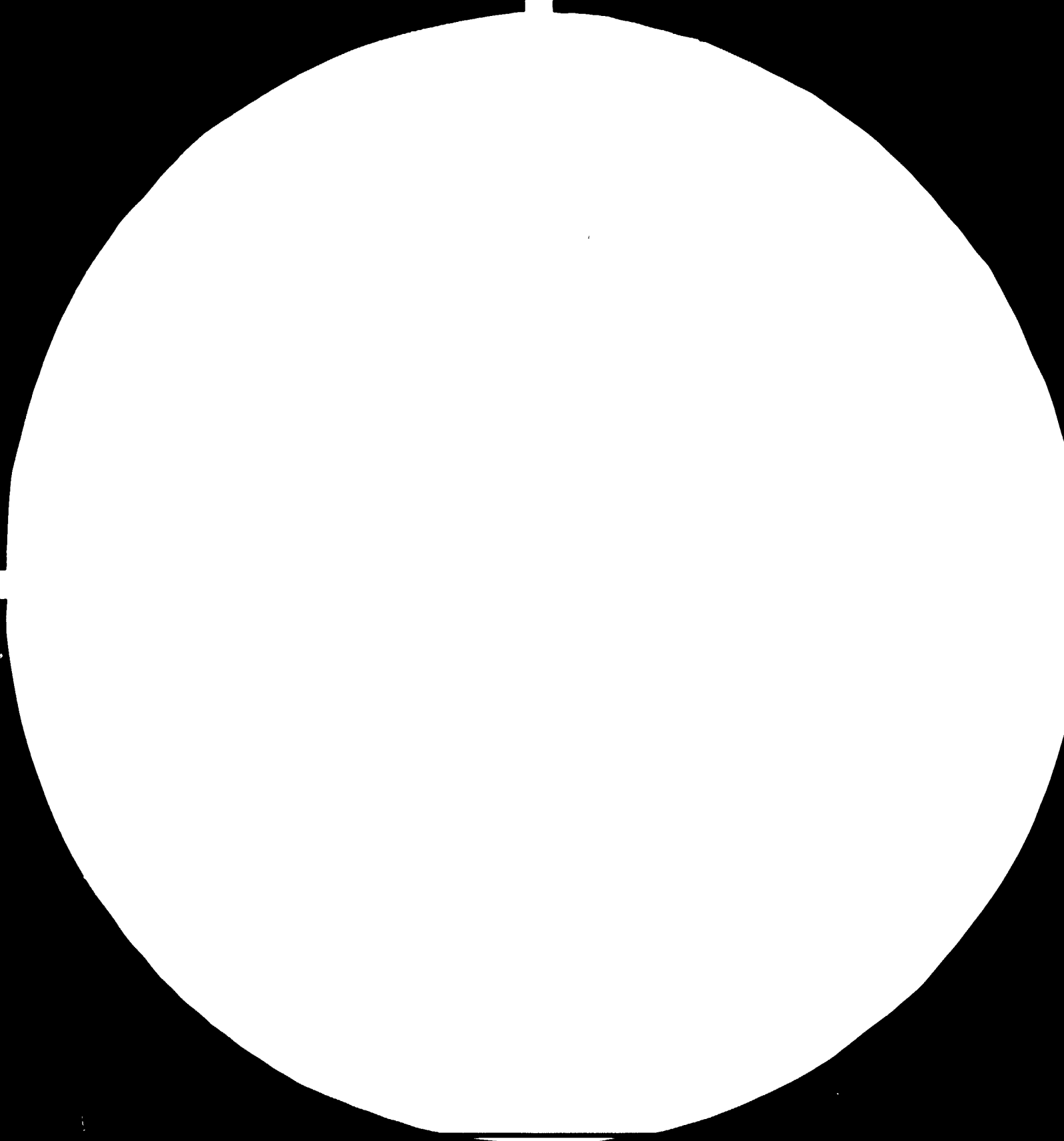

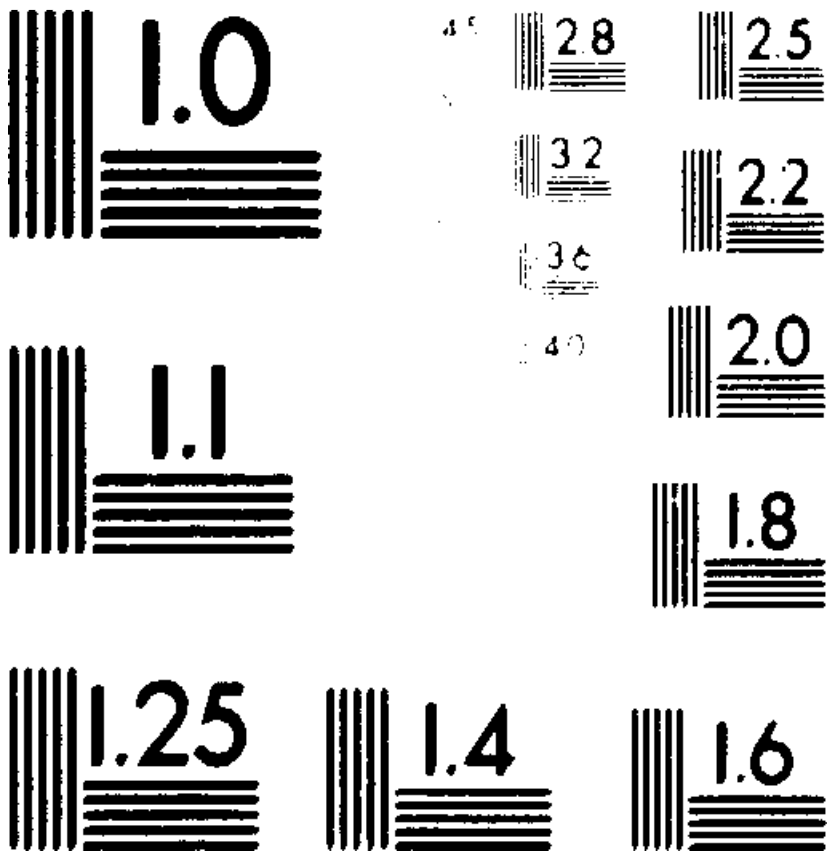

REPORT ON
IRON AND STEEL INDUSTRY IN THE DEVELOPING ESCAP REGION

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3014

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REPORT ON IRON AND STEEL INDUSTRY IN THE DEVELOPING ESCAP REGION

I N T R O D U C T I O N

The 39 ESCAP countries in Asia and Pacific have 2300 million people accounting for about 55% of the total world population. Around 800 million people in these countries live below the poverty line constituting the largest poverty concentration in the world. These countries differ considerably in terms of geographical position, area, population, resource endowment, economic size and socio-economic and political environment. In the developing ESCAP region, agriculture continues to be the largest source of employment and is the most important contributor to GNP. However, a definite process of growth accompanied by a structural shift from agriculture to industry is clearly discernible. Practically all the countries of the developing ESCAP region find themselves in various phases of this structural shift from agriculture to industry.

Despite competition from other materials for many uses, the steel industry continues to be regarded as the most important single parameter for industralisation by most Governments of the developing countries. Steel output was considered to be an important indicator of

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national economic strength for almost a century before national income accounting became common. Steel industry is essentially a resource based industry requiring iron ore, coking coal, limestone and power. Before the Second World War location of iron making was largely determined by the availability of coking coal and iron ore.

Steel industry is generally considered as the key of national economy of any country. As the country moves forward, diversification of steel products to meet the country's multi-farious requirements becomes an obvious conclusion. Moreover, steel industry is a mother industry that creates a number of subsidiary industries both up-stream and down-stream and produces a cumulative and multiple spin-off effect in terms of employment, infrastructural development, technology and other related items.

During the mid 1960s, the developing countries produced only around 4% of the world steel and consumed just over 7%. During the period 1960 - 1980, the steel production of the world as a whole has more than doubled. Production in the developing countries has grown by nearly seven times its initial level. But in 1981, it still accounted for less than 10% of the world total.

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The industralised countries of the world had rapid expansion during 1960s when the rate of growth was around 6% per annum, being replaced by stagnation or even decline during the 1970s. Over the same period, the developing countries have collectively increased their level of steel use to nearly 100 MT or five times the initial level thereby doubling their share of world consumption.

It is important to note that during the 1970s, the developing countries as a group had not only managed to maintain their rate of growth in steel use but also were able to increase it during the period when consumption in industralised countries was shrinking.

The developing countries of Asia and far East are forecast to continue expansion of their steel use. It is a well-known fact there is no example of sustained economic and industrial growth in a country without domestic steel production and there are a number of very real incentive and compelling reasons for establishing a national steel industry such as -

a) to make use of domestic natural resources.

b) to replace imported steel by domestic produce and save on foreign exchange.

c) to accelerate the growth of steel consuming industries and sectors.

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d) to promote ancillary industries and sectors.

e) to create employment.

However, the road to industralisation via the steel industry is not free of problems and furthermore steel making is among the more expansive ways to industralise. Also in general investment expenditure not only for steel plants but also for other industrial operations tends to be higher in developing countries than in industralised countries. The main reason is that in most cases a parallel infrstructure has to be created.

While the question of large investment expenditure is among the formidable problems which arise when a national industry is established, there are many related planning needs which need careful consideration before the irreversible decision is taken to start the domestic steel production. The crucial question is whether the economy has attained a stage of economic development that provides what is known as the condition for take-off.

Amongst the developing countries of the ESCAP region, the steel scene is comparatively poor both from the point of view of per capita consumption and self-sufficiency. The geographical distribution of steel production and consumption in the years 1974 and 1983 is given in Table-I.

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TABLE-1

GEOGRAPHICAL DISTRIBUTION OF STEEL PRODUCTION AND CONSUMPTION IN 1974 AND 1983

1 9 7 4		1 9 8 3	
World Total : 704 million metric tons		World Total : 662 million metric tons	
*Production:		*Production	
- Industralised countries	65.8%	- Industralised countries	51.6%
- Developing countries	4.4%	- Developing countries	9.4%
- Centrally-planned economies	29.8%	- Centrally-planned economies	38.8%
**Consumption		**Consumption	
- Industralised countries	59.2%	- Industralised countries	45.5%
- Developing countries	9.9%	- Developing countries	14.4%
- Centrally-planned economies	30.9%	- Centrally-planned economies	40.1%
Note		Note	
*Developing countries total consists of:		*Developing countries total consists of :	
- Latin America	2.5%	- Latin America	4.4%
- Africa, except South Africa, and Middle East	0.3%	- Africa, except South Africa, and Middle East.	0.7%
- Asia except Japan, China, DPR Korea	1.7%	- Asia except Japan, China, DPR Korea	4.5%
**Developing countries total consists of:		**Developing countries total consists of:	
- Latin America	4.4%	- Latin America	3.5%
- Africa, except South Africa, and Middle East	2.5%	- Africa, except South Africa, and Middle East	4.4%
- Asia except Japan, China, DPR Korea	3.0%	- Asia except Japan, China, DPR Korea	6.5%

Source: World Steel in Figures 1984 IISI Publication.

Based on the growth level projections for steel demand, the per capita consumptions are expected to go up substantially in these countries by turn of the century.

The ESCAP member countries include both developing and developed nations. Amongst the ESCAP members, there are a few industrially developed countries like UK, USA, Japan, Australia and USSR. A few are emerging nations like China and India and yet other nations are on the threshold of development like Indonesia, Malaysia, Philippines, etc.

The major objective of this sectoral study on iron and steel industry in the developing ESCAP region is to provide a brief review and analysis of past developments, the present situation, basic problems and future trend and prospects of development of the iron and steel industry. In fact, the study examines the various aspects of setting up steel industry in the developing ESCAP countries. The study covers the following countries:-

Afghanistan, Bangladesh, Burma, Hong-Kong, India, Indonesia, Iran, Republic of Korea, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka and Thailand.

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While the economy of these developing ESCAP countries is generally agro-based and labour intensive, a few of these developing nations are favourably placed as potentially the area of steel development on account of the following considerations:-

a) Ecological.
b) Human resources.
c) Raw materials.
d) Growing market.
e) Suitable sites.

Since the ESCAP member countries include both the developing and developed countries, there exists a strong possibility of an interaction between them in terms of technology transfer, financial assistance and raw materials and product linkage.

In order to ensure sustained growth in the economy of both developing and developed ESCAP region countries, the need for setting up basic industries like steel is obvious. Installation of steel plants shall help in exploitation of domestic resources and shall create employment for people directly as well as indirectly in the various down-stream industries.

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REVIEW OF THE PAST ECONOMIC DEVELOPMENTS AND THE PRESENT SITUATION

The recession that has afflicted the world economy since 1980 seems to be easing gradually. But the economic conditions of many developing countries have, however, further worsened . Many middle-income countries have today faced a greater liquidity crisis than was expected. This was brought on by high interest rates and reduced demand for export. Low-income countries dependent on the export of raw materials have suffered historically from low commodity prices in real terms.

The developing countries' present difficulties are the culmination of events dating back a decade or more. Table-2 gives the detail of key indicators for industrial as well as developing countries.

These difficulties are a consequence partly of conditions in the industrial market economies and partly of their own policies.

The 1980-82 Recession

The recession during the period was no simple repetition of the mid 1970s recession. Following the jump in oil prices in 1973, GDP growth rates in the

ANNEX-2

KEY INDICATORS, 1973 - 1982 (PERCENT)

Indicator	1973	1974	1975	1976	1977	1978	1979	1980	1981	1
- World trade growth (volume)@	12.5	4.0	-4.0	11.5	4.5	5.0	6.5	1.5	0.0	-2.
- Industrial countries										
- GDP growth	6.3	0.6	-0.7	5.1	3.6	3.9	3.2	1.3	1.0	-0
- Unemployment	3.4	3.7	5.5	5.5	5.4	5.1	5.0	5.6	6.5	7
- Inflation rate	7.7	11.6	10.2	7.3	7.4	7.3	7.3	8.8	8.6	7
- Developing countries										
- Oil importers										
GDP growth	6.5	5.3	4.0	5.3	5.6	6.6	4.2	5.0	2.2	2
Debt service ratio**	12.6	11.4	13.3	12.6	12.7	15.7	14.7	13.9	16.6	21.
- Oil exporters@@										
GDP growth	9.1	7.2	3.7	8.2	4.8	2.4	1.2	-1.3	1.5	1
Debt service ratio	12.2	6.7	7.8	8.4	11.1	14.9	15.5	13.0	15.7	13.

* Estimated.
@ IMF data for 1973 to 1981; GATT data for 1982.
** Service on medium and long term debt as a percentage of exports of goods and services.
@@ Excludes China.

Source(World Development Report 1983).

industrial economies fell sharply for two years and then recovered rapidly in 1976, although in the three subsequent years growth was still well below the average for the 1960s. In contrast growth rates were initially less depressed by the 1979 rise in oil prices, but subsequently failed to match the recovery seen after 1975. The second recession was shallower than the first, but it has lasted longer since industralized countries tightened monetary controls to bring down inflation. As a result, unemployment in the industrial countries which stayed high at about 5 percent after the first recession, has since climbed to more than 8 percent.

Developing countries are directly affected by fluctuations in the industrial world (Figure-1). Their overall growth rates have been higher, but even those that have grown fastest have not been able to avoid the cyclical influence of industrial countries. They have also been affected by high interest rates. Both effects were powerful in the early 1980s when many developing countries have been squeezed between stagnating foreign exchange earnings and soaring interest payments on their debt.

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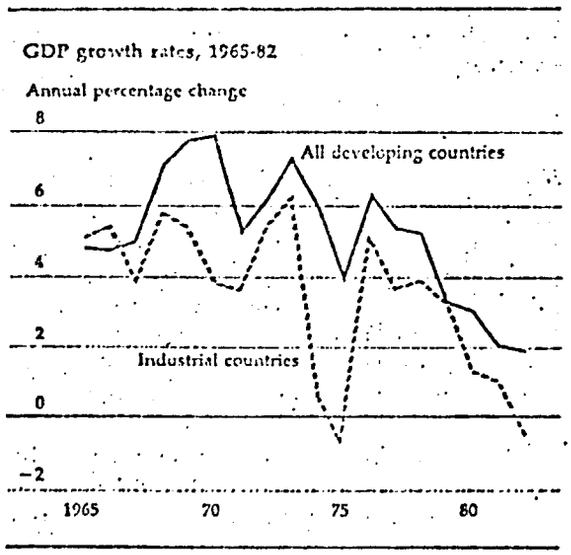
FIGURE - 1



Source: World Development Report 1983

Developing countries have reacted to these pressures in different ways. Those middle income countries that had adopted outward oriented trade policies - mainly in East Asia - have managed to maintain the momentum of export expansion and avoid serious new debt problems.

The two largest low-income countries - China and India - have come through the current recession with encouraging resilience. They were not so heavily dependent on foreign trade, had little commercial debt, and so were not much affected by high interest rates. They have also made impressive progress in agriculture.

The state of economy will determine whether the stage is ripe for the economic development. This is determined by what is known as the condition for take-off. A pre-requisite is that the GDP per capita has reached a level signifying that the economy is moving from a stage of under development towards the start of industralisation. The exact level of per capita income corresponding to a change overwill vary with the type of economy and may be between 400 and 800 US$.

The per capita GDP in the developing and a few developed ESCAP countries is presented in Table-3. It may be observed that the per capita GDP of

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Table - 3

PER CAPITA GDP OF SELECTED ESCAP COUNTRIES IN 1975 US$

Country and country group	1960	1970	1980
Developing			
Afghanistan	92	85	103
Bangladesh	n.a.	126	142
Burma	69	97	116
Fiji	813	858	1,191
Hong Kong	682	1,476	2,746
India	122	123	143
Indonesia	154	168	289
Iran	550	1,157	1,102
Korea, Rep.of	236	405	778
Malaysia	426	636	1,062
Nepal	117	121	121
Pakistan	n.a.	163	194
Philippines	251	324	446
Singapore	909	1,732	3,561
Sri Lanka	212	267	357
Thailand	182	280	452
Developing Group	155	195	265
Developed			
Australia	4,198	5,947	6,886
Japan	1,572	3,843	5,453
New Zealand	3,229	3,937	4,569
Developed Group	1,864	4,067	5,588

Source : UNIDO
UN Monthly Bulletin of Statistics, various issues

developing ESCAP countries is generally low except for Fiji, Hong-Kong, Iran, Republic of Korea, Malaysia and Singapore where the per capita GDP is above $ 500 in the year 1980 at 1975 prices.

