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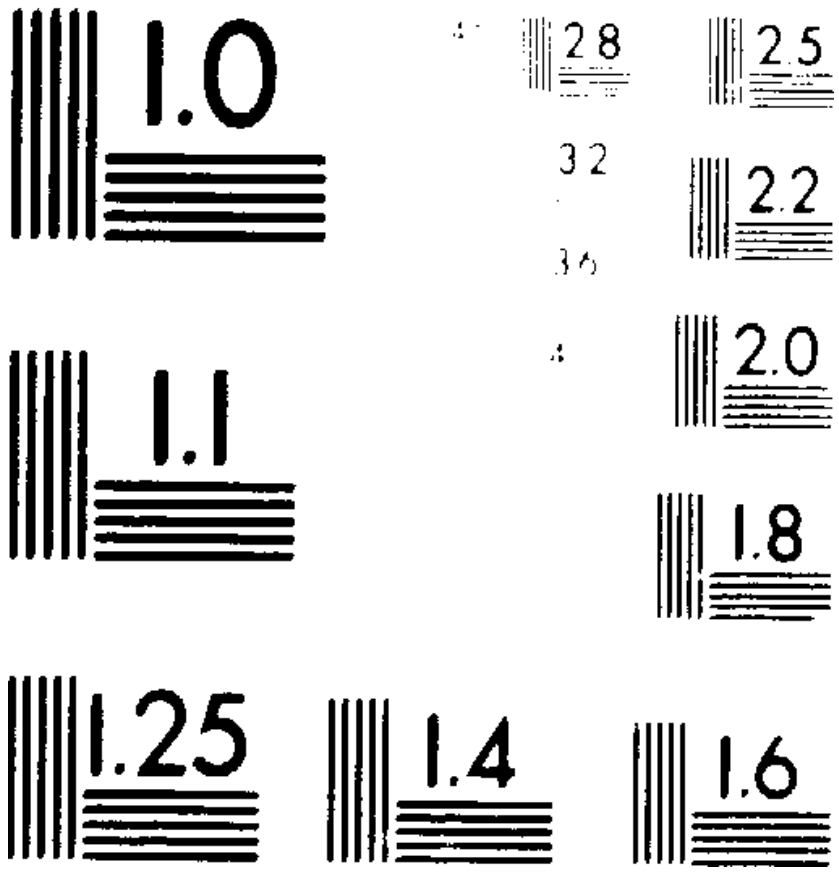
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org



V.K.DAR
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INTERNAL BRIEF

FOR

UNIDO/ESCAP WORKSHOP

ON

CERTAIN SECTORAL STUDIES ON POTENTIAL FOR

DEVELOPING COUNTRIES IN ESCAP REGION

Sectoral Studies Branch

received from E.Kolm

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1. IRON AND STEEL

Agriculture is the dominant economic activity in the developing ESCAP region; providing large scale employment and contributing substantially to GNP. There has been however, a definite effort to structurally shift from agriculture towards industry; with steel being considered an important yardstick for determining level of industrialization. Steel industry provides opportunities for up-stream as well as down-stream subsidiary industries with its deverse spin-off effect in relation to employment, infrastructural growth, technology and generally for a major contribution to bringing about buoyancy in the economy, provided the economic climate otherwise is favourable.

In 1979, world apparent steel consumption was about 747.5 million tonnes. Of this 50 per cent was consumed by developed countries, 33 per cent by centrally planned economies and about 10 per cent by developing countries. By 1983, world steel consumption dropped to 662 million tonnes with industrialized countries claiming 45.5 per cent, developing countries 14.4 per cent and centrally planned economies 40.1 per cent. The average per capita consumption in developing countries was 50 kg and that of developed countries was 500 kg. Table 1 indicates the regional consumption pattern in 1974-1979.

It would be observed that the developing ESCAP countries have potential for enlargement of their iron and steel industry. With their natural resources base, this region should aim at self-sufficiency in iron and steel and in due course to develop export to countries which are likely to continue import of steel for quite some time. The reserves of iron ore, coal and natural gas for the developing ESCAP countries are contained in table 2. While these countries contribute about 10 per cent to world raw steel production their share of beneficiated iron ore production is more than 30 per cent and may go up to 50 per cent by 2000 AD. The iron ore reserves of Hong Kong, Sri Lanka, Nepal and Thailand are low and cannot be exploited commercially. India, Iran, Malaysia and Philippines are iron ore producing countries in the region. Reserves of Afghanistan need to be explored for determining vialibility for steel production.