Table-4 gives the sectoral structure of GDP at constant (1975) market prices for the selected ESCAP countries. An analysis of the sectoral contribution to the GDP in the developing ESCAP region countries indicates that the major contribution to the GDP is from agriculture which generally ranges from 30% to 60%. The contribution from the manufacturing sector is comparatively low at present and is about 10% to 30%. Contrary to this in the developed countries manufacturing sector has much higher contributions of about 30% to 50% and agricultural sector contributes only to the extent of 5% to 10%.

The International Development Strategy for the Third United Nation Development Decade constitutes the basic guidelines whereby the international community has agreed to intensify cooperative efforts to accelerate development in the Third World and eliminate the inequities of the existing international economic order.

In this global context of ESCAP regional input into the formulation of the strategy together with the regional action programme elaborated in the light of

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Table - 4

SECTORAL STRUCTURE OF GDP AT CONSTANT 1975 MARKET PRICES IN SELECTED ESCAP COUNTRIES(1960,1970 & 1976)

(Percentage)

	Year	Agriculture A_o	Industry I_o	Services S_o	Structure
Developing countries or areas					
1. Afghanistan	1960	75.6	14.1	10.3	$A_o - I_o - S_o$
	1970	61.0	24.7	14.3	$A_o - I_o - S_o$
	1978	55.1	28.1	16.8	$A_o - I_o - S_o$
2. Bangladesh	1960	62.4	8.1	29.5	$A_o - S_o - I_o$
	1970	58.2	11.2	30.6	$A_o - S_o - I_o$
	1978	50.3	15.2	34.5	$A_o - S_o - I_o$
3. Burma	1960	37.5	9.8	52.7	$S_o - A_o - I_o$
	1970	42.9	10.3	46.9	$S_o - A_o - I_o$
	1978	45.5	11.2	43.3	$A_o - S_o - I_o$
4. Fiji	1960	38.7	31.3	30.0	$A_o - I_o - S_o$
	1970	31.8	30.4	37.8	$S_o - A_o - I_o$
	1978	26.7	25.9	47.4	$S_o - A_o - I_o$
5. Hong Kong	1960	11.2	30.3	58.5	$S_o - I_o - A_o$
	1970	4.4	36.4	59.2	$S_o - I_o - A_o$
	1978	0.8	33.1	66.1	$S_o - I_o - A_o$
6. India	1960	51.0	19.4	29.5	$A_o - S_o - I_o$
	1970	44.4	23.4	32.2	$A_o - S_o - I_o$
	1978	39.6	25.5	34.9	$A_o - S_o - I_o$

Table - 4 (Contd..)

	Year	Agriculture A_o	Industry I_o	Services S_o	Structure
7. Indonesia	1960	46.4	22.8	30.8	$A_o - S_o - I_o$
	1970	39.1	28.0	32.9	$A_o - S_o - I_o$
	1978	29.2	35.5	35.2	$I_o - S_o - A_o$
8. Iran	1960	22.3	52.3	25.4	$I_o - S_o - A_o$
	1970	12.1	64.5	23.3	$I_o - S_o - A_o$
	1978	10.0	53.8	36.2	$I_o - S_o - A_o$
9. Korea, Rep.of	1960	45.4	13.8	41.7	$A_o - S_o - I_o$
	1970	31.2	26.4	42.4	$S_o - A_o - I_o$
	1978	19.4	41.4	39.2	$I_o - S_o - A_o$
10. Malaysia	1960	30.4	25.5	44.1	$S_o - A_o - I_o$
	1970	30.7	31.4	37.9	$S_o - I_o - A_o$
	1978	26.1	33.3	40.6	$S_o - I_o - A_o$
11. Nepal[a/]	1965	68.0	10.0	22.0	$A_o - S_o - I_o$
	1970	70.0	11.1	18.8	$A_o - S_o - I_o$
	1978	61.7	12.3	26.0	$A_o - S_o - I_o$
12. Pakistan	1960	40.8	18.7	40.4	$A_o - S_o - I_o$
	1970	35.2	24.5	40.3	$S_o - A_o - I_o$
	1978	29.8	24.5	45.7	$S_o - A_o - I_o$

Table 2 (Contd..)

	Year	Agriculture A_o	Industry I_o	Services S_o	Structure
13. Papua New Guinea[a/]	1960	48.9	13.5	37.7	$A_o - S_o - I_o$
	1970	36.0	25.5	38.5	$S_o - A_o - I_o$
	1978	37.3	24.7	38.0	$S_o - A_o - I_o$
14. Philippines	1960	33.6	27.6	38.8	$S_o - A_o - I_o$
	1970	31.1	29.9	39.9	$S_o - A_o - I_o$
	1978	28.2	35.1	36.7	$S_o - I_o - A_o$
15. Singapore	1960	4.8	21.8	73.5	$S_o - I_o - A_o$
	1970	2.8	33.7	63.5	$S_o - I_o - A_o$
	1978	1.6	34.0	64.4	$S_o - I_o - A_o$
16. Sri Lanka	1960	46.0	16.1	37.9	$A_o - S_o - I_o$
	1970	41.8	19.3	38.9	$A_o - S_o - I_o$
	1978	36.6	22.2	41.2	$S_o - A_o - I_o$
17. Thailand	1960	41.6	17.8	40.6	$A_o - S_o - I_o$
	1970	33.5	23.3	43.2	$S_o - A_o - I_o$
	1978	28.2	29.9	41.9	$S_o - I_o - A_o$
Socialist countries					
1. Mongolia	1960	22.9	21.3	55.8	$S_o - A_o - I_o$
	1970	25.3	28.4	46.3	$S_o - I_o - A_o$
	1978	20.0	31.4	48.6	$S_o - I_o - A_o$

Table - 4 (Contd..)

	Year	Agriculture A_o	Industry I_o	Services S_o	Structure
Developed countries					
1. Australia	1960	7.5	38.1	54.4	$S_o - I_o - A_o$
	1970	5.8	38.7	55.5	$S_o - I_o - A_o$
	1978	5.7	34.7	59.6	$S_o - I_o - A_o$
2. Japan	1960	14.7	38.7	46.6	$S_o - I_o - A_o$
	1970	6.1	41.6	52.3	$S_o - I_o - A_o$
	1978	4.5	43.4	52.3	$S_o - I_o - A_o$
3. New Zealand	1960	14.9	25.2	59.9	$S_o - I_o - A_o$
	1970	12.4	29.1	58.5	$S_o - I_o - A_o$
	1978	10.2	30.3	59.5	$S_o - I_o - A_o$

Source: UNIDO Bulletins

a/ GDP at current market prices

the goals, the strategy should specify a series of quantitative targets which must be met if the existing disparities between the developing and the developed countries are to be reduced.

The Commission recognised in its Thirty-seventh Session that in order to meet the regional development objectives for the Third Development Decade, the developing ESCAP countries would have to achieve as a minimum the following targets: an acceleration of the annual growth of GDP from 6.4% in the 1970s to 6.7% in the 1980s: an increase of agricultural output from 2.7% to 6.5% and of industrial growth from 8.7% to 8.9% : an increase in the investment - GDP ratio from 19.7% to around 22.2% : and a substantial increase in the foreign resource inflows. A minimum rate of growth of 8% per annum for industrial export was also recognised to be essential to the attainment of the target set in the Lima Declaration and Plan of Action.

In view of the heterogenesity of the ESCAP region, the regional targets were further refined to allow for different economic and social conditions prevailing in the main sub-regions of Asia and the Pacific. Thus a higher target rate of GDP growth was set up for East and South-East Asia (7.5% and 5.7%) respectively, while a lower rate of growth of agriculture was envisaged for

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East and South-East Asia (3%) than for South-Asia (3.6%). For industrial production, the minimum target growth rates were set at 8.2% for South Asia and 9.9% for East and South-East Asia.

Table-5 gives the average annual rates of growth of production by sectors. It may be observed that the average annual growth rates in agricultural production has generally shown a declining tendency during 1970 - 1978 as compared to the period 1960 - 1970. The growth rates in the production of industry and services sectors, however, have not registered a substantial increase.

Table-6 gives the value for percentage change in the real GDP for the selected developing ESCAP countries. As can be seen the growth rates in several developing ESCAP countries remained well above the level of regional strategy goals in 1980 and 1981. Against this, the performance in 1982 showed a drastic deterioration of the economic conditions in the region. Although more than half the economies of the region still achieved growth rates between 4-6% (which were considerably above the average), the performance of 1982 showed that the impact of world recession was gradually being felt and the regional strategy objectives appeared increasingly difficult to attain in absence of substantial improvement in the world economies conditions.

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Table - 5

AVERAGE ANNUAL GROWTH RATES OF PRODUCTION BY SECTOR IN SELECTED ESCAP COUNTRIES
(1960-1970, 1970-1978 and 1960-1978)

(Percentage)

Country group and country or area	Period	Agriculture A_o	Industry I_o	Services S_o	GDP a/
1	2	3	4	5	6
Developing countries or areas					
1. Afghanistan	1960-1970	-0.1	7.8	5.3	1.8
	1970-1978	2.2	5.2	5.7	3.9
	1960-1978	0.9	6.7	5.5	2.6
2. Bangladesh	1960-1970	1.9	6.1	3.0	1.7
	1970-1978	1.6	7.4	5.1	3.6
	1960-1978	1.8	6.7	4.0	3.0
3. Burma	1960-1970	7.0	6.0	4.4	5.1
	1970-1978	4.3	4.6	2.5	3.3
	1960-1978	5.8	5.4	3.5	4.7
4. Fiji	1960-1970	2.8	4.5	7.3	4.9
	1970-1978	2.7	2.9	8.0	5.4
	1960-1978	2.7	3.8	7.6	4.9
5. Hong Kong	1960-1970	0	11.8	9.9	9.7
	1970-1978	-12.1	7.0	9.8	8.2
	1960-1978	-6.0	9.7	9.9	9.2
6. India	1960-1970	1.8	5.1	4.0	3.5
	1970-1978	1.8	4.4	4.3	3.2
	1960-1978	1.8	4.8	4.1	3.2

Table - 5 (Contd..)

1	2	3	4	5	6
7. Indonesia	1960-1970	1.9	5.8	4.4	3.6
	1970-1978	3.9	11.0	8.7	8.0
	1960-1978	2.8	8.1	6.2	5.5
8. Iran	1961-1970	4.1	13.0	10.4	10.9
	1970-1978	3.3	3.4	11.8	5.8
	1961-1978	3.7	8.4	11.0	8.5
9. Korea, Rep. of	1960-1970	4.4	16.5	8.6	8.9
	1970-1978	4.0	16.7	9.3	10.2
	1960-1978	4.3	16.6	8.9	9.3
10.Malaysia	1960-1970	6.8	9.0	5.1	6.6
	1970-1978	5.6	8.5	8.6	7.7
	1960-1978	6.2	8.8	6.6	7.2
11.Pakistan	1960-1970	5.3	9.8	6.8	7.1
	1970-1978	2.1	4.3	5.9	4.1
	1960-1978	3.9	7.3	6.4	5.7
12.Philippines	1960-1970	4.8	6.4	5.6	5.3
	1970-1978	4.8	8.3	5.4	6.4
	1960-1978	4.8	7.3	5.5	5.8
13.Singapore	1960-1970	3.7	14.4	7.9	9.7
	1970-1978	2.3	9.3	9.4	9.3
	1960-1978	3.1	12.1	8.5	9.4
14.Sri Lanka	1960-1970	4.7	7.6	6.0	5.8
	1970-1978	2.2	5.7	4.7	4.9
	1960-1978	3.6	6.8	5.4	4.9

Table - 5 (Contd..)

1	2	3	4	5	6
13. Thailand	1960-1970	5.3	10.5	8.3	7.9
	1970-1978	5.9	11.6	7.7	7.9
	1960-1978	5.5	11.0	8.0	7.9
Socialist countries					
1. Mongolia	1960-1970	3.5	5.6	0.6	2.6
	1970-1978	2.8	7.2	6.6	5.9
	1960-1978	3.2	6.3	3.3	4.1

Source: UNIDO

Table - 6

PERCENTAGE CHANGE IN GDP IN SELECTED ESCAP COUNTRIES

	1980	1981	1982
Afghanistan	-	1.5	-
Bangladesh	2.8	6.8	0.3
Burma	7.8	6.7	5.9
China	6.9	3.0	4.0
Hong Kong	9.8	11.0	4.0
India	7.9	4.6-5.5	2.5-3.0
Indonesia	7.0	7.6	4.0-6.0
Iran	-12.0	1.0	-2.0
Malaysia	7.8	6.9	3.9
Nepal	-5.2	3.3	4.1
Pakistan	7.3	6.1	6.6
Philippines	4.9	3.8	2.6-2.8
Republic of Korea	- 6.2	7.1	6.0
Singapore	10.3	9.9	5.0-7.0
Sri Lanka	5.8	5.8	5.0
Thailand	5.8	7.6	5.0

Source : UNIDO

During the first year of the 3rd Development Decade the growth rates of the developing ESCAP economies following export led growth strategies were the highest in the region and much above the world average. Hong-Kong with 11% attained the highest rate of GDP growth in 1981, surpassing 9.8% record achieved in 1980, Singapore's growth rate of 10.3% in 1980 fell only slightly to 9.9% in 1981. The Republic of Korea recovering from the dramatic economic slow down of 1979-80 achieved a GNP increase of 7.1% in 1981. The high rates of growth of these economies indicate that the industrial restructuring programme that they had introduced in the late 1970s brought about positive changes.

However, these adjustment measures were not sufficient to fully compensate the rapidly deteriorating conditions in the world economy or to cope with the changing trade policies of the region's major trading partners. This is suggested by the sharp decline in the export growth rate of Singapore from 38% in 1980 to 6.2% in 1981 and by the slow down in the rate of growth of Hong-Kong from 30% in 1980 to 10.3% in 1981.

The worsened external financial situation in all the countries following export-led growth strategies in 1980 and 1981 had a serious negative influence on

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their overall economic performance in 1982. According to a preliminary official estimate the GDP rate of growth fell in 1982 to 4% in Hong-Kong, 5% to 7% in Singapore and 6% in the Republic of Korea.

For Malaysia in 1980 the GDP growth rate was still high at 7.8%. The economy, however, in 1981, was hit by sharp set-backs in the prices of different products and Malaysia's rate of GDP growth slipped to 6.9% in 1981 and further down to an estimated 3.9% in 1982.

For Indonesia the rate of GDP growth in 1980 and 1981 was 7% and 7.6% respectively. In the Philippines the GDP growth rate slowed to 3.8% in 1981 as compared to 4.9% in 1980.

For Sri Lanka the economic growth rate during the first two years of 1980s was high at 5.8% per annum. The estimated growth rate in 1982 was around 5%.

The rate of GDP growth in Thailand was 7.6% in 1981 and the estimated rate of GDP growth is 4.5% in 1982.

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India achieved a very substantial GDP growth rate of 7.9% in 1980-81 followed by an estimated 4.6% to 5.5% growth rate in 1981-82. Agricultural growth rate for India was particularly impressive in 1980-81 and in 1981-82 averaging 9.2%.

For Bangladesh, 1981 can be considered successful in terms of economic growth. GDP increased by 6.8% with agricultural production rising by 8.1% and industrial output by 14.6%.

Pakistan registered a growth rate of 6.1% in GDP in 1981-82 stood at 7.8% and 6.7% respectively.

Table-7 gives the details of trade turn over and balance of trade for the selected ESCAP countries. It may be observed that most of the developing ESCAP countries have shown deficit trade balance during the years 1980 and 1981.

From the above analysis, it is quite clear that rates of economic growth in the ESCAP region although still comparing favourably with rest of the world have been adversely affected and need closer analysis. A review of the progress in the main sectors of economic activity would be necessary for identifying the factors responsible for the shortfalls and slow down of economic activity.

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Table - 7.

TRADE TURNOVER AND BALANCE OF TRADE IN SELECTED DEVELOPING ESCAP COUNTRIES

	Millions of US dollars				Annual percentage change			
	1980	1981	1982		1980	1981	1982	
			First Quarter	Second Quarter			First Quarter	Second Quarter
Afghanistan								
Exports	729	849	...	...	49.0	16.4	-43.5	...
Imports	924	441	...	...	34.5	-52.3	1.3	...
Balance	-195	408						
Bangladesh								
Exports	760	791	192	164	21.2	4.1	-16.2	-16.3
Imports	2616	2594	687	...	71.0	-0.8	18.4	...
Balance	-1856	-1803	-495					
Burma								
Exports	465	455	158	...	20.3	-2.2	17.6	...
Imports	352	373	132	...	6.0	5.9	26.5	...
Balance	113	82	26					
China								
Exports	16255	23257	...	...	33.7	27.4	28.7	...
Imports	19530	20643	...	...	24.6	5.7	-25.2	...
Balance	- 1192	2614						
Fiji								
Exports	377	311	50	45	46.7	-17.5	-15.3	- 8.2
Imports	562	632	123	122	19.6	12.4	-21.3	-21.3
Balance	-185	-321	-73	-77				
Hong Kong								
Exports	19714	21737	4827	5362	30.1	10.3	-1.0	-0.5
Imports	22413	24680	5729	7308	30.8	10.1	-3.2	16.0
Balance	-2699	-2943	- 902	1946				
India								
Exports	8337	7695	2066	...	6.4	-7.7	11.5	...
Imports	14086	14877	3805	...	38.9	5.6	4.3	...
Balance	-5749	-7182	-1739					
Indonesia								
Exports	21909	22259	5432	4511	40.5	1.6	-5.1	-7.4
Imports	10834	13271	3962	4377	50.4	22.5	32.1	33.5
Balance	11075	8988	1470	134				

Table - 7 (Contd..)