TABLE - 1

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
EC	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

Table - 24

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	198	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

Availability of scrap in this region is limited as per capita consumption of steel is low. This input is therefore not available for steel production in a big way.

Resources of coal are mainly of the non-coking variety except in India and to some extent in Iran and Philippines. The potential therefore exists for use of non-coking coal for steel production.

As regards natural gas, Bangladesh, Indonesia, Iran, Malaysia and Pakistan are comfortably placed. This input could be commercially exploited for steel-making in these countries.

The Blast Furnace route is the most commonly used one in steel-making in the world. While this method is highly capital intensive, the capital cost per unit of crude steel produced by electric arc furnaces is as low as one fourth to one third of the unit capital cost by the BF-BOF route. The domestic demand for iron and steel products in developing ESCAP countries being in the range mainly of 1.7 to 2.3 million tonnes, most of these countries should set-up electric arc furnaces for steel production. For countries with larger domestic steel demands, like India and South Korea, crude steel production through Blast Furnace route would still be the main stay, duly supplemented by production in electric arc furnaces. Nominal steel-making capacities and suggested process routes for these countries are indicated in tables 3 and 4.

Governments in most of these developing countries are promoting efforts for increasing domestic supply and import substitution of steel products. Master plans have been prepared for growth of the iron and steel industry; Feasibility Studies for setting up steel factories have been commissioned and financial arrangements have been provided at low interest rates, apart from giving fillip to setting up expansion of infrastructural facilities like harbours, roads, railways, power plants etc. Fiscal measures are also taken to facilitate growth of the steel sector by way of reduced corporation taxes, low import duties for imported machinery, subsidies for research and training and also provision of low interest credit for working capital. Governments have directly financed establishment of steel plants in South Korea,

(Thousand Ton)

COUNTRY \ YEAR	1983	1986	1990
South Korea	13,720 (12,580)	13,720 (13,200)	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.

Table 4

Sl. No.	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.

Philippines, Indonesia, Singapore, Malaysia and India. A dominant role is therefore being played by governments in this sector in view of the capital intensive nature of the industry and the long gestation periods involved. Future planning of growth of this industry is well in the hands of the respective Governments. Administered pricing is also a feature of the steel industry particularly of South Korea, India and Thailand; which indicates governments involvement in this respect too.

For securing domestic supply and to protect domestic users, a collective import system is followed in some countries. The government managed Krakalau Steel Corporation in Indonesia imports steel items under this system; while in India the public sector steel undertaking, holding company - Steel Authority of India (SAIL) canalizes import of steel products. In Philippines, nominal import duties are levied on some steel items, and in South Korea most iron and steel items come under the category of restricted imports. By varying import duties, the intake of steel items can be regulated to suit each country's requirements; in relation also to domestic steel production.

The developing ESCAP countries are a growth area with significant resources and relatively low labour costs. Demand is expected to outstrip production capability in the region but both demand and production would normally grow at rates higher that of the industrialized regions. It may also happen that in an effort to serve domestic needs, steel capacity may be created but in view of limited local demand it may not be possible to support an economic production capacity. In developed countries the level of demand is high and therefore advantages of scale can be availed of. It would therefore be advisable to arrange suitable mechanisms for industrial co-operation for developing ESCAP countries, under the aegis of UNIDO/ESCAP, in the field of iron and steel industry, so as to help overcome the obstacles of demand and create steel capacity of optimal size in each country.

A word about the international scene. The major growth areas in the developed world at present are telecommunications, energy, aero space and computers; all of which are not intensive users of steel. This has resulted in shrinkage of demand for steel in addition to technical advances/changes in production processes, which have resulted in drastic reduction in steel users

requirements. Steel has for instance been substituted by aluminium, plastics and highly resistant glass in several traditional areas. In contrast, the developing countries have evidenced rise in steel consumption with growing needs of the manufacturing sector combined with high rates of investment in construction, equipment and infrastructure. In semi-industrialized countries like Brazil and Republic of Korea, steel consumption has gone up dramatically in recent years with their export of steel-intensive products such as automobiles. Thus, keeping the demand factor as an indicator, while the developed countries are generally contracting their steel making capacities, most parts of the developing world is adding to the capacities.

With rising investment costs in the context of continuing enlargement of optimal plant size, the technology parameter has changed over the years. There is the difference in cost structures in developing and the developed countries. Labour cost is two to five times higher in developed countries while raw material cost is high for the several developing countries, particularly for those which import ore, coke and scrap. Developed world has abundance of such raw materials. On R+D side, there is an emphasis on increased production flexibility and capacity rationalization. Continuous casting of molten steel is the trend which avoids ingot stage and saves energy and labour by a bypassing costly reheating process and handling of ingots. The other major advance is in the field of direct reduction of ore which eliminates the blast furnace. These innovations provide for low capital and operating costs, smaller optimal sizes and greater flexibility than the conventional plants of the 1960s and early 1970s.

Conversion to continuous casting has however been slow and many advanced countries are still reluctant to scrap/convert existing conventional capacity. Almost 31 per cent of the worlds' crude steel was produced through this new method in 1981 - more than double the quantities in 1975. In 1980, 27 per cent of United Kingdom, 20 per cent of United States and 12 per cent of USSR steel production was through this route. Republic of Korea has also taken to this in a big way. In the new steel capacity being created in India through the blast furnace route, continuous casting has been accepted as the feasible method.

For developing countries in the ESCAP region particularly those which do not have a sufficiently large domestic market, the technology to adopt for steel production for the present is that of direct reduction. In this respect, significant developments are taking place in this region. In India a unit producing 30,000 tonnes of sponge iron by using SL/RN process utilising solid reduction has been set up at Paloncha. Its commercial production started in November 1980 and with success achieved in obtaining over 100 per cent rated capacity utilization, the capacity of this plant is being doubled - to be commissioned in early 1985. A chain of such projects is likely to come up at several other centres in India; using ordinary quality of iron ore and coal. Ways and means have now to be explored for increasing regional steel production by means of application of modern steel-making technology, in particular, direct reduction process to produce sponge iron for mini-steel plant operations. The subject of development and promotion of sponge iron production was discussed in detail at a UNDP sponsored and UNIDO/RCCT organized Study Tour and Workshop to Promote Technology Development and Transfer in the Area of Sponge Iron Manufacture and Use in Developing Countries of the ESCAP region, held in March-April 1983 at Hyderabad, India.

Steep scrap in recent years has been an uncertain and unpredictable commodity, both in respect of availability and price; that electric arc steel melting capacity has to find alternative feed material for sustained growth. It is estimated that for some developing countries (as per table 5) there will be an overall scrap deficit of about 4 million tonnes by 1985 and 10 million tonnes by the year 2000. Assuming that the projected scrap shortage would be met by sponge iron, the corresponding demand for sponge iron is projected at 4.7 million tonnes and 11.7 million tonnes by 1985 and 2000 respectively.

In tables 2 and 4, the position regarding raw material potential and suggested routes for steel production respectively have been indicated. A massive sponge iron production programme has to be undertaken in tnese countries to be able to meet the steel demands of this area by 2000. Countries opting for blast furnace routes would have to take up continuous casting to achieve economies in operations. Raw material testing facilities can be provided by the UNIDO-assisted Indian (Paloncha) sponge iron project, which has already undertaken such work for some countries.

Table 5

Scrap position and sponge iron requirements by 1985 and by 2000

(in 1000 tons)

Country	1985 Scrap position	1985 Equivalent sponge iron requirement	2000 Scrap position	2000 Equivalent sponge iron requirement
Afghanistan	(-) 23	25	(-) 32	35
Bangladesh	(-) 75	83	(-) 364	400
Bhutan	(+) 0.35	-	(+) 1	-
Brunei	(+) 0.53	-	(+) 2	-
Burma	(+) 11	-	(-) 295	324
India	(-) 694	760	(-)1180	1300
Indonesia	(-) 630	690	(-) 715	786
Iran	(-) 2,538	2,790	(-) 6,265	6,900
Kampuchea	(-) 22	24	(-) 35	38
Laos	(+) 4	-	(+) 11	-
Malaysia	(-) 212	233	(-) 978	1,075
Nepal	(-), 20	22	(-) 32	35
Pakistan	(-) 10	11	(-) 329	362
Philippines	(+) 77	-	(-) 53	58
Singapore	(+) 48	-	(-) 200	220
Sri Lanka	(-) 37	41	(-) 149	164
Thailand	(+) 16	-	(+) 151	-
Vietnam	(+) 173	-	(+) 502	-
TOTAL	(-) 3,931	4,679	(-) 9,960	11,697