1	2	3	4	5	6	7	8	9
Iran								
Exports	14251	10548	2984	...	-28.3	26.1	-24.6	...
Imports	12247	11390	2516	...	25.8	-7.0	-20.8	...
Balance	2004	-842	468					
Malaysia								
Exports	14345	12884	3043	...	19.4	-10.2	-8.1	...
Imports	12139	13132	3120	...	40.2	8.2	1.8	...
Balance	2206	-248	-77					
Nepal								
Exports	80	145	25	24	-26.6	81.2	-26.5	-55.5
Imports	200	195	...	...	25.0	-2.5	...	...
Balance	-120	-50						
Pakistan								
Exports	2588	2880	624	722	25.9	11.3	-33.7	-9.3
Imports	5350	5348	1217	1354	31.9		-7.1	7.3
Balance	-2762	-2468	-593	-632				
Papua New Guinea								
Exports	1033	851	143	176	17.0	-17.6	-23.1	...
Imports	1023	1116	283	...	29.8	9.2	3.7	...
Balance	10	-265	-140					
Philippines								
Exports	5788	5722	4492	...	25.8	-1.1	194.4	...
Imports	7727	7946	2199	...	16.8	2.8	8.6	...
Balance	-1939	-2224	2293					
Rep. of Korea								
Exports	17505	21254	4870	5543	16.3	21.4	5.4	0.9
Imports	22292	26131	5745	6093	9.6	17.2	-4.7	-9.7
Balance	-4787	-4877	-875	-550				
Singapore								
Exports	19773	20933	5137	5539	38.6	6.2	-0.4	7.4
Imports	24003	27571	7310	7072	36.0	14.9	8.9	2.8
Balance	-4230	-6638	-2173	-1533				
Sri Lanka								
Exports	924	1036	219	...	-5.8	12.1	-8.3	...
Imports	2029	1803	359	...	40.1	-11.1	-20.7	...
Balance	-1105	-767	-140	-				
Thailand								
Exports	6505	7037	1942	...	23.0	8.2	7.1	...
Imports	9214	9955	2046	...	28.2	8.1	-18.8	...
Balance	-2709	- 2918	-104					

Source : Compiled from Economic and Social Survey of Asia and the Pacific, 1982

REVIEW OF PROGRESS IN THE MAIN SECTORS OF ECONOMIC ACTIVITY

Agriculture

The agricultural sector in developing ESCAP region performed well in 1981. The total agricultural output increased by 4.5% against the 3.5% set as the average annual growth target in the regional strategy. Despite considerable progress made in achieving self-sufficiency in food-grains production, the ESCAP countries in 1981 still imported about 60 million tonnes of cereals to meet the deficits and build up stocks.

Industry

The development of the manufacturing industries in the developing ESCAP region in the early 1980s displayed a somewhat unusual pattern as compared to the overall economic performance in the region. In 1980s, the rate of growth in the manufacturing industries was only 0.8% while GDP increased by more than 5%. In 1981, manufacturing growth accelerated recording a 5.2% increase. At the same time the overall economic growth rate was maintained at the same rate as in the previous year. Only in 1982 did the regional indicators of overall economic performance and those of manufacturing declined simultaneously and substantially.

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It appears that the negligible average rate of manufacturing growth in 1980 was caused by drastic production slow-down in only 2 countries of the region. These countries are India and Republic of Korea which accounted for almost half (29% and 17% respectively) of the region's manufacturing outputs. In 1981, the situation was somehow different. India displayed formidable industrial recovery achieving the growth rate of 7.9% and negative growth in Republic of Korea was replaced by 10.6% increase in industrial production. At the same time, industrial activity in other countries of the region although still relatively high, slowed down significantly. This related to several countries of South East Asia particularly Indonesia, Malaysia, Philippines and Singapore. In 1982, the industrial production in all the countries of the region diminished drastically. The growing needs for flexible industrial adjustment to changing conditions in the external and internal market on one hand and diminishing possibilities of achieving this during the period of economic slump on the other, pose a major dilemma for the industrial development of the ESCAP region.

The problems of structural transformation in the industrial revolution of the region poses new questions and challenges. While there is no ready prescription as to how these difficulties can be resolved, identification of the emerging problems and prospects is very

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much necessary for determining the directions of the restructuring process.

During 1960s and 1970s many developing ESCAP countries passed through the fundamental transformation from the traditional sectoral structure of GDP with the largest share occupied by agriculture and the lowest by the industry, to a more advanced structure with the largest share in the services sector followed by industry and agriculture. The share of industry in GDP at the end of last decade was much larger than the industries' share in the employment (34% and 13% respectively), indicating that the production effect of structural changes was much stronger than its employment effect.

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REVIEW OF THE STEEL DEVELOPMENT SECTOR

Every developing country desires to build up its own heavy industries because it constitutes a vital industry base which is so necessary to maintain the rapid pace of industrial development. Without any heavy industry of their own, the developing countries have to depend on others for supply of machinery and industrial raw materials and intermediate inputs. With a base of heavy industries the developing countries not only strengthen and enlarge their industrial base for the accelerated growth for other industries but also enhance technological progress for a new direction.

The industralised countries of the world have been through a period of very low economic growth. This has resulted in stagnation and recession of steel demand. The causes of mid 1970s recession were manifold cyclic factors combined with changes in the economy structure of the advanced countries with the breakdown of an over-shared international monetary system. With the manifold increase in the prices of oil and related general increase in energy prices, created an economic depression of frightening domension.

The world economy is going through a phase of adjustment to the changed conditions. During this period of adjustment the demand of steel has remained

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slack. Two-third of the steel use in industralised countries is investment related and as the economies are stagnating, investment is at a low level. Furthermore, the characteristics of investment has changed from investment for capacity expansion which is steel intensive to investment for productivity increase which is much less steel intensive. In view of these consideration, it is expected that steel demand in industralised countries during the 1980s to grow at a very low level. Relatively high growth rate of steel use in developing countries which were attained in 1970s and stood on trend at about 10% a year cannot be maintained in 1980s. 4% to 5% growth rate for the year would be quite realistic. This means that the dynamics of growth of steel production and also of production will shift from the developed to the developing countries.

Even when iron and steel production in the developing countries is increasing at a more sustained rate than in the market economy developed countries, this production is still at an extremely low level. The developing countries are still far away from meeting their own requirements from their own production. One can distinguish various categories of countries according to the period in which their first development of their iron and steel unit was established. Amongst them, the

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15 countries for which the study is being undertaken, India is the only country which had the iron and steel production of its own prior to 1950.

Group second consists of those countries where the first iron and steel production dates from 1950s. The Philippines and Republic of Korea figure in this group. Group third consists of those countries where the first iron and steel installations dates from the end of 1960s and the beginning of the 1970s. Hong-Kong, Indonesia, Iran, Malaysia, Pakistan, Sri-Lanka and Thailand would figure in this group. Group fourth consists of those countries where the first iron and steel installation started after the 1970s and is under construction or in the project stage. Singapore would figure in this group also. Afghanistan, Burma and Nepal would also figure in this group.

International Comparisons

In 1980s, the total production of iron and steel products (in terms of crude steel equivalent) in the world was 717.70 million tonnes. Compared with the production level in 1970s, 598.5 million tonnes, this figure indicates an increase of 119.20 million tonnes in iron and steel production in the world during the last decade.

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The developing countries started to strengthen their production of iron and steel products in the 1970s when the production of iron and steel in the developed countries turned stagnant or declined. Among those countries which have shown striking increase in iron and steel production during the last decade are South Korea (increased by 17.1 times), Taiwan (increased by 11.3 times), Brazil (increased by 2.8 times), North Korea (increased by 2.6 times), and China (increased by 2.1 times). On the other hand, U.S.A. (declined by 15.4 percent), West Germany (declined by 2.7 percent), France (declined by 2.6 percent), Luxemburg (declined by 15.5 percent), and Sweden (declined by 23 percent) are among those countries which showed large decrease in iron and steel production in the 1970s.

Differences in the demand structure between those developing and developed countries seem to be among major factor which explain the above mentioned changes in quantities of production in these countries. It is a common view that the demand for steel products increases alongwith process of economic development. The theoretical frame-work for empirical analysis in the form of steel intensity curve is available which gives the functional relationship between the economic development and steel demand. The IISI had devided the steel intensity (SI) curve into four stages according to the stages of economic development (Figure - 2).

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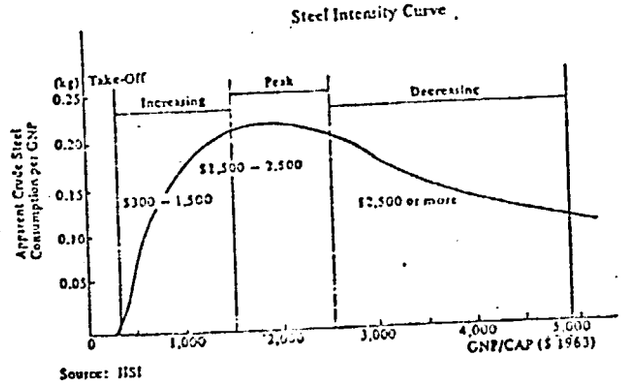
FIGURE - 2



Source: IISI

Stage of Sharp Upward Sloping SI Curve

As per capita GNP comes to 300 $ per year, the demand for iron and steel products increases almost vertically. In the take-off stage in the economic development, it is generally observed that the demand for iron and steel products rose almost vertically.

The Stage of easy Upward Sloping SI Curve

When per capita GNP falls in the range 300 $ to 1200 $ per year, the growth rate of demand for iron and steel products slows down, but still exceeds the growth rate of GNP. The demand for non-flat products exceeds the flat steel products since the steel demand increases rapidly in the construction sector in this stage.

The Stage of Horizontal SI Curve

When per capita GNP falls in the range 1200 $ to 2000 $ per year, the growth rate of demand for iron and steel products comes close to that of the GNP. Consequently the SI curve becomes horizontal. The ratio of non-flat products to flat products demand is reversed in the stage since steel demand is increased for making cars, household, electric machine and steel ships.

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The Stage Downward Sloping SI curve

When per capita GNP exceeds 2000 $ per year, the rate of growth of the demand for the iron and steel products becomes less than that of GNP and as a result the SI curve slopes downward. This concept of SI curve can be used to present the relationship between economic growth and demand for iron and steel products.

In the developing countries, the implementation of large-scale infrastructure projects and the construction of light and heavy chemical industry plants - in accordance with the positive development policies in these countries - brought about large increases in the demand for iron and steel products. The mentioned demand for iron and steel products in the developed countries has been satisfied in the past economic development. Therefore, there is a little room left to further develop the demand for iron and steel products.

Taking advantage of the increasing demand for iron and steel products, new industralized countries like South Korea, Taiwan, Mexico and Brazil assigned first priority to the iron and steel industry in their strategy of economic development. Accordingly, policies protecting and promoting domestic iron and steel industries were taken and, thus, shifted upwards the supply of these products.

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In 1980s, the level of crude steel production was 9.51 million tonnes in India, 8.61 million tonnes in South Korea, 4.22 million tonnes in Taiwan, 0.12 million tonnes in Hong-Kong, 0.34 million tonnes in Singapore, 0.20 million tonnes in Malaysia, 0.40 million tonnes in the Philippines, 0.45 million tonnes in Thailand, and 0.36 million tonnes in Indonesia. These figures are quite small compared with the total world production in the same year (741.79 million tonnes).

However, in the historical dimension changes in the production level of iron and steel in these countries were strikingly large. Compared with 1971, the production level in 1980 was 36 times larger in Indonesia, 18.2 times larger in South Korea, 9.0 times larger in Taiwan, and 3.0 times larger in the Philippines. These figures substantially exceed the pace of growth of the world iron and steel production (1.23 times) in the same period, and seem to reveal results of various policies in favour of the iron and steel industries in these countries.

World Apparent Steel Consumption

The world apparent steel consumption in 1979 was estimated at 747.5 million tonnes. Of this, total one-half was consumed by developed countries, one-third

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by centrally planned economies and about 10 percent by developing countries. Four years later in 1983, the world steel consumption declined to 662 million tonnes. Of this, 45.5% was consumed by industralised countries, 14.4% by developing countries and 40.1% by centrally planned economies.

The average steel consumption per capita in developed countries was about 500 kg. per year. On the other hand, the average steel consumption per capita in developing countries was only 50 kg. per year, or about 10 percent of that in developed countries.

With regard to the level of apparent steel consumption in Asian countries, Japan recorded 78.0 million tonnes, South Korea 7.0 million tonnes, Taiwan 5.5 million tonnes, Hong-Kong 1.44 million tonnes, and ASEAN countries ranged from 1.3 to 2.0 million tonnes in 1979. In terms of per capita apparent steel consumption, Japan and Singapore were at 673 kg. (larger than the world average) while South Korea was at 265 kg., Taiwan and Hong-Kong at 320 kg., Malaysia at 100 kg., Thailand at 43 kg., the Philippines at 35 kg., and Indonesia at 10 kg. In general, the level of per capita consumption of iron and steel in Asia is still far behind the world average and, thus, indicates prospect for upward shift in the future.

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The mentioned high level of per capita steel consumption in Singapore (673 kg/year) includes imported iron and steel products which are to be re-exported to Indonesia without any kind of processing. In this sense, this level does not truely present the actual domestic consumption of iron and steel products of Singapore. Therefore, it is estimated that about 25 - 30 percent of iron and steel products imported to Singapore are re-exported to Indonesia without or with very slight degree of processing, the actual per capita steel consumption in Singapore must be about 400 kg/year.

Table - 8 gives the world crude steel production by region and block for 1970 and 1980.

Table- 9 gives the details regarding the changes of crude steel production for Asian, South-East Asian, Middle East and ASEAN countries and also the share of South East Asian countries in the total Asian and world steel production.

Table-10 gives the world apparent steel consumption for the period (1974 - 1979) by region and block.

Table-11 gives Asia's apparent steel consumption for the period 1971 - 1980.

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TABLE - 8

WORLD CRUDE STEEL PRODUCTION BY REGION AND BLOCK

(Unit:1000 M/T %)

	Production		Change	Percentage Change	Share	
	1970	1980	'80/'70	'80/'70	1970	1980
Region W.Europe	161,911	161,190	-721	-0.4	27.1	22.5
U.S.S.R. E.Europe	155,968	208,550	52,582	33.7	26.1	29.1
N.America	133,320	118,890	-14,430	-10.8	22.3	16.6
C.S.America	13,181	29,150	-15,969	121.2	2.2	4.1
Africa	5,712	11,400	5,688	99.6	1.0	1.6
Asia	121,406	180,700	59,294	48.8	20.3	25.2
Oceania	7,066	7,820	754	10.7	1.2	1.1
Block: OECD Member Countries	393,391	395,670	2,279	0.6	65.7	55.1
Japan	93,322	111,406	18,084	19.4	15.6	15.5
U.S.A.	119,310	100,900	-18,410	-15.4	19.9	14.1
E.C.	138,070	127,760	-10,310	-7.5	23.1	17.8
Developing Countries	29,205	70,640	41,435	141.9	4.9	9.8
Total	422,596	466,310	43,714	10.3	70.6	65.0
U.S.S.R.	115,886	149,100	33,214	28.7	19.4	20.8
E.Europe 6 Countries	40,082	59,450	19,368	48.3	6.7	8.3
China N.Korea	20,000	42,840	22,840	114.2	3.3	6.0
Total	175,968	251,390	75,422	42.9	29.4	35.0
World Total:	598,500	717,700	119,200	19.9	100.0	100.0

Source: JISF

CHANGES OF CRUDE STEEL PRODUCTION , 1971-1980

TABLE-2

(Unit:1000 M/T)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	
- Japan	88557	96900	119322	117131	102313	107313	102399	102405	111748	11
- PRC China	21000	23000	26000	26000	26000	21000	23700	23700	34480	3
- India	6101	6856	6889	7068	7921	9364	10009	10099	10124	
- RO Korea	472	586	1157	1947	1994	3515	4347	4969	7610	
- DRO Korea	2360	2500	2900	3200	2900	3000	4000	5000	5100	
-RO China(Taiwan)	470	540	535	901	1010	1628	1770	3432	4250	
- Thailand	170	283	324	326	251	281	309	346	440	
- Philippines*	133	170	212	233	309	350	357	276	400e	
- Indonesia	10	30	50	80	100	139	250	225	300e	
- Singapore	125	191	204	186	187	193	104	278	295	
- Malaysia	160	187	180	158*	183*	189*	194	203	187	
- Hong Kong	105	110	115	120	120	120	120	120	120	
- Others	190	190	300	300	300	300	350	350	350	
- Middle East	557	587	910	1227	1181	1184	2548	2176	2903	2
- Total Asia(B)	119861	131553	158199	157686	143666	147487	148024	159265	175730	17
- ASEAN	596	861	970	983	1030	1152	1314	1328	1645	
- SEAISI (A)	1066	1401	1505	1884	1040	2780	3084	4760	5895	
World (C)	582554	630287	698394	708995	745431	676359	675431	717000	747528	71
A/B (%)	0.9	1.1	1.0	1.2	1.4	1.9	2.1	3.0	3.4	
A/C(%)	0.2	0. 2	0.2	0.3	0.3	0.4	0.5	0.7	0.8	

* Not including steel for casting.
e Estimate

Source: SEAISI

TABLE - 10

WORLD APPARENT STEEL CONSUMPTION (1974-1979)
(million metric tons crude steel equivalent)

(Unit:million M/T)

	1974	1975	1976	1977	1978	1979 preliminary
Japan	78.6	67.6	65.2	65.1	67.9	78.0
EEC	121.6	99.7	113.1	105.5	103.8	112.7
Other Western Europe	38.3	35.2	34.8	35.3	33.4	32.9
United States	149.7	113.7	127.8	138.5	146.4	143.2
Canada	15.8	13.0	12.6	12.8	13.6	14.9
South Africa	6.3	6.8	5.3	4.5	5.1	5.9
Oceania	9.2	6.2	6.4	5.8	5.7	7.2
Total industralised countries	419.5	342.2	365.2	367.5	375.9	394.8
Latin America	29.7	29.8	26.9	30.9	31.3	33.8
Africa except South Africa	6.4	6.3	6.4	8.8	8.8	8.9
Middle East	11.6	13.4	15.1	14.1	13.6	14.1
Asia except Japan, China, N.Korea	21.6	21.9	23.6	29.2	32.8	35.2
Total developing countries	69.3	71.4	72.0	83.0	86.5	91.8
Total Western World	488.8	413.6	437.2	450.5	462.2	486.8
USSR and Eastern Europe	188.9	195.0	200.9	205.9	214.2	213.4
China and North Korea	34.1	34.0	29.9	34.2	47.9	48.7
Total World	711.8	642.6	668.0	690.6	724.5	748.9
Unallocated	-2.8	2.8	8.4	-15.2	-7.3	-1.4
World steel production	709.0	645.4	676.4	675.4	717.2	747.5

Source : IISI

ASIA APPARENT STEEL CONSUMPTION, 1970-1980
(thousand metric tons crude steel equivalent)

(Unit: 1000 M/T)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
- Japan	60,313	71,008	89,319	78,976	68,080	65,220	65,205	66,652	78,163[e]	
- Korea	1,833	1,800	2,862	3,229	2,964	3,967	5,896	7,272	7,115	
- Taiwan	1,992	2,214	2,638	3,066	2,308	3,196	4,343	5,335	5,500[e]	5,9
- Hong Kong	581	637	584	584	584	885	1,144	1,474	1,445	
- Singapore	924	1,074	1,267	1,617	1,500	1,217	1,011	1,232	1,589	1,9
- Thailand	766	1,028	1,181	1,170	973	1,407	1,655	1,863	2,000	2,1
- Philippines	634	1,298	1,012	1,353	1,071	1,372	1,632	1,480	1,700	1,9
- Malaysia	610	693	1,023	1,170	842	944	1,002	1,139	1,300	1,4
- Indonesia	603	1,014	1,451	1,425	1,434	1,592	1,743	1,925	2,100	2,3
ASEAN TOTAL:	3,537	5,107	5,934	6,735	5,821	6,532	7,043	7,639	8,589	9,3

Source: SEAISI
KOSA

Table-12 gives the per capita apparent steel consumption during the period 1971 - 1980 for the Asian and South East Asian countries.

From the review of the steel production and consumption data in a region-wise manner, it is clear that so far as the potential and opportunities for development of iron and steel industry are concerned, the developing ESCAP countries are favourably placed. In the recent past there has been growing awareness amongst these countries to exploit their natural resources. The individual status of development of steel industry is discussed in the subsequent paragraphs.

Afghanistan

Afghanistan does not have any iron and steel production capacity of its own and has been meeting all its requirement through imports. Based on the information available, the imports of the iron and steel products were 1514000 US$ in 1970 which increased to 3612000 US$ in 1975 and to 7028000 US$ in 1977. The bulk of the imports were for steel plates and sheets.

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TABLE - 14

PER CAPITA APPARENT STEEL CONSUMPTION (1971-1980)

(in crude steel equivalent)

(Unit: Kg)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
- Japan	568	660	819	714	608	577	554	579.	673[e]	
- Korea	63	78	115	137	118	160	206	249	265	
- Taiwan	133	145	169	193	143	194	258	311	320[e]	350[e]
- Hong Kong	144	155	139	135	133	199	253	320		
- Singapore	438	501	580	729	667	535	458	529	673	740
- Thailand	20	27	29	29	23	33	38	42	43	47
- Philippines	17	33	25	33	26	31	36	32	35	36
- Malaysia	57	63	91	101	71	77	80	90	100	110
- Indonesia	5	8	12	11	11	12	13	14	15	16

Source : SEAISI
KOSA

Bangladesh

The economy of Bangladesh is overwhelmingly agrarian in character. Over 90% people live in villages and of this, 75% are directly dependent on agriculture. Bangladesh has considerably potential for development of steel capacity. Between 1985 to 1990, it is expected that Bangladesh should have excess to more sophisticated iron and steel production.

Chittagoag Steel Mills is at present the lone basic steel industry of the country. The plant went into operation in 1967. Necessary operational and maintenanco personnel were trained in Japan and also locally by M/s. Kobe Steel Ltd., the supplier and erector of the plant.

The crude steel production and the apparent steel consumption during the period 1972 to 1981 is given below:

Year	Crude steel production ('000t)	Apparent consumption in terms of crude steel ('000t)	Per capita consumption (kg)
1972	65	79	1.1
1973	68	187	2.5
1974	74	103	1.3
1975	76	93	1.2
1976	90	102	1.3
1977	108	79	1.0
1978	120	100	1.2
1979	125	130	1.5
1980	137	150	1.7
1981	134	150	1.7

Source: International Iron and Steel Institute.

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Based on the above, the average annual growth rate of steel consumption works out as 8% during 1976-1981 and 7.4% during 1972-1981. Bangladesh is expected to have a nominal steelmaking capacity of 257000 tonnes by 1986.

B u r m a

At present only a 40,000 tonnes DR Plant is in operation in Burma. In 1979, Danieli was asked by Burmese Government to prepare a feasibility study for a small integrated steel works based on DR. The first phase of the plant was started in October 1981. The first stage of DR is a module with a capacity of 20,000 tonnes per year. The second module will also have a capacity of 20,000 tonnes per year. It is planned that in the initial stage the plant shall produce 100% pig iron for supplying to many small foundries.

Malaysia

Malaysia is poised for rapid economic and industrial growth accompanied by balanced distribution of wealth among its population. Efforts are being made to effectively employ its huge energy and resource endowment for industralisation of the country. Practically all the output of industry comes from

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Peninsular (Malaysia). While the production of fabricated metal products had been undertaken for some time, the country became a major user of primary iron and steel products with the commencement of production of Malayawata Steel Limited in 1967. The growth of primary iron and steel production contributed significantly to the growth of output of the whole industry which reached US$ 276 million by 1974, an annual increase from 1968 of 35.3%. The growth has been uniformly sustained in the subsequent years.

The effective capacity of the iron and steel production had never been large and upto 1980 not shown signs of any significant expansion. This situation changed from 1981 when crude steel output was estimated to have increased from 230,000 tonnes to 680,000 tonnes. By the end of 1982 the total capacity was expected to increase to 926,000 tonnes and 250,000 tonnes coming from Malayawata and Amelgameted Steel Mill respectively. Table - 13 gives the details of number of producers and effective capacity in the Malaysian Iron and Steel Industry during the period 1978 - 1981.

The crude steel production and apparent steel consumption during the period 1972 - 1981 are shown below:-

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TABLE - 12

NUMBER OF PRODUCERS AND EFFECTIVE CAPACITY IN THE MALAYSIAN IRON AND STEEL INDUSTRY, 1978 - 1981

Type of Product	Number of Producers			Effective Capacity ('000 tonnes)				Future Additions Capacity (Year)
	1979	1980	1981	1978	1979	1980	1981*	
- Crude Iron (excl.foundries)	1	1	1	120	120	n.a.	n.a.	600 (1983)
- Crude Steel(excl.foundries)	4	4	45	n.a.	230	230	680	600 (1984)
- Hot Rolled Non-Flats:								
- Wire Rods	2	2	2	n.a.	120	150	150	
- Bars	5	5	6	260	260	260	310	230 (1982)
- Other Light Sections	5	5	6					
- Cold Rolled Flats	0	0	0	0	0	0	0	150
- Steel Pipes & Fittings	5	5	5	n.a.	140	144		
- Wire	11	11	11	n.a.	130	130	130	
- Coated Sheets:								
- Galvanised Sheets	4	4	4	107	107	107	107	
- Tinplates	0	0	0	0	0	0	0	90 (1982)
- Foundries								
- Cast Iron Pipes & Fittings	9	9	9	n.a.	500	15	n.a.	
- Other Iron Castings	212	212	212	n.a.		n.a.	n.a.	
- Steel Castings	5	6	6	n.a.	10	31	n.a.	

* estimated only.
n.a. not available.

Sources: 1. Southeast Asia Iron and Steel Institute, "Steel Statistics for Member Countries", mimeo.
2. Communication from the Malaysian Industrial Development Authority.

Year	Crude steel production ('000 t)	Apparent consumption in terms of crude steel ('000 t)	Per capital consumption (kg)
1972	187	701	43
1973	180	1,047	60
1974	182	987	84
1975	183	744	63
1976	190	840	68
1977	194	867	69
1978	203	1,221	77
1979	207	1,360	79
1980	210	1,515	100
1981	210	1,600	105

Source : International Iron and Steel Institute.

Table - 14 shows the main types of crude steel produced. Most (76% of the total output in 1980) are in the form of ingots, while practically all the remainder is in the form of continuous cast series. The latter, however, experienced a decline in output between 1979 and 1980.

Table - 15 gives production figures for down-stream products of the iron and steel industry.

The apparent steel consumption recorded an average annual growth rate of 13.8% during 1976-1981 compared to a growth rate of 9.6% during the period 1972-1981.

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PRODUCTION OF CRUDE STEEL, BY TYPE, MALAYSIA, 1974 - 1980

('000t)

Year	Ingots	Continuous Cast Semis	Steel for Casting*	Total
1974	110.0	47.6		157.7
1975	132.8	49.8		182.6
1976	120.2	68.6		188.8
1977	129.1	57.2	8.0	194.3
1978	128.2	67.0	8.0	203.2
1979	143.8	55.0	8.0	206.8
1980	138.6	35.8	8.0	182.4
Increase per annum 1974-80 (%)	3.9	-4.6	-	2.4

* Estimate only.

Sources : SEAISI, MIDA.

TABLE 15

Production of Goods of Iron and Steel and of Downstream Industries, Peninsular Malaysia, 1970–1980

Number of Units

Year	Structural Shapes & Complete Steel Structures (tonne)	Iron & Steel Drums	Tin Cans and Metal Boxes	Electric Fans	TV Sets	House-hold Refrige-rators	Bodies for			Assembly of				
							Motor Coaches Buses & Vans	Lorries	Trailers	Passenger Cars	Lorries	Vans	Buses	Other Commercial Vehicle
1970	8,252	926,063	250,198				397	508	224	20,957				
1971	11,446	956,436	236,871				348	663	109	23,528				
1972	16,108	1,141,916	244,285	139,631	59,439	31,236	250	497	34	24,703	2,285	2,769	75	992
1973	19,924	1,441,929	296,213	146,257	64,773	43,944	232	614	215	41,345	3,707	2,542	99	1,082
1974	17,318	1,381,461	303,517	166,539	77,986	48,014	424	762	185	52,891	5,692	3,219	182	2,230
1975	9,497	1,396,133	234,050	130,195	101,445	48,971	570	1,144	88	39,179	3,814	3,102	242	2,132
1976	10,155	1,420,249	235,653	175,728	107,775	61,830	416	1,239	28	44,231	3,387	2,273	457	2,000
1977	11,415	2,029,648	314,489	226,783	142,486	64,068	579	470	80	55,557	4,305	3,243	446	1,314
1978	14,413	2,093,130	368,184	320,945	150,108	88,681	816	1,075	231	62,298	5,148	4,103	770	1,583
1979	12,540	2,227,000	450,314	371,694	154,127	87,810	638	946	422	59,570	6,803	4,000	599	2,925
1980[1]	12,490	2,742,000	436,620	392,845	156,353	123,006	804	1,482	527	77,263	10,255	6,818	446	3,914
% Increase per annum	4.2	11.5	5.7	13.8	12.8	18.7	7.3	11.3	8.9	13.9	20.6	11.9	25.0	18.7

Note: 1. Estimated from 10 months' (Jan. – Oct.) data.
Source: *MSB: PM*

The Government of Malaysia is pushing for steel expansion as a means of strengthening Malaysian industrial base and providing for extensive manufacturing sector growth. Voest Alpine and Midrex have recently been awarded a contract to build a 600,000 tonnes per year DR Plant at Labuan. Nippon Steel Corporation has also been awarded a contract to build a 600,000 tonnes per year DR Plant at Terengganu. This plant is expected to be commissioned in 1984-85.

The fourth Malaysian plan forecasts a rate of growth of 7.6% between 1981 and 1985 while the forecast of the Japan Iron and Steel Exporters' Association is 7-8%. The corresponding rate of increase of nominal GNP is of the order of 14%. Based on these assumptions the forecasts of apparent consumption of iron and steel between 1979 - 1985 are given in Table-16.

I n d i a

India achieved an economic growth rate of 3.3% per annum during the period 1970 to 1980 compared to a figure of 3.5% during 1975-1980. The industrial production and gross domestic capital formation registered average annual growth rates of 4.1% and 5.5% during 1970 to 1980 and 4.7% and 7.7% during the period 1975 to 1980 respectively. The share of agriculture in GDP declined from 43% in 1970 to 38% in 1980.

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TABLE - 16

FORECASTS OF APPARENT CONSUMPTION OF IRON AND STEEL, 1979 - 1985

Year	Japan Iron & Steel Exporters' Association				Regression Estimate	
	Steel Products		Total Iron and Steel	Per Capita Iron and Steel	Total Iron and Steel	Per Capita Iron & Steel
	Non-Flats	Flats				
1979	519	470	1,300	100	1,300	100
1980	570	520	1,400	110	1,521	118
1981	640	570	1,600	120	1,676	127
1982	720	630	1,800	130	1,853	137
1983	820	690	2,000	140	2,055	148
1984	950	760	2,200	150	2,285	160
1985	1,100	840	2,500	170	2,548	174
Average Income per annum (%)	13.7	10.2	11.5	9.2	11.9	9.7

Sources: Institute of Developing Economies Tokyo 1982

The crude steel output and apparent steel consumption during the period 1972 to 1981 are shown below:

Year	Crude Steel production ('000T)	Apparent consumption in terms of crude steel ('000T)	Per capita consumption (kg)
1972	6,856	9,227	16
1973	6,889	8,221	14
1974	7,068	8,551	15
1975	7,991	8,500	14
1976	9,364	9,350	13
1977	10,009	10,185	16
1978	10,099	10,110	16
1979	10,126	11,690	17
1980	9,514	10,863	16
1981	10,780	13,750	20

Source: International Iron and Steel Institute

Steel consumption registered an average annual growth rate of 8.0% during 1976-1981 compared to a growth rate of 4.5% during 1972-1981.

India has to play a significant role in the development of steel industry in the developing region. Among the developing countries, India is well-placed in respect of four major raw material sources viz. iron ore, manganese ore, coking coal and hydro-electric potential. With a crude steel production of 10.8 Mt in 1981, India

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contributed around 1.5% to world steel production and ranked 4th among the developing countries and 17th in the world. Per capita steel consumption, however, remains low at around 20 kg. compared to world average of 162 kg. Besides, having an advantageous combination of low labour costs, abundance of raw materials, industrial and diverse market, the country has achieved significant degrees of self-reliances in equipment manufacturing, engineering, construction and development of technical and trained manpower in the field of steel industry. Viewed in this perspective, India holds the key to the development of steel industry especially among the developing countries.

The steel industry in India continues to face fundamental problems in deciding as to how to meet the needs of the potentially vast domestic market. The present population of nearly 700 million in 1981 will grow to about 825 million by 1990 and could reach 1 billion by the year 2000. India will need to increase its steel output by about 50% by 1990 just to maintain its 1981 per capita output level of 20 kg. Any significant increase in its per capita output level will require substantial additions to its steel making capacities.

The Indian Government has long supported expansion of the steel industry perticularly through the addition

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of large integrated steel works. In the early 1970s the steel industry in India shifted away from large integrated steel plants to small mini steel producers, with the Government issuing licenses for more than 200 plants. Through the second half of 1970, the mini steel plants were hit by acute power shortages throughout the country and inadequate availability of inputs such as scrap and electrodes. The Government has assisted the mini steel plants by obtaining ferrous scrap and other imported raw materials. The Government has also provided the mini steel plants with various loan packages and allowed them to diversify into alloy steel production and integrate forward by constructing finishing capacity. A potentially very favourable development for the mini steel sector has been the construction of sponge iron capacity. With India's substantial ore-reserves, additional sponge iron capacity will be an important element of the domestic steel industry by end of the decade. The latest plans of the Indian Government are for the steel industry expansion primarily through integrated steel plants. The Government of India plans to increase the capacity of integrated steel plants from a level of 11.4 million tonnes to about 23 million tonnes per year by 1989-90. The expansion plans include modernising and expanding existing works as well as building new green field sites. Among the modernisation projects are the

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expansion of Bhilai and Bokaro Works to 4.0 million tonnes per year capacity each. The other large green field plant the Visakhapatnam Steel Project is scheduled to begin production by 1988.

With the maturity of direct reduction process, it is expected that India will take advantage of its large iron ore reserves and expand the steel making capacity through the DR process route.

Indonesia

Iron and Steel has been produced in Indonesia since quite sometime. The products produced by this industry were generally in the form of simple agricultural tool. Amongst the steel producers, P.T. KRAKATAU Steel is the largest. It is a Government owned company located in West Jawa. The plant combines direct reduction of iron ore pellets with electric arc furnace steelmaking and is being constructed in a series of well defined phases. The Phase-I programme includes an HYL process direct reduction plant with a rated capacity of 2,000,000 tonnes per annum. The second phase of this plant began production in 1978 and the last unit started production in 1981.

KRAKATAU Steel is continuing its growth and will play a major role in the development of Indonesia Iron

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and Steel Industry. Facilities for the production of flat rolled steel all of each is being currently imported, are now being constructed. In this phase of expansion, second steelmaking and continuous casting plant is being installed for production of slabs. The slabs will be rolled in strips and coils subsequently. An extensive cold rolling mill at Cilegon is now being planned. This phase calls for construction of a hot strip mill, a cold rolling mill, 1.1 MT slabbing mill, a million tonne capacity sheet plant, and doubling the capacity of sponge iron unit to 2 MT.

The crude steel output and apparent steel consumption during the period 1972 to 1982 are given below:

Year	Crude steel production ('000t)	Apparent consumption in terms of crude steel ('000t)	Per capita consumption (kg)
1972	30	1,030	6
1973	80	1,442	9
1974	80	1,280	10
1975	100	1,448	11
1976	139	1,382	10
1977	250	1,744	12
1978	225	1,964	14
1979	305	2,136	14
1980	360	3,060	16
1981	500	3,100	16

Source: International Iron and Steel Institute.

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The average annual growth rate in steel consumption was recorded as high as 17.5% during 1976-1981 and 13.0% during 1972-1981.

The present Government policy is to place KRAKATAU Steel at the centre of steel sector as the only integrated steel producer in Indonesia. The smaller electric furnaces and finishing plants are being dispersed throughout the country. Govt. has an important role to play to ensure the continued operation of KRAKATAU Steel which will make available adequate steel supplies to the country.

The Government's recent import restrictions and price controls have improved domestic profit margins. This improved financial outlook has resulted in stepped up expansion plans. It is proposed to instal a 150,000 tonnes per year mini steel mill at Surabaya in the near future. Demand for iron and steel products has increased drastically with the increased construction of physical facilities. Considering an average growth of 7.57% the project of demand for crude steel during the period 1981-85 has been worked out and is given below:-

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PROJECTIONS OF DEMAND FOR CRUDE STEEL, 1981 - 1985

Year	Population Projection	Construction Sector projection (billion Rp)	Per Capita steel demand kg/capita	Total crude steel demand ('000 t)
*				
1981	151.2	676.1	19.1634	2,898
1982	155.0	272.3	20.1600	3,125
1983	158.9	782.3	21.2042	3,369
1984	162.9	841.5	22.3048	3,633
1985	167.0	905.2	23.4624	3,918

Steel production had increased from 10,000 tonnes in 1970 to 150,000 tonnes in 1977 an average annual increase of 47.24%. If the average annual increase in production remains at 47.24% by 1985, crude steel production will reach approximately 3.3 million tonnes. Projections for 1981 - 1985 are given below:

Year	Crude Steel Production Projection (tons)
1981	705,009
1982	1,038,055
1983	1,528,432
1984	2,250,463
1985	3,313,582

*Source:Institute of Developing Economies Tokyo 1982.

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Seeing the projections of demand and actual production, it can be seen that Indonesia is still short of sufficient crude steel to fulfil demand. Thus, crude steel has to be imported in increasing small amounts. Details of demand and production projects for crude steel for 1981 - 1985 are given below:

DIFFERENCE BETWEEN PRODUCTION AND DEMAND FOR CRUDE STEEL, 1981 - 1985

Year	Production Projection ('000 t)	Demand Projection ('000 t)	Difference between Production & Demand ('000 t)
1981	705	2,898	- 2,193
1982	1,038	3,125	- 2,087
1983	1,528	3,369	- 1,841
1984	2,250	2,633	- 1,383
1985	3,314	3,918	- 604

Source : Institute of Developing Economies Tokyo 1982.

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The Iranian revolution has severely altered the development of Iran's steel industry. The details of Iran's crude steel production and apparent steel consumption during the period 1972 to 1981 are given below:

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Year	Crude steel production ('000 t)	Apparent consumption in terms of crude steel ('000 t)	Per capita consumption (kg)
1972	NA	1,804	59
1973	240	2,568	82
1974	567	2,973	93
1975	551	5,382	163
1976	549	4,919	147
1977	1,825	5,864	171
1978	1,300	7,000	199
1979	1,430	3,400	85
1980	1,200	3,800	90
1981	1,200	3,200	76

Source: International Iran and Steel Institute.

Steel consumption registered an average annual growth rate of (-)8.2% during 1976-1981 compared to a growth rate of 6.6% during 1972-1981.

Isphahan with .65 million tonnes BOF plant and Ahwaz are the two potential sites for capacity expansion. A 3 million tonnes per year DR based steel plant is being built by Italy at Bandar Abbas, which is reportedly progressing. It is expected that by Iran will have a steel production capacity of 1970, 2770 and 5170 thousand tonnes by 1984, 1986 and 1990 respectively.

Republic of Korea

The Iron and Steel Industry in Korea originally dated back to 1918 when Kyumipo Iron Works was constructed

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but the contemporary iron and steel industry in Korea is spear headed by the construction of Pohang Iron and Steel Company in 1973, thus strengthening the foundation for iron and steelmaking comparable to those in the advanced countries, although the industry in a modernistic sense was being deployed in 1960. South Korea has achieved remarkable progress in two decades following the Korean war. Steel industry has registered an impressive growth since mid 1970s. Starting from a steel production level of below 2 million tonnes in 1975, the South Korean industry produced 10.8 million tonnes in 1981. The tremendous increase in production stems from the exceptionally fast construction of 8.5 million tonnes integrated steel works built by Pohang Iron and Steel Company. This new steel works took about 10 years to construct with the last 6 million tonnes capacity being built in only 4 1/2 years. The rapid construction of Pohang works and its incorporation of the latest technology and low labour cost makes it possible the world's lowest cost integrated steel producer.

The South Korean steel industry underwent the most dramatic growth in the world during the 1970s. As a result of completion of the first stage of

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development of Pohang Steel Works, the total crude steel integrated output steel capacity of the iron and steel industry in the country as a whole increased from 911 thousand tonnes in 1971 to 2183 thousand MT in 1973. Since then, Pohang Steel Works has carried out phase second and third capacity expansion projects in 1976 and 1978 respectively and the said capacity raised to 456,000 MT in 1976, and 524,000 MT in 1978. As of 1980 the capacity rose to 9,335,000 MT crude steel ingot per annum which corresponds to an average increase rate of 32.5% per annum during 1973-1980. Such a marked increase in capacity has contributed not only to stable supply of iron and steel but a very high scale of economy of heavy industralisation. This remarkable growth achieved in the iron and steel in Korea since 1970 in the industry today obtained the system of self-sufficiency in iron and steel industry. Korea now appeared as a promising strong iron and steel making country in the world. The iron and steel industry in Korea consists of Pohang Integrated Iron and Steel Company, 16 steelmaking enterprises based on electric furnaces and 61 rolling enterprises. In this context, capacities are pig iron making 8.019 MT, steelmaking per annum 12.335 MT and rolling 12.949 MT.

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The crude steel production and apparent steel consumption of South Korea during the period 1972-1981 are given below:-

Year	Crude steel production ('000t)	Apparent consumption in terms of crude steel ('000t)	Per capita consumption (kg)
1972	586	1,496	54
1973	1,157	2,860	84
1974	1,947	4,222	93
1975	1,994	3,120	84
1976	3,515	5,416	151
1977	4,347	5,997	165
1978	4,969	7,010	201
1979	7,610	7,460	193
1980	8,558	6,100	178
1981	10,753	7,480	218

Source : International Iron and Steel Institute.

While the apparent steel consumption recorded an average annual growth rate of 6.7% during 1976-1981 and 19.6% during 1972-1981, the growth rates in steel production were still faster at about 25.1% in the period 1976-1981 and 38.2% during 1972-1981. The per capita steel consumption substantially increased from 54 kg in 1972 to 218 kg in 1981.

South Korea is blessed with high productivity and low labour cost. These factors have allowed the country's steel makers to expand agressively into export

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market. It is expected that Korea will increase its export of steel from 5.2 million tonnes in 1981 to 14.4 million tonnes in 1990. The forecast of demand for iron and steel in Korea has been conducted by the various institutions based on both micro and macro methodological approaches. As a result of long term iron and steel requirements forecast conducted under the assumption that iron and steel demand pattern in Korea would conceive similarity of its world pattern, it was identified that iron and steel requirement in Korea is estimated at 16.04 MT in 1986 and 25.08 MT in 1991 respectively and such forecasts are considerably close to the result of their projections already conducted by Korea Development Institute.

The country has ambitious expansion plans for the steel industry and the annual capacity is anticipated to touch the levels of 14 Mt/yr by 1985 and 24 Mt/yr by 1990 compared to the present capacity of about 12 Mt/yr.

Pakistan

Pakistan presently has only two steel plants. The largest plant is the Pakistan Steel Mills new Bin Quasim Works in Karachi. By 1986, it is proposed to raise the capacity of this plant to 2 million tonnes per year.

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The apparent steel consumption during 1972-1981 is shown below:

Year	Apparent consumption in terms of crude steel ('000 T)	Per capita consumption (kg)
1972	382	6
1973	367	5
1974	433	6
1975	537	7
1976	497	7
1977	673	9
1978	600	8
1979	805	9
1980	640	8
1981	800	10

Source: International Iron and Steel Institute.

The apparent steel consumption registered average annual growth rate of 10.0% during 1976-1981 and 8.6% during 1972-1981.

The Philippines

The iron and steel industry in the Philippines was born in 1948, when the National Development Company established the first nail making plant. The fifties was a decade of several firsts of the industry. In 1951, the first three rolling mills were installed by Philippine Blooming Mill, Sta Ana Mills and the Central

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Steel Manufacturing Company. These mills cut scrap bars into billets which were reheated and rolled into reinforced bars. In 1952, the first scrap melting plant was established by the Marcelo Steel Corporation. In 1956, the first sheet galvanising plant was established by Elizalde Steel Corporation. Pipe and Tube making was pioneered by Republic Steel Tubes (INC) in 1958. By the end of fifties, there were a number of firms producing a variety of steel products ranging from GI sheet to pipes and tubes.

In the 1960s, steel production grew by an average annual rate 30% in real terms. However, even though production growth out paced the growth in steel demand, steel production never met the actual requirements. The gap between production and demand had to be filled with imports. At the beginning of the 1960's at least 50% of the steel requirement was met with imports. The proportion decreased very gradually until it was 40% at the end of 1960s. The seventies brought many changes to the iron and steel industry as a result of external and internal developments. On the average, steel production exhibited a negative 3.8% real growth between 1970-1972. 1973 and 1974 were better years because the newly founded Iron and Steel Authority stimulated and regulated the industry through its

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cooperative raw material purchasing programme and through its enforcement of stronger tariff protection laws. In 1975, the Government led construction boom caused steel demand to increase by 19.2% in real terms. Domestic production increased by 28.5% from its 1974 level, reaching a high of 659,000 metric tons. In 1976, steel production growth was a relatively low 4.7% and for the rest of the decade, steel production growth averaged around 4.9% keeping just a pace ahead of the 4.3% average consumption growth rate.

The production and consumption of steel during 1972-1981 is furnished below:

Year	Crude steel production ('000 t)	Apparent consumption in terms of crude steel ('000 t)	Per capita consumption (kg)
1972	173	1,350	35
1973	216	1,206	30
1974	237	1,214	29
1975	316	1,088	26
1976	357	1,394	32
1977	364	1,640	36
1978	276	1,526	37
1979	397	1,827	32
1980	330	1,500	32
1981	350	1,500	32

Source : International Iron and Steel Institute

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The apparent consumption of steel registered an average annual growth rate of 1.5% during 1976-1981 and 1.2% during 1972-1981. The iron and steel industry has also been growing in importance as a foreign exchange earner with export of its products increasing significantly in the past decade at an average of 110% annually. In 1980 some US$ 144.1 million worth of iron and steel products were exported. Despite the rapid increase in its export shipments, however, the industry remained import dependent. Iron and steel imports were worth $ 209 million in 1980. The national capacity stands at about 400,000 tonnes per year. One of the developments that iron and steel producers are optimistic about is the establishment of the direct reduction plant in the integrated steel mill.

The demand for iron and steel products is expected to increase as the Government expands its infrastructure and housing programmes. The demand projections of iron and steel products based on the estimated growth of consuming industries with 1979 as the base year upto 1990 are given in Table-17. It is expected that the demand for steel goods will reach 3,250,000 metric tons by 1990 reflecting an average growth rate of 7.9%. Flat products are expected to grow by 7.5% annually and non-flat products by 8.0%.

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TABLE - 17

Projected Demand for Iron and Steel Products*, 1979–1990

(000 M/T)

Products	Base Year 1979	1980	1981	1982	1983	1984	1985	1990	Growth Rate (In Percent)
A. Flat Products									
Cold-Rolled Steel									
Tinplates	166	172	179	186	194	202	210	255	4.0
G.I. sheets	145	158	173	190	208	228	249	392	9.5
Cold-rolled Sheets	67	72	78	84	91	98	106	144	8.0
Subtotal	378	402	430	460	493	528	565	791	6.5
Hot-rolled Steel									
Plates	115	127	141	156	173	192	213	358	10.9
Hot rolled Sheets	60	66	73	80	88	97	107	189	10.1
Pipes and Tubes	104	111	119	127	136	145	155	217	6.9
Subtotal	279	304	333	363	397	434	475	764	9.3
Total flat products	657	706	763	823	890	962	1,040	1,555	7.5
B. Non-Flat Products									
Steel bars	528	569	615	665	718	775	837	1,329	8.0
Wire rods	125	136	149	162	176	191	203	308	8.7
Structural shapes, sections and rails	26	28	30	32	35	38	40	58	7.6
Subtotal	679	733	794	859	929	1,004	1,080	1,695	8.0
Total finished steel	1,336	1,439	1,557	1,682	1,819	1,956	2,120	3,250	7.9
Crude steel equivalent**	1,712	1,845	1,996	2,156	2,332	2,521	2,718	4,167	

* Based on the estimated growth of consuming industries for a 10-year period.
** Based on Yield Factor 0.78.
Source: MIRDC Primary Iron and Steel Industry in the Philippines, 1980.

A 1.25 million tonnes per year plant is coming up at Philippines' National Steel Co., Mindano. This is based on DR process of steelmaking. The Philippines' first galvanising plant, Philippines Steel Coating Corporation will produce 50,000 tonnes per year of galvanising coil. NKK, Japan have a project to build up a 130,000 tonnes per year Heavy Plate Mill to be fed by electric steelmaking and continuous casting. According to a world bank study the prospects for economic basic steel production in the Philippines would be appreciably influenced by how well the following business conditions are satisfied:

1. The existing world excess of steel supply over steel demand will be diminished significantly by the mid 1980s.
2. The availability of semi-finished products, billets, blooms, slabs for rerolling will become less certain and supply of such items will be subject to increased price volatility.
3. Prices of semi-finished and finished steel products will strengthen relative to prices of major inputs by mid 1980.
4. Relative prices of steel plant capital equipment are likely to rise.

Singapore

The Singapore economy achieved a growth rate of 6.3% in GDP during 1982 compared to a growth rate of 9.7% in 1981. The country witnessed a high industrial

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growth resulting in substantial rise in steel consumption in the last decade. The crude steel production and apparent steel consumption during the period 1972-1981 are given below:

Year	Crude steel production ('000t)	Apparent consumption in terms of crude steel ('000t)	Per capita consumption (kg)
1972	198	912	424
1973	211	1,229	561
1974	194	1,762	790
1975	188	1,619	716
1976	194	1,342	586
1977	206	1,014	435
1978	281	1,235	526
1979	297	1,610	676
1980	340	1,850	788
1981	350	2,380	975

Source : International Iron and Steel Institute.

The apparent steel consumption registered an average annual growth rate of 12.1% during 1976-1981 and 11.2% during 1972-1981.

The steel industry spent about US$ 26 million on capital investment in 1982 and is expected to spend another US$ 49 million in the calendar year 1983. The investments are basically for uprating of melting facilities to bring billet production to 500,000 tonnes

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per year from the current 350,000 tonnes per year and for the installation of a new rolling facility to replace an older less-efficient facility and to bring rolling capacity to about 600,000 tonnes per year. Uprating of melting facility is underway and these facilities are likely to be completed in 1983/1984.

Thailand

Prior to the year 1966, almost all the domestic demand for iron and steel in Thailand was met by imports. The rapid growth in the domestic demand gave rise to the setting up of host of iron and steel units in Thailand. Steel production started in the year 1960 when galvanised sheets and steel plants were produced by Thailand Iron Works Limited.

In 1963, a joint venture enterprise between Japan and Thailand, The Steel Pipe Company Ltd. was established and started its production of welding steel pipes in 1965. During 1960s, a substantial number of rerolling mills and sheet steel finished plants were set up as a result of a boon in the construction sector in Thailand. In 1966 bar production was started using electric arc furnaces. During the 1970s, there was an upward trend in the production of iron and steel. Total production rose from 653,000 tonnes in 1974 to 1,116,000

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tonnes in 1979. The share of bars in total production in 1979 was almost 60 percent of the total production. The percentage share of galvanised sheets, welded pipes, tin plates and light gauges were 11.4%, 22%, 5.7% and 2.3% respectively. Thus bars and wire rods constituted about 60% while flat steel products represented about 40% of the total domestic production. With a rapid progress in industralisation in Thailand domestic demand for iron and steel has increased dramatically in the seventies. In 1966, total steel consumption was estimated to be around 610,761 tonnes. It rose to 1,070,000 tonnes in 1970 and stood at 2,100,000 tonnes in 1977. The average annual growth rate was 11% for the year 1970-1979 compared to 7.2% for average annual growth rate of the economy in the same period. Amongst flat and non-flat products the average annual growth rate for flat products was 15.4% as against 8.1% for non-flat products during the period 1970-1979. Flat products are perhaps the least developed sector of the steel industry in Thailand. The reason why all the flat products have to be imported is that the domestic demand is not large enough to enable producers to set up sheet rolling mills profitability. It seems that country will have to continue to rely on imported flat products in the forcible future as domestic demand is unlikely to increase to a level that will warrant the high investment necessary to establish the rolling mills.

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Thailand achieved a modest economic growth rate of 5.7% during 1981. The indigenous steel production has been quite insufficient to meet the growing steel demand. The crude steel production and apparent steel consumption during the period 1972 - 1981 are shown below:

Year	Crude steel production ('000t)	Apparent consumption in terms of crude steel ('000t)	Per capita consumption (kg)
1972	283	1,081	28
1973	324	1,240	31
1974	326	1,234	30
1975	251	1,108	26
1976	281	1,377	32
1977	309	1,655	38
1978	346	1,902	42
1979	440	2,140	43
1980	450	2,240	44
1981	300	2,100	41

Source: International Iron and Steel Institute.

The apparent steel consumption recorded an average annual growth rate of 8.8% during 1976-1981 and 7.7% during 1972-1981.

The steel industry in Thailand is comprised of 6 steel plants with a combined capacity of 728,000 tonnes per year. A feasibility study for 2.1 million

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tonnes per year DR based integrated steel plant is being done by ESTEL Technical Services, Netherlands. This proposed plant would have a raw steel making capacity of 1.6 million tonnes per year with 600,000 tonnes per year of hot rolled products and 740,000 tonnes per year of cold rolled products. The recent discovery of natural gas in the Gulf of Thailand has attracted the attention of Thai Govt. to the idea of establishing a sponge iron and an integrated steel industry in Thailand. However, Thai Govt. prefers the DR process to BF process due to the low investment costs and also the domestic demand is only large enough to justify setting up of direct reduction plants. In view of the low quality of local iron ore and difficulty of transporting it to the plants the ore could be imported from Australia or India.

Hong-Kong

Hong-Kong has a total steel consumption (annual basis) of 1.4 to 1.5 million tonnes. The crude steel production for Hong-Kong for the period 1972-1982 is given below:

Production	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Crude Steel	110	115	120	120	120	120	120	120	120	120	120

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The import of iron and steel products by Hong-Kong were US$ 76,592,000; US$ 143,896,000 and US$ 680,107,000 during the period 1970, 1975 and 1980 respectively. The details of steel imports for 1980 and 1981 are given below:

Imports	1980	1981
Steel Products		
- Ingots and semis	156	127
- Railway track material	5	3
- Heavy structurals	130	257
- Wire rods	30	22
- Concrete reinforcing bars	-	-
- Other bars and light shapes	784	749
- Plates	117	101
- Strip	27	20
- Galvanized sheet	47	48
- Tinplate and blackplate	42	48
- Other sheet and coil	175	196
- Steel tubes and fittings	95	103
- Drawn wire	37	36
- Other steel products	1,646	1,711
Raw Materials		
- Iron ore	-	-
- Pig iron	19	23
- Ferro-alloys	2	4
- Scrap	93	94

Source : IISI.

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N e p a l

Nepal has met all its requirements of iron and steel products through imports. The total imports for iron and steel products were US$ 1,392,000 and US$ 6,837,000 in 1975 and 1980 respectively.

Sri-Lanka

Sri Lanka has also met bulk of its iron and steel products requirement through imports. The imports of the iron and steel products were US$ 11,646,000; US$ 16,236,000 and US$ 70,766,000 during the period 1970; 1975 and 1980 respectively. Sri Lanka is establishing nominal steel making capacity based on DR:EAF Route and it is expected that by 1986, 65,000 tonnes of steel shall be produced on per annum basis.

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PLANNING FOR FUTURE STEEL CAPACITY

Planning for steel production should be well ahead of planning for the rest of the sectors. Firstly, steel is a basic commodity and its use is all pervasive in the production of all other commodities. Secondly, the transport problems involved in assembling the raw materials required in bulk for the production of steel are big. Thirdly, the stages through which iron ore has to pass before conversion first into ingot steel and then to finished steel are numerous and planning all along this line depends on the plan for steel production. Fourth, there comes up once again the problem of transport of finished steel to consuming centres. Fifth, the creation of production facilities for steel involve long gestation period. The interval between the decision to set up a steel plant and the time when the unit actually goes into production and finished steel is ready for despatch to consumers, is appreciably long. Considerable work is involved in site clearance, civil construction, transport of heavy capital equipment, erection at site and in tackling the teething troubles normally met in the commissioning of steel plant. Gestation period is longer in the developing countries which have inadequate facilities for manufacture of heavy metallurgical equipment and

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insufficient technical skill for the erection and commissioning of the equipment. Yet another crucial factor which has a bearing on gestation period is the scarcity of both internal finance and foreign exchange for the import of capital equipment. Investment in the steel industry is so large that it usually overshadows investment in other industries. Hence great care in judgement is called for to make investment decisions in the steel industry especially when operating with limited domestic and foreign capital resources.

All these make it imperative for the developing countries first to project their future demand for steel on a long term basis and then think of the production facilities. Such long term projections for basic commodities like steel takes into account the possible changes in the structure of the economy of the country. Also it helps to make the planning of steel production a continuous process, which is essential owing to the long time interval involved. Further, a knowledge of the magnitude of steel demand over some years can help decisions on the planning of indigenous fabrication of metallurgical equipment and the complimentary facilities for intermediate products.

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The concept of Steel Intensity Curve for relationship between economic development and steel demand has been discussed. Now it is of interest in what stages of the estimated SI Curve for the developing ESCAP countries are located. The theoretical SI curve estimated by IISI show (Figure-3) that in case of South Korea at $100 per capita GNP, the apparent steel consumption per $ of GNP shifts from .15 kg per $ to .30 kg per $. At the same level of per capita GNP this ratio increases from .10 kg to .17 kg per $ in case of Thailand. The per capita GNP of Indonesia has not reached $ 100 and consequently the apparent steel consumption estimated per $ of GNP is still at a low level of 0.05 kg. per $. In case of Philippines, the ratio of steel consumption and GNP is still at 0.07 kg. per $ although the per capita GNP is as high as 500 $.

From the above observation, it can be stated that the demand for iron and steel products of South Korea has entered the stage of rapid growth while that of Indonesia, Thailand and Philippines has not.

The close relationship between the process of economic development and the economic structure has been identified. Furthermore, the economic structure determines the demand structure of steel products in terms of product items. Therefore, the stages of

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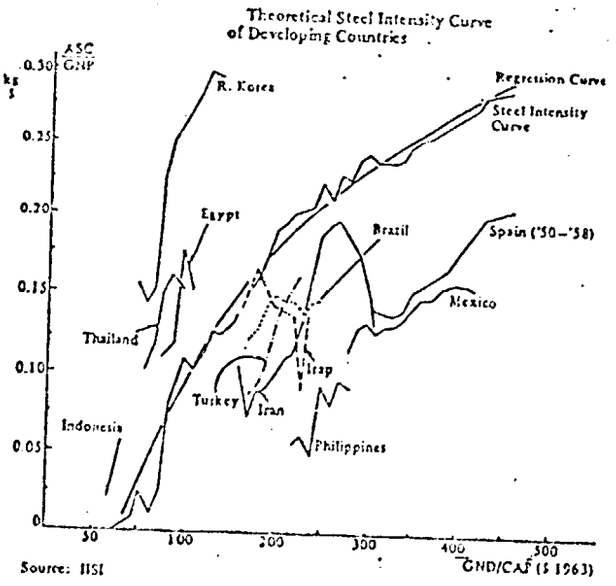
FIGURE - 3


Theoretical Steel Intensity Curve
of Developing Countries
ASC/GNP
kg/$
0.30
0.25
0.20
0.15
0.10
0.05
0
R. Korea
Regression Curve
Steel Intensity Curve
Egypt
Brazil
Spain ('50–'58)
Mexico
Thailand
Turkey
Iran
Philippines
Indonesia
50
100
200
300
400
500
GND/CAP ($ 1963)
Source: IISI

economic development are expected to have effects on product items of steel demand. The construction and consolidation of industrial plants, harbors, rail roads and high ways among other large scale investments often increase additional demand for non-flat steel products. On the other hand, the development of such industries automobile, shipbuilding, other transportation machinery, industrial machinery and electric machinery brings about large increase in the demand for flat iron and steel products.

The sectoral share of steel consumption of South Korea in 1979 are as follows:

*

a)	Construction sector	-	52.1%
b)	Metal products industry	-	24%
c)	General machinery industry	-	9.6%
d)	Electric machinery industry	-	4.5%
e)	Automobile industry	-	5%
f)	Shipbuilding industry	-	4.0%

The steel product consumption share in the whole manufacturing sector was 47.9%. For the share of manufacturing sector in which the consumed quantity of flat steel products was greater than that of non-flats was 47.9% and the ratio of flat product consumption in total steel product consumption was as large as 51.2%. As the development of machinery industry holds a strategic role it can be foreseen that growth rate

*Source: Institute of Developing Economies Tokyo 1984.

of the demand for flat iron and steel products in the country will accelerate in the future. In case of Philippines the steel consumption share by the construction sector was 43%. The metal product industry share was 28%, automobile 8%, shipbuilding 3%, joint machinery 2% and electric machinery industry 1%. The share of flat iron and steel products in the total steel products consumption was as high as 49.1%. In case of Thailand the construction sector shared 60% manufacturing sector 15% and remaining sector consumed 25%.

Most of the iron and steel produce for the developing ESCAP countries is sold in the domestic market and exports are mere adjustments.

Singapore plays the role of a relay station for transit. Large quantity of foreign steel materials are imported to Singapore and after receiving slight processing treatment they are reexported to neighbouring countries. South Korea, Malaysia and India are the three countries which are endowed with blast furnaces for integrated iron and steel production. In Indonesia, integrated iron and steel production is based on direct reduction furnaces. The Philippines, Thailand and Singapore are endowed with semi-integrated steel

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steel production facilities based on electric arc furnace to produce crude steel from scrap. Malaysia is also installing facilities for production of DRI.

Aiming at self supply and import substitution of iron and steel product most of Asian countries have installed sufficient facilities for production of wire rods, steel billets, welded pipes, wires, galvanized sheets and tinplates. With regard to heavy sections, hot rolled plates, sheets, cold rolled sheets, South Korea and India has production capacity large enough to meet the domestic consumption. In Philippines and Thailand studies have been made on the possibility of introducing blast furnaces and construction of DRI plant for integrated iron and steel production.

The size of the market of iron and steel imports in Asia with South Korea, Taiwan, Hong Kong and Asean countries included was 12.7 MT in 1979. Of this, countries like South Korea, Hong Kong and Singapore and Taiwan shared 60% and the remaining Asean countries 40%. The size of iron and steel products import of these countries ranged from 1.08 million tonnes for Malaysia, 2.280 million tonnes for South Korea. The share of Japan in the total iron and steel import was the maximum and varied between 60% to 80% for different category products

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In 1979, the share of flat iron and steel products in total iron and steel imports was between 40 to 60% for Thailand, Indonesia, Singapore and Malaysia, 30% in Philippines and 20% in South Korea and Hong Kong. Since South Korea and Philippines are endowed with rolling facilities for the production of flat iron and steel products, ingot steel share more than 55% of the iron and steel imports of these countries. In case of Hong Kong the ratio of self production is as low as 8%. In 1979, the domestic production of crude steel was 0.12 MT compared to the net import of 1.3 MT. The share of non-flat steel in total iron and steel import is large. Singapore is exporting pipes and other steel products for extractive work to Malaysia and Indonesia for use in the development of petroleum and natural gas in these countries. South Korea, Philippines, Thailand and Singapore meet their requirement of hot coils from Japan.

The break up of production of iron and steel products in developing ESCAP countries for the period 1976 - 1978 for flat as well as non-flat categories are given in Table-18.

The details of import of iron and steel products for flat and non-flat categories for developing ESCAP countries for 1976-1978 are given in Table-19.

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TABLE - 18

Production of Iron & Steel Products in Asia

(Unit: 1,000 M/T)

	Unit: Thousand Tonnes	1976							1978						
		Korea	Taiwan	Singapore	Malaysia	Thailand	Philippines	Indonesia	Korea	Taiwan	Singapore	Malaysia	Thailand	Philippines	Indonesia
	INGOTS & SEMIS	5,832	1,599	193	189	278	350	136	8,550	3,542	278	195	343	276	200
STEEL PRODUCTS	NON FLATS: Heavy Sections	215		–	–	–	–	–	395	25	–	–	–	–	–
	NON FLATS: Bars	102	1,037	14	2	...		...	325	435	12	6	282		138
	NON FLATS: Other Sections	909		235	181	...	350	656	1,377	1,690	316	240	...	402	200
	NON FLATS: Wire Rods	191		–	3	...		...	301	381	–	1	84		–
	NON FLATS: Seamless Pipes & Fittings		–	–	–	–	–	–		–	–	–	–	–	–
	NON FLATS: Wire		155*	42*	55*	...	64*	...		150*	42*	73*	90	68*	101*
	NON FLATS: Railway Track Materials	6	...	–	–	–	–	–	16	...	–	–	–	–	–
	NON FLATS: Wheels, Tyres & Axles		...	–	–	–	–	–		...	–	–	–	–	–
	NON FLATS: Steel Castings	28	29	1.2	...	3.2	3.5	...	95	39	2.8	8[E]	3.5	48	1.3
	NON FLATS: Steel Forgings	0	...	–	–	–	–	–		...	–	–	–	–	–
	NON FLATS TOTAL	1,452	1,221	292	241	...	449	...	2,509	2,720	373	328	...	518	440
	FLATS: Heavy Plates	447	...		–	–	–	–	822	350		–	–	–	–
	FLATS: Medium Plates		...	–	–	–	–	–		38	–	–	–	–	–
	FLATS: Galvanized Sheets	67	35	–	56*	115*	105	...	171	42*	–	54*	114*	105	185*
	FLATS: Other Coated Sheets		...	–	–	...	...	...	7	...	–	–	...	...	
	FLATS: Uncoated Sheets	508	...	–	–	–	...	–	829	50	–	–	–	...	–
	FLATS: Tinplate	42	26	–	–	26*	...	–	84	80*	–	–	44*	...	–
	FLATS: Hoop & Strip	759	...	–	–	–	...	–	910	...	–	–	–	...	–
	FLATS: Welded Pipes	496	200	26	58*	168*	45	...	956	244	34*	85*	155*	47	120*
	FLATS TOTAL	2,319	...	26	114	...	...	...	3,778	804	34	139	...	...	307
	STEEL PRODUCTS TOTAL	3,771	...	318	355	...	...	...	6,287	3,524	407	467	...	...	747
IRON PRODUCTS	Cast Iron Pipes & Fittings	31	105	17	10	...	58	...	49	288	21	18	24	78	35
	Other Iron Castings	306			...	...		...	517			82			30
	IRON PRODUCTS TOTAL	337	105	17	...	...	58	...	566	288	21	100	24	78	65

Source: SEAISI

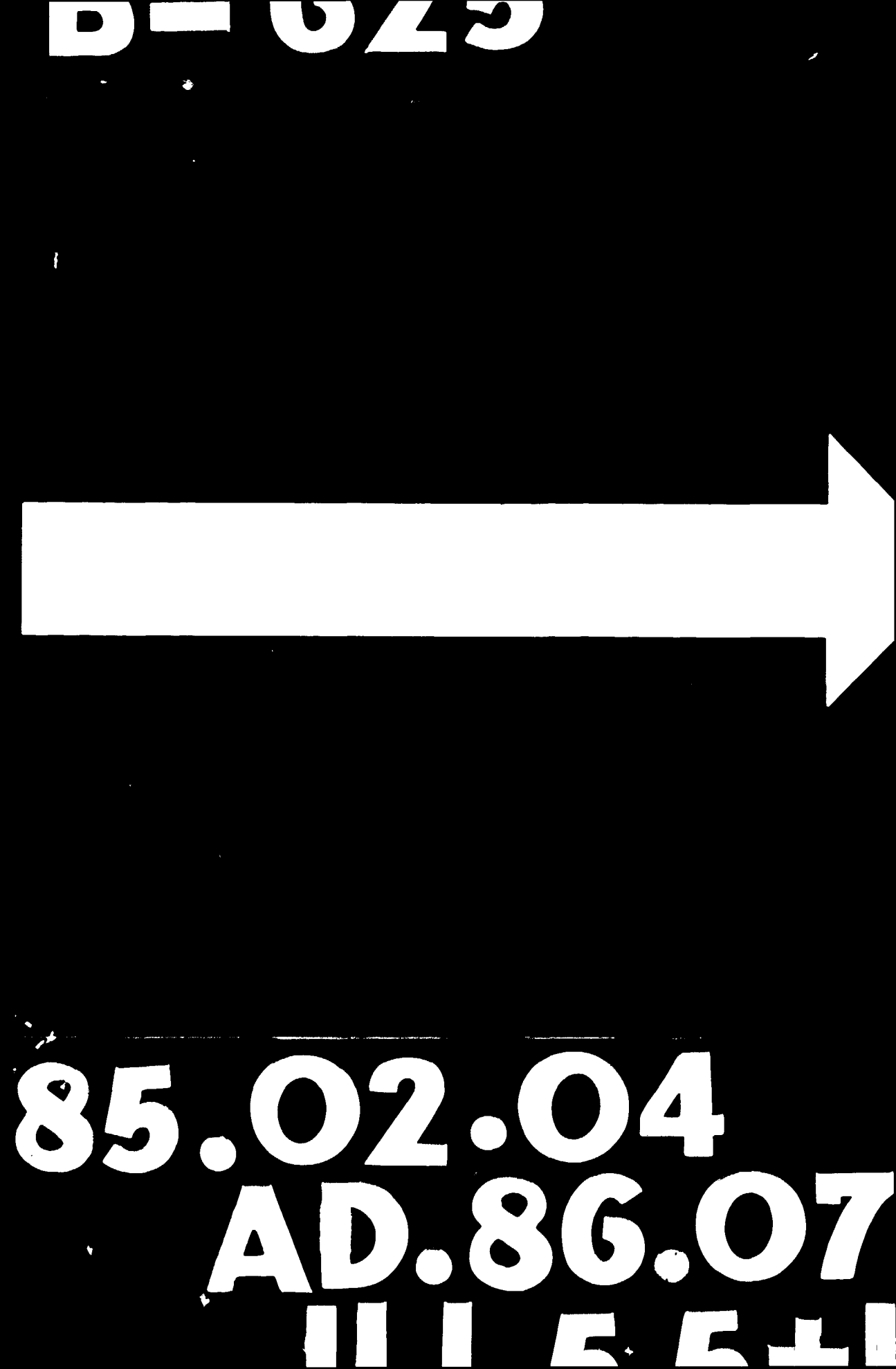
TABLE -19

Import of Iron & Steel Products in Asia

(Unit: 1,000 M/T)

Unit: Thousand Tonnes			1976							1978						
			Korea	Taiwan	Singapore	Malaysia	Thailand	Philippines	Indonesia	Korea	Taiwan	Singapore	Malaysia	Thailand	Philippines	Indonesia
INGOTS & SEMIS			127	81	137	30	194	362	130	481	27	64	92	385	556	203
STEEL PRODUCTS	NON FLATS	Heavy Sections	64	28	134	46	13	–	14	225	40	170	41	16	9	7
		Bars	45	55	74	84	46	20	123	42	67	52	115	61	31	129
		Other Sections	0	11	45	53	54	33	67	72	4	14	45	126	26	17
		Wire Rods	224	137	44	17	30	14	112	271	170	36	30	49	17	87
		Seamless Pipes & Fittings		22	73	18	4	15	94		33	157	10	3	20	99
		Wire		25	14	8	29	14	5		20	17	13	22	15	6
		Railway Track Materials	36	16	11	8	–	2	10	27	6	9	1	5	3	16
		Wheels, Tyres & Axles		1	–	1	3	–	3		4	–	–	1	–	1
		Steel Castings	4	–	0.3	0.6	–	–	3.4	2	0.1	0.5	0.4	–	–	1.3
		Steel Forgings	8	0.5	1.2	0.4	–	–	1.4		1.0	5.0	–	–	–	2.9
	NON FLATS TOTAL		382	346	397	236	169	99	434	639	345	461	255	282	120	357
	FLATS	Heavy Plates		104	189	55	4	2	60		132	231	88	17	59	87
		Medium Plates	207	105	22	28	1	–	23	384	176	33	37	3	7	46
		Galvanized Sheets	1	2	27	13	15	4	1	1	10	42	45	25	16	7
		Other Coated Sheets		21	2	1	2	–	21	10	32	3		11	1	12
		Uncoated Sheets	77	560	110	155	434	295	326	140	1,024	220	195	421	131	420
		Tinplate	3	66	73	65	45	33	61	–	112	82	67	44	64	90
		Hoop & Strip	74	21	21	14	16	11	35	69	38	32	15	15	21	38
		Welded Pipes	45	7	35	6	12	9	41	73	11	73	6	10	18	71
	FLATS TOTAL		407	886	479	337	528	354	569	676	1,535	716	453	545	316	771
	STEEL PRODUCTS TOTAL		789	1,352	876	573	697	453	1,003	1,315	1,907	1,177	708	827	436	1,128
IRON PRODUCTS	Cast Iron Pipes & Fittings		–	–	25	4	–	–	14	1	1	21	2	–	–	26
	Other Iron Casting		1	–	1	1	–	–	3	11	–	1	–	–	–	1
	IRON PRODUCTS TOTAL		1	–	26	5	–	–	17	12	1	22	2	–	–	27

Source: SEAISI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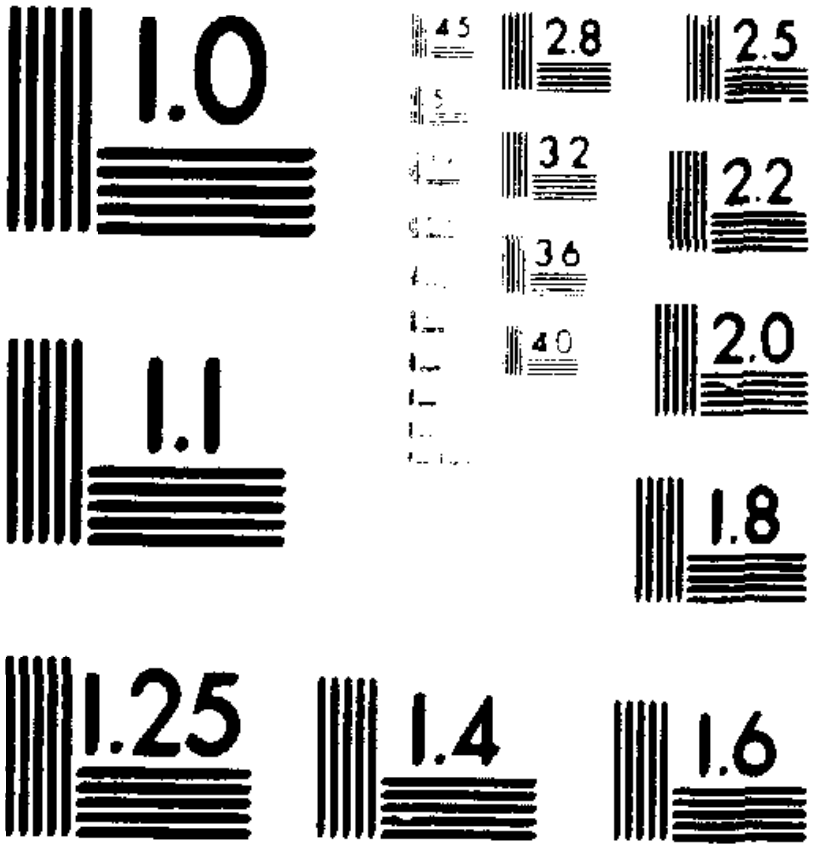

The composition of iron and steel imports to developing ESCAP countries is characterised by large share of flat iron and steel products are given in Table-20.

In the South East Asian region in particular, the significant factor in the steel market is its small size in relation to total area and population.

Regarding production as discussed earlier, several countries in the developing ESCAP region have established sizeable steel industries.

The demand in steel can be met by either recycling scrap or production of fresh metallic like pig iron/sponge iron and conversion of the same to steel. Iron ore is the basic raw material for production of such fresh metallic. The possible alternatives for production of steel are given in Figure-4. All these alternatives have been commercially exploited. The other important factors for production of pig iron/sponge iron is the choice of reductants. The options for various reductants are given in Figure-5.

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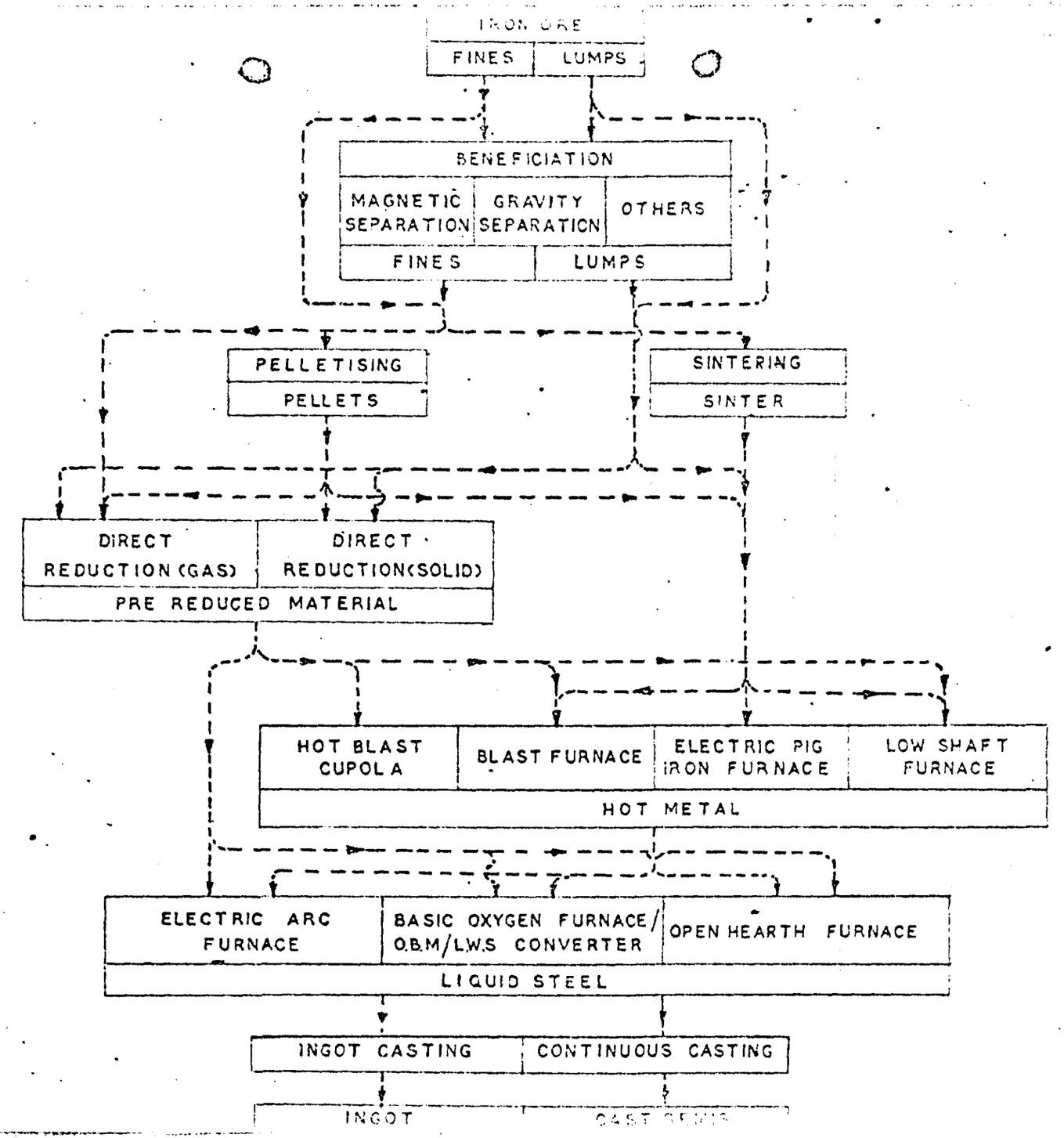
TABLE - 20

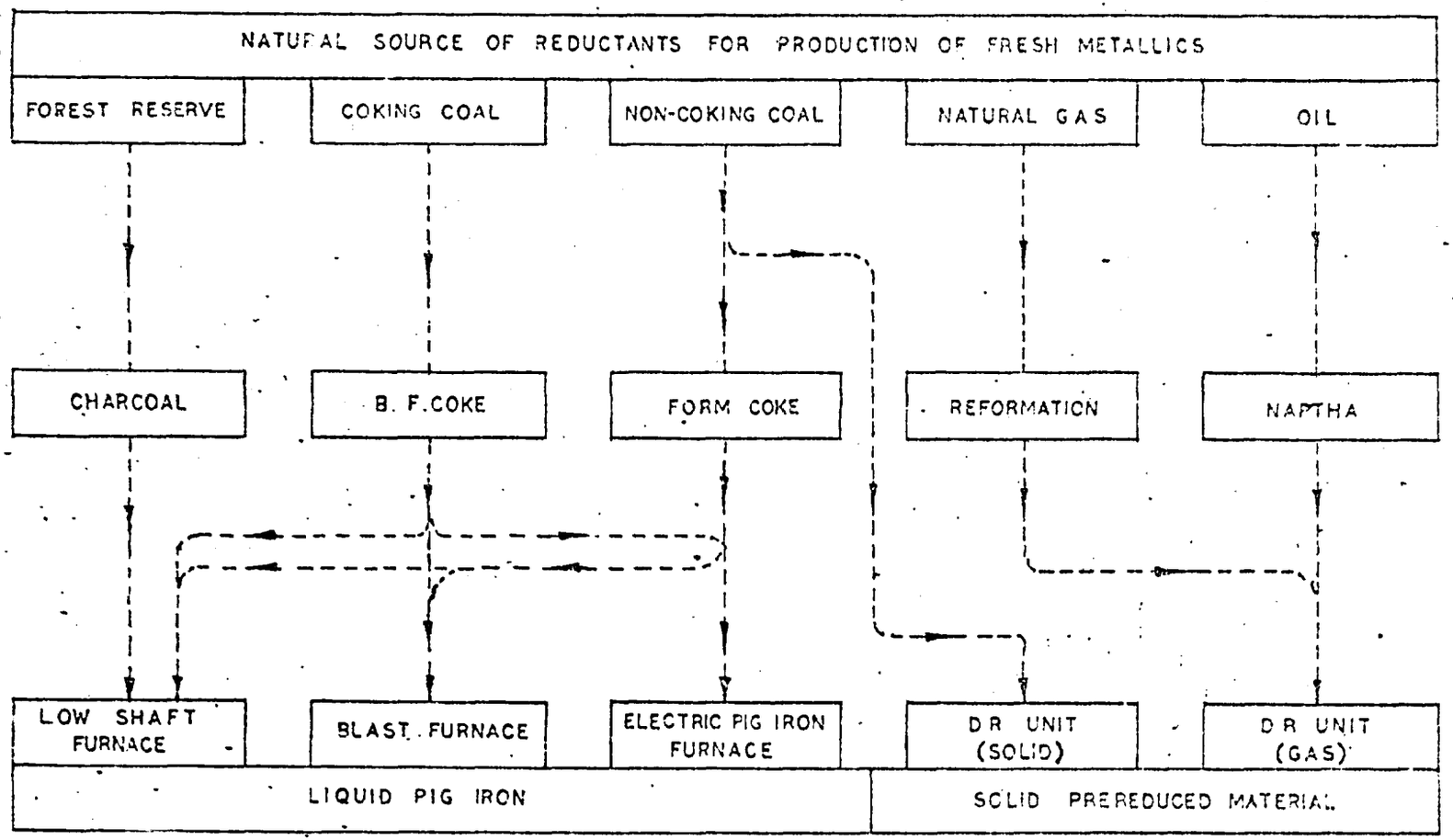
Import of Iron and Steel Products in Asia (1979) by Product Groups

(Unit: %)

	Korea	Taiwan	Hong Kong	Singapore	Malaysia	Philippines	Thailand	Indonesia	Total M/T
Ingots and semi-finished Steel	55.2	3.4	17.5	8.2	22.2	56.7	21.3	18.9	3,450,647
Non-Flat Iron and Steel Products	18.6	13.6	48.6	18.2	26.4	6.7	19.7	13.4	2,579,408
Flat Iron and Steel Products	19.4	80.1	24.0	47.5	44.6	31.9	54.0	57.5	5,572,262
Railway track Material	0.8	0.1	0.2	2.5	–	0.9	1.6	1.1	112,141
Wire Rods	2.2	0.2	2.5	1.4	1.3	1.4	1.7	0.6	182,172
Steel Tubes and Fittings	3.3	2.5	7.2	21.4	5.5	2.4	1.7	8.4	772,987
Steel Forgings and Castings	0.5	–		0.8	–	–	–	–	25,969
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	12,695,676

Source: JISEA


IRON ORE
FINES
LUMPS
BENEFICIATION
MAGNETIC SEPARATION
GRAVITY SEPARATION
OTHERS
FINES
LUMPS
PELLETISING
PELLETS
SINTERING
SINTER
DIRECT REDUCTION (GAS)
DIRECT REDUCTION (SOLID)
PRE REDUCED MATERIAL
HOT BLAST CUPOLA
BLAST FURNACE
ELECTRIC PIG IRON FURNACE
LOW SHAFT FURNACE
HOT METAL
ELECTRIC ARC FURNACE
BASIC OXYGEN FURNACE/ O.B.M/L.W.S CONVERTER
OPEN HEARTH FURNACE
LIQUID STEEL
INGOT CASTING
CONTINUOUS CASTING
INGOT


NATURAL SOURCE OF REDUCTANTS FOR PRODUCTION OF FRESH METALLICS
FOREST RESERVE
COKING COAL
NON-COKING COAL
NATURAL GAS
OIL
CHARCOAL
B. F.COKE
FORM COKE
REFORMATION
NAPTHA
LOW SHAFT FURNACE
BLAST FURNACE
ELECTRIC PIG IRON FURNACE
D R UNIT (SOLID)
D R UNIT (GAS)
LIQUID PIG IRON
SOLID PREREDUCED MATERIAL

The choice of a particular alternative for a plant depends to a large extent on the capacity of the plant considered, which is directly dependent on the potential of the demand of a particular country. The availability of raw materials, reductants, energy, infrastructure, etc. are also major guiding factors for the choice of a process route. The possible alternative routes which can be considered for setting up of a mini steel plant are given below:

Alternative	Processing routes with major production facilities
A	Electric arc furnace (EAF) based on steel scrap.
B	Direct reduction unit - Electric arc furnace (DR-EAF)
C	Electric pig iron furnace - Basic Oxygen converter (EPIF-BOF)
D	Small Blast Furnace - Basic Oxygen Converter (SBF-BOF)

Down the stream after steel making, continuous casting route and conventional steel casting are the two alternatives available for casting of liquid steel. Continuous casting route is a cheaper proposition than the conventional steel casting route. Before a choice of technological process could be made, it would be essential to review the alternatives from the raw material and energy requirement considerations.

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Raw Materials

The basic raw materials required for the steel industry are the source of metallics and source of reductant. It is necessary to assess the potential of the region with respect to the availability of the raw material. The potential reserves of iron ore, coal, and natural gas for the developing ESCAP countries are shown in Table - 21 and Figure - 6.

Iron Ore Reserves

Many of the developing ESCAP countries are favourably placed with regard to iron ore reserves. While these countries contribute only about 10% to world raw steel production, their share of beneficiated iron ore production is more than 30% and may go to 50% by 2000 AD.

Although, most of the developing ESCAP countries do have iron ore reserves, the reserves of Hong Kong, Nepal, Sri Lanka and Thailand are low enough and are not considered commercially exploitable. India, Iran, Malaysia and Philippines are the only iron ore producing countries in this region.

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Table - 21

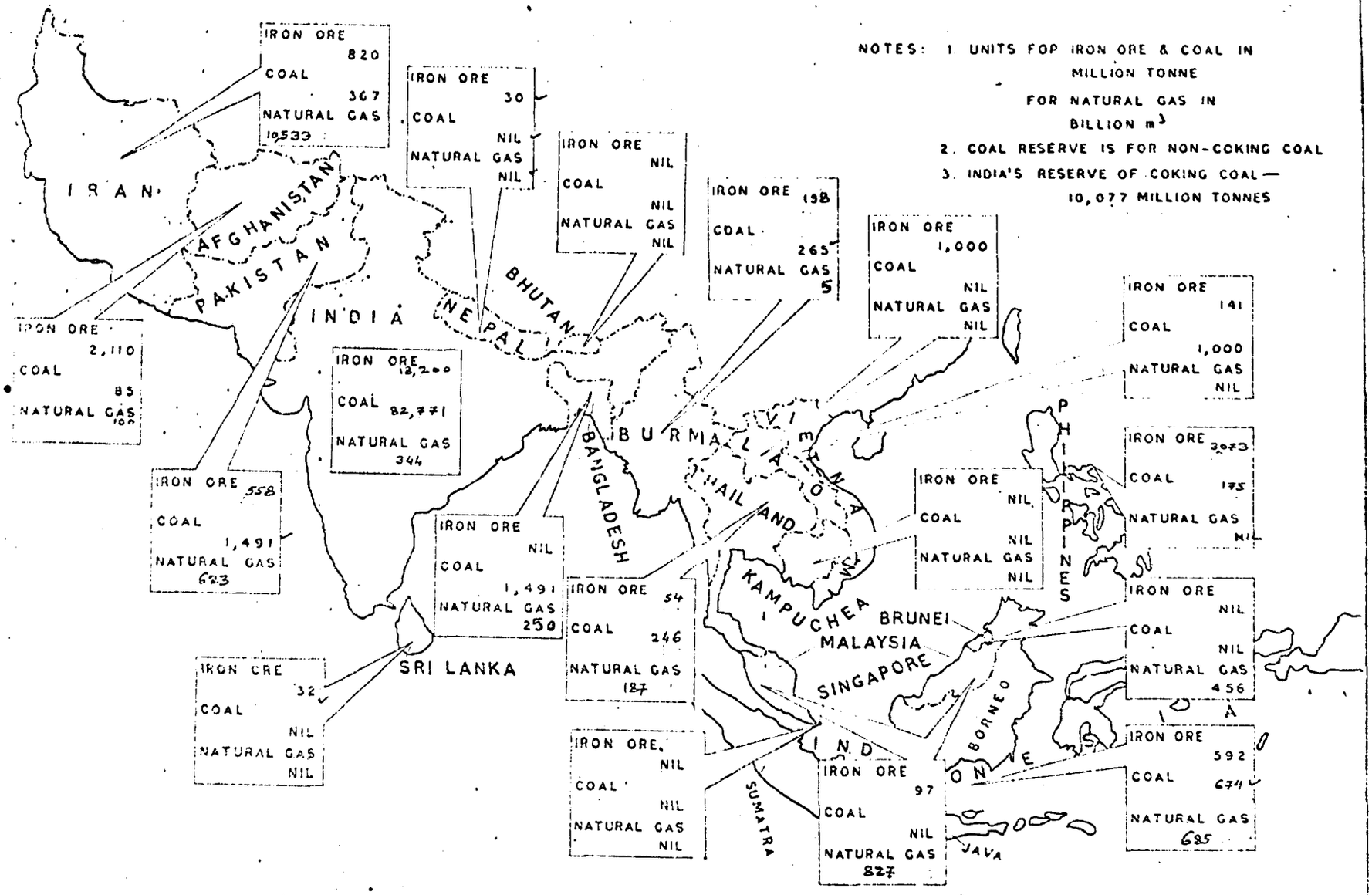
RESERVES OF IRON ORE, COAL, NATURAL GAS AND CRUDE PETROLEUM IN ESCAP COUNTRIES

Country	Iron ore reserves (Mt)	Coal reserves (Mt)	Natural gas (thousand MM^3)	Crude petroleum (Mt)
Afghanistan	2,110	85	100	-
Bangladesh	-	1491	250	-
Burma	193	265	5.0	10.0
Hong-Kong	6.0	-	-	-
India	18,200	82,771	344.0	354.0
Indonesia	592.0	674	685.0	1070.0
Iran	820	367	10533	6148.0
Republic of Korea	74.0	182.0	-	-
Malaysia	97.0	-	827	143
Nepal	30	-	-	-
Pakistan	558.0	1491	623	38
Phillipines	3073	175.0	-	12
Singapore	-	-	-	-
Sri Lanka	32.0	-	-	-
Thailand	54.0	246	187	-

Source: MECON, India.

Note : India's reserves of coking coal = 19,350 million tonnes
" " " limestone = 63,151 million tonnes
" " " Dolomite = 4,946 million tonnes

Figure-6


NOTES: 1. UNITS FOR IRON ORE & COAL IN MILLION TONNE
FOR NATURAL GAS IN BILLION m³
2. COAL RESERVE IS FOR NON-COKING COAL
3. INDIA'S RESERVE OF COKING COAL — 10,077 MILLION TONNES
IRAN
IRON ORE 820
COAL 367
NATURAL GAS 10533
AFGHANISTAN
PAKISTAN
IRON ORE 30
COAL NIL
NATURAL GAS NIL
INDIA
IRON ORE NIL
COAL NIL
NATURAL GAS NIL
NEPAL
BHUTAN
IRON ORE 198
COAL 265
NATURAL GAS 5
IRON ORE 1,000
COAL NIL
NATURAL GAS NIL
IRON ORE 2,110
COAL 85
NATURAL GAS 100
IRON ORE 12,200
COAL 82,771
NATURAL GAS 344
IRON ORE 558
COAL 1,491
NATURAL GAS 623
BANGLADESH
IRON ORE NIL
COAL 1,491
NATURAL GAS 250
BURMA
IRON ORE 54
COAL 246
NATURAL GAS 187
IRON ORE 32
COAL NIL
NATURAL GAS NIL
SRI LANKA
IRON ORE NIL
COAL NIL
NATURAL GAS NIL
IRON ORE 97
COAL NIL
NATURAL GAS 827
SUMATRA
JAVA
BORNEO
IRON ORE 592
COAL 674
NATURAL GAS 685
IRON ORE NIL
COAL NIL
NATURAL GAS 456
BRUNEI
MALAYSIA
SINGAPORE
IRON ORE NIL
COAL NIL
NATURAL GAS NIL
KAMPUCHEA
VIETNAM
THAILAND
IRON ORE 3073
COAL 175
NATURAL GAS NIL
PHILIPPINES
IRON ORE 141
COAL 1,000
NATURAL GAS NIL

Afghanistan has a faily large reserves of ore to the extent of 2110 million tonnes. It is of low grade hematite and sidarite in banded deposit within marble strata. At present there is no mining facility. In view of the vastness of the deposit, it may be worthwhile to explore the reserves and examine its economic suitability of producing steel.

The proved, probable and possible reserves in iron ore in Pakistan is around 558 million tonnes.

India is endowed with about 18 billion tonnes of potential iron ore reserves. The grade of iron ore is generally quite superior and the steel industry is quite developed.

Reserves of iron ore in proved and possible categories is rather limited in Malaysia. Philippines has about 3073 million tonnes of proved, probable and possible reserves of iron ore. The potential reserves is considered quite high. Since the beneficiated iron ore requirements for the developing ESCAP countries will be very high, the production needs to be geared to meet the requirement.

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Scrap

Scrap is a major input material to the steel industry. Its availability in the developing ESCAP countries is limited as per capita consumption of steel is very low.

Coal

Known economic recoverable reserves and potential of coal in Anthracite, Bituminous and semi-bituninous varieties in ESCAP countries are given in Table-22.

In general, the entire reserves are for non-coking coal except for India and to a very limited for Iran and Philippines.

Coal will pose a serious constraint in steel development programme of developing ESCAP countries. It may be required to import coking coal from other countries to meet the demand. Non-coking coals have found so far limited applications in iron and steel industry. To help off-set the dependence on coking coal, intensive efforts are being made to use non-coking coals in iron making and these are reflected in use of formed coke, coal dust injection, washing and blending with coking coal and development of direct reduction processes. Thus there is a good potential for greater use of non-coking coal in future iron and steel industry.

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Table - 22

RESERVES OF COAL IN DEVELOPING ESCAP COUNTRIES

(In million tonnes)

Sl. No.	Countries	Non-coking coal			Coking coal
		Total known	Economically recoverable	Potential	Potential reserve
1.	Afghanistan	NA	NA	85	-
2.	Bangladesh	780	591	1491	-
3.	Burma	NA	NA	265	-
4.	India	82,771	NA	82,771	10,077
5.	Indonesia	573	NA	674	NA
6.	Iran	367	NA	367	NA
7.	Pakistan	804	172	1491	-
8.	Philippines	175	46	175	NA
9.	Thailand	246	118	246	-

Source : MECON, India

NA - Not available

Natural Gas

Bangladesh, Indonesia, Iran, Malaysia and Pakistan are quite favourably placed as regards the availability of natural gas. Exploitation of this natural gas can herald much promise in the growth of iron and steel industry in the developing ESCAP countries.

Demand Size and Steelmaking Methods

At present the steel making method by blast furnace and BOF is most commonly used in the world. The most efficient equipment set of consist of blast furnaces of 4000 to 5000 M^3 size which gives a production of10,000 T/day. The present iron and steel plant is equipped with 2 to 3 blast furnaces of this size and produces 6 to 10 MT of crude steel per year. Therefore, the steel making method by blast furnace and BOF is suitable to the rapid growing economy, when the size and the growth rate of the demand for iron and steel products are large.

In general, while the iron and steel production by blast furnace is extremely capital intensive and requires large amount of investment, the capital cost per unit of crude steel produced by electric arc

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furnaces is as low as 1/4 to 1/3 of the unit capital cost by the BF-BOF route. The capital cost by the DR-EAF route is 65 to 70% of the conventional iron making route. (Figure-7).

The utilisation of electric arc furnaces to produce iron and steel products from iron scrap is specifically suitable to countries and regions where iron scrap can be stably supplied at low prices and labour and electric power are available at low cost.

For these iron and steel plants with demand scale less than 1.8 MT per year, the scrap iron and electric arc furnace method of the DR and EAF method are better than the BF-BOF.

The size of domestic demand for iron and steel products in developing ESCAP countries is in the range of 1.7 to 2.3 MT. Thus to these countries the scrap iron and electric arc furnace method and the DR-EAF are most adequate. For countries with larger size of steel demand like India and South Korea, the crude steel production by blast furnaces are better from the point of view of construction cost per unit of steel produced. In this case iron scrap and EAF method can be used as a complement to blast furnace.

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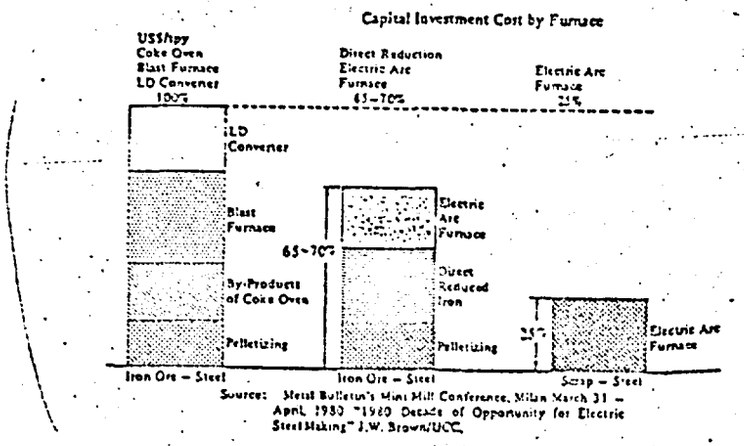
Figure-7



Source: Steel Bulletin's Mini Mill Conference, Milan March 31 – April 1980 "1980 Decade of Opportunity for Electric Steel Making" J.W. Brown/UCC

Based on these constraints the nominal steel making capacities for developing ESCAP region are given in Table - 23.

The details of the suggested process route are given in Table - 24.

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NOMINAL STEEL MAKING CAPACITY

Table 2-3

(Thousand Ton)

COUNTRY \ YEAR	1983	1986	1990
South Korea	13,720 (12,580)	13,720 (13,250)	17,320 (16,760)
Philippines	640 (430)	640 (430)	1,840 (1,510)
Indonesia	2,310 (1,060)	2,410 (1,500)	2,410 (1,500)
Pakistan	1,700 (430)	1,700 (840)	1,700 (840)
Hong Kong	210 (120)	210 (120)	210 (120)
Burma	35	35	50
Bangladesh	257	257	257
Sri Lanka	65	65	65
Nepal	-	-	-
Afghanistan	-	-	-
Iran	1,970 (1,380)	2,770 (1,940)	5,170 (3,620)

Note: ( ) ÷ Estimated actual production.

	Country	Suggested process route
1.	India	Market - very large; iron ore and reductant - available in plenty; hydro-power potential-good; steel development-through large integrated steel plant; iron production route-blast furnace/direct reduction route.
2.	Republic of Korea	---
3.	Iran	Market - very large; iron ore-available; reductant-natural gas plenty; hydropower potential - very good; possible iron production route-direct reduction/BF with imported coking coal; steel development - normally through large integrated plant.
4.	Afghanistan	Market - very limited;reductant - not sufficient; hydropower potential - good; production of hot metal/sponge iron not planned; steel through EAF on scrap/purchased sponge iron.
5.	Bangladesh	Market - limited; reductant-enough natural gas, hydropower potential - exists; production of sponge iron planned; steel-through EAF on sponge iron feed.
6.	Burma	Market - limited; iron ore - available; reductants - non-coking coal and forest reserve; hydropower potential - very good; possible iron production route - small capacity blast furnace/direct reduction; steel-through converter/EAF; integrated mini-steel plant
7.	Indonesia	Market - large; iron ore-available; reductant-natural gas plenty; non-coking coal-available; possible ironmaking route-direct reduction by 1985 and BF by 2000 AD with enlarged market; steel-through integrated mini steel plant at initial stage possible.
8.	Malaysia	Market - fairly large by 2000 AD; iron ore - available; reductants - natural gas plenty and forest reserve; hydropower potential- good; possible iron production route - direct reduction initially, blast furnace when market enlarges; steel-through integrated mini steel plant to startwith.
9.	Nepal	Market - limited; no natural resources except small quantity iron ore; steel - through EAF on scrap/purchased sponge iron to startwith; iron ore may be utilised later for hot metal production and steel through integrated mini steel plant
10.	Pakistan	Market - fairly large by 2000 AD; iron ore - available; reductant - natural gas/non-coking coal; iron making route - blast furnace/direct reduction; steel - through integrated plants based on hot metal/pre-reduced material; mini steel plant possible
11.	Philippines	Market - large; iron ore - fairly large; reductant - non-coking coal/forest reserve; hydropower potential - very good; steel development - normally through large integrated steel plant, mini steel plant possible through DR-EAF route.
12.	Singapore	Market - fairly large; no natural resources; possibility of steel development through large integrated plants based on purchased raw materials - planned after 1985.
13.	Sri Lanka	Market - limited; natural resources - nonexcept small quantity iron ore; hydropower potential good; steel-through EAF on scrap/purchased sponge iron.
14.	Thailand	Market - large; iron ore small quantity; reductant - non-coking coal; hydropower potential - good; steel development possible through integrated mini steel plant or large capacity one on hot metal route, future possibility mini-steel plants on direct reduction route.

INVESTMENT NEEDS AND SOURCES OF FINANCE

Aiming at industralisation developing ESCAP countries are taking policies to promote domestic supply and import substitution of steel products under the leadership of their Governments. The Governments in these countries have made the master plans for the iron and steel industry, direct or indirect involved in the feasibility study of the steel factories, induced low interest foreign and domestic capital, established government enterprises, or financed private enterprises, constructed and consolidated such social infrastructure like harbours, roads, railways, electric and water power plants, lowered import duties of necessary machinery and materials and taken various other measures for promotion of their domestic iron and steel industries.

In many cases even after a steel factory entered the period of operation, the Governments continues its support for a certain period by providing long term low interest credit for working capital, discounts of public service fees, reduction or exemption of corporation tax, subsidies for industrial research or technical training and various export promotion policies.

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The Pohang Iron and Steel Company of South Korea, the National Steel Corporation of Philippines and Karatatu Steel Corporation of Indonesia are government enterprises while National Iron and Steel Mill Limited, Singapore and Malayawata Steel of Malaysia are private owned enterprises but financed by the government. The Siam Iron and Steel Industry of Thailand is purely private. National Steel Corporation of Philippines which first started in 1950s as private enterprise but afterwards the ownership was transferred in 1974 to the Government.

From the above, it is clear that Governments' owned or Government financed steel plants will continue to be dominent in newly constructed steel plants or plans to enlarge the existing steel plants in future. The second integrated iron and steel plant in South Korea, the planned expansion of Karatatu Steel Corporation of Indonesia are materialised by using Government expenditure. The enterprises are or will be under the management of the Government. It is also learnt that the two direct reduced iron and steel plants being planned for Malaysia, will be financed by the State Government. The plants to establish for ingot steel production plan in Philippines and Thailand still face some difficulties. However, the Government of these countries plans to put-forward these plants under their leadership.

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The construction of iron and steel plants requires large amount of costs in terms of both money as well as time. The high cost of construction through the conventional iron and steel making route makes the construction of ingot iron and steel plants in the developing countries, more and more difficult. Public attention is now directed towards the construction of DR plants and electric arc furnaces which require comparatively less capital. In Philippines, the feasibility study for an integrated steel plant equipped with the blast furnace was finished in 1977, yet the construction work has not started because of insufficient funds. Recently there is a move towards changing its plan into construction of a low cost direct reduced iron plant. In those countries where natural gas can be extracted like Malaysia and Indonesia, the prevailing view is to utilise natural gas for reduction of iron ore.

The Karakatau Steel Corporation, Indonesia is already equipped with direct reduction iron facilities of production capacity of 2 MT of reduced iron per year. This factory is presently producing .5 MT of crude steel per year for both domestic consumption and export to neighbouring countries.

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In Malaysia, the on-going plans to establish two direct reduced iron plants have passed the bidding and now enter on the stage of construction work.

Thailand has planned a direct reduced iron plant using the natural gas resources at Saim Gulf. The Government of Thailand has finished a pre-feasibility study for 1979 - 2000 iron and steel master plan and has completed pre-feasibility study for the production of flat iron and steel products by integrated steel plants equipped with the blast furnaces. However, the construction has not yet started. Singapore has one integrated steel plant equipped with the electric arc furnaces. For the time being, there are no plan to construct integrated iron and steel plant based on blast furnaces or DR route in Singapore.

As the scales of investments and production related to iron and steel industry are large, the industry usually has relatively strong monopolistic characters. The iron and steel industry is also related to other industries by its provision of iron and steel products for use as raw materials. Therefore, the development and competitiveness in the world market of those industries which use iron and steel products as inputs largely depend on price and supply conditions of these products.

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The production of iron and steel product can be hardly adjusted in the short run while their demand is largely affected by general market fluctuations. Therefore, the prices of iron and steel products suffer from large fluctuations.

As a common measure to protect both producers and consumers, the contemporary developing countries often set ceiling prices to iron and steel products. In South Korea, iron and steel products are considered monopolistic commodities where ceiling prices are fixed by the government which reflect actual production costs, marketing costs, reasonable profits and prevailing demand and supply situation. Ceiling prices are also given to iron and steel products in Thailand.

In order to increase the effective protection rates of import substituted, ASEAN countries apply different duty rates to different products according to their degree of processing. In the case where import licence system is applied to restrict imports, in some countries collective import system is used for iron and steel products to secure domestic supply and to protect domestic users. The government managed Krakatau Steel Corporation in Indonesia is importing steel items authorised by Indonesia government under

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a collective import system. In India, Steel Authority of India Limited (SAIL) is the canalising agency for import of steel products. In Philippines, nominal import duties on imports are low viz 10% on scrap, billets, slabs and HR Coil. CR Coil have, however, 30% duty. Tin plates, galvanized sheets are subject to 50% duty. In case of South Korea, most of iron and steel items are subject to import restrictions. Import duty rates are fixed in proportion to the degree of processing of duties. In Thailand although the import duty rate of HR Coil is as low as one percent the import duty rate of welded pipes and tubes processed from hot coils is as high as 30 percent.

The two international factors which have major impact in the economy of the South East Asian countries over the last five years have been -

a) the recession during latter half of the seventies.

b) recent appreciation of the Japanese Yen.

The appreciation of the Yen has made Japanese steel less competitive in the region. Regional producers have benefitted from lover import levels. For the SEASI region for major constraint on the steel demand and production are -

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a) lack of finance.

b) lack of technical and industrial skills.

c) small market size.

d) costly transport.

It will be essential for governments of industralising regions to accept that international finance has extreme freedom and to make every effort to channel the maximum possible resources from outside and inside if planned developments are to grow at adequate rate. Lack of industrial experience hinders absorption of technology. To accelerate the rate at which higher technology can be transferred three methods have specific relevance to steel -

i) establishing a competent technology group to provide a local vehicle for transport.

ii) purchasing from industralized regions.

iii) encouraging equity participation with imported capital technology and industrial expertise from international companies of competence who are willing to interest local vehicles - research and developments universities etc. go only part of the way and so slowly.

Purchase appears to be only short term gains source. The objective of the render and purchaser are quite different. Joint equity participation with right partners would appear to offer the best opportunities by far.

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The developing ESCAP countries can substantially reduce the production cost of iron and steel plants if the following three support measures are provided:-

1. Provision of low interest long term credit for working capital.
2. Exemption of income tax, Corporation tax, raw material and machinery and import duties to reduce investments.
3. Discount on public utility fees.

For the purpose of promotion and protecting iron and steel industry, the Government might consider the following approaches:-

a) Put duties on import of iron and steel productions.

b) Limit import of iron and steel products.

c) Apply export quota to secure domestic supply of iron and steel products.

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C O N C L U S I O N

In summary the developing ESCAP countries is a growth area with significant national resources and relatively low labour costs. Throughout most of the region lack of finance and industrial skills coupled with the social needs of the large majority of the population pose continuing problems. However, the steel industry development pattern already in progress suits the social and industrial needs of the region. Demand will outstrip production capability in the region but both demand and production will grow at rates well above those of the industralised regions.

Regional availability of raw material is excellent and there is a burning desire to develop a steel industry and this above will provide impetus to growth rates of GNP and steel demand will be relatively high and the opportunity exists to adopt modern practices and combine them with relatively low labour costs. Most raw material and scrap would be imported although local natural gas would be used for direct reduction of ore/pellets in Indonesia, Thailand and Malaysia and steel melting would be by EAF based on DRI supplemented by imported scrap.

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Singapore would continue with imported scrap or sponge iron EAF practice and in Philippines the major production would come from conventional BF/BOF route.

South Korea can be expected to continue its successful use of conventional BF/BOF practice backed up by private industry EAF development.

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