Developing countries in the ESCAP region to be able to undertake steel projects on the lines suggested above would need to:

a) ensure that there does not exist shortage of skilled manpower. For this purpose a properly planned effort would have to be made to obtain requisite number of qualified persons to man positions at various levels for which assistance of other countries in the region could also be taken. Training programmes would have to be worked on, for which UNIDO assistance should be forthcoming;

b) finalize suitable strategy for import of equipment in phases keeping in view foreign exchange constraints if any. Steel-making programme should not suffer on this account;

c) expand the raw materials base, which is time-taking business, particularly as there may be need to upgrade the naturally occuring supplies;

d) ensure that transportation (of raw materials and finished products) does not become a bottleneck hindering the full utilization of plants. Each tonne of steel produced requires 6 tonnes of carrying capacity;

e) adopt appropriate/latest technology suiting the raw material base of the country; and

f) have dispersal in location of plants to meet regional aspirations. In India there are special incentives for locating industries in backward areas.

UNIDO could assist the developing countries of the ESCAP region by:

a) disseminating information on research and development work, including pilot plants, feasibility and pre-investment appraisals;

b) providing studies relating to consultancy and project engineering services for setting up steel plants and also collaborate in development of national consultancy services for project engineering;

c) formulating, on request, the choice of production technology appropriate for a given scale of production and a given product mix;

d) assessing capital availabilities and assist in negotiations of developing countries with international financial institutions;

e) exploring the possibility of regional and interregional groupings to overcome limitations if any of domestic markets for facilitating growth of steel-making capacity; and

f) training of personnel, wherever there are gaps locally.

A well thought-out strategy has to be evolved by each of the developing countries in the ESCAP region to meet their requirements of iron and steel (including exports) by the turn of the century, which would have to be executed with precision and determination. Export markets would be available for these countries in view of the likely stagnation of steel-making levels in the developed countries for the reasons stated above. The developing countries of the ESCAP region should avail of this opportunity and step in to fill the gap between demand and supply in iron and steel and speedily create additional steel-making capacity mainly through direct reduction (gaseous or solid reductant route). This will not only give strength to their respective economies but would also enable them to play an important role in international trade in iron and steel. The steel base would facilitate building up of engineering industries in the region apart from several other steel using items. There would be a spurt in export oriented production with adequate availability of iron and steel. Fortunately, the various governments have been taking interest in the steel sector which provides for valuable support particularly in relation to financial inputs, price ceilings, fiscal reliefs and the like. Government controlled development banks and commercial banks should also accept the need for growth of this industry in a short period of time, with a view to providing term-finance and working capital for it. Continued backing of the respective Governments would be necessary to be able to achieve self-sufficiency, with marginal export surpluses in iron and steel in most countries. Government policy would have to be directed towards this end and in the scheme of priorities, steel-making capacities would have

to get the top position. Then alone will the entire governmental machinery operate to speed up establishment of requisite steel capacities, with all the infrastructural and other supports required. A massive government effort is necessary particularly in view of the capital intensive nature of the industry and the long gestation periods involved. Work would also have to be done in close co-ordination with UNIDO and the other technical agencies concerned.

The strategy would require regional co-operation so that duplication of products is avoided wherever possible. The countries would have planned their steel-making programmes in unison to get the maximum out of the investments made. Flat products and rolled/shaped products should be so organized that the capacities created supplement each other in various countries to the extent feasible. As the exercise will be resource-based, import of raw material could be minimal and that too from within the region. Close liaison and co-ordination between the developing countries in the region must be achieved at each stage of implementation of the Master Plans of each country, which in turn should be closely integrated. The per capita consumption of steel should reach the level at least of semi-industrialized countries in the next decade if the quality of life in these countries has to improve substantially. The experience of the developing countries should be continually shared and a dialogue kept up amongst them, with UNIDO/ESCAP playing their catalytic role.

II PETROCHEMICAL INDUSTRY

Petrochemical products and their derivatives are several in number - from fertilizers, solvents, plastics, fibres, rubbers to base material for detergents and pharmaceuticals. It has been the most rapidly developing sector of the chemical industry and at present includes most of the earlier established organic chemical segments. The growth of developed region markets has of late somewhat slowed down though the developed world has dominated this industry. There is increasing interest in the developing countries to establish this industry and their market is also growing. Latin American countries, India, South Korea, Turkey and Singapore, for instance, have operational basic petrochemical facilities. In other developing countries this industry is limited to down-stream processing units. Petrochemical industry contributes to the objective of rapid and balanced expansion in the industrial sector, with small-scale industries and their linkages playing a lead role. Gases (natural, associated and refinery) as well as liquid e.g. naphtha, gas oils form the main source of feedstock for all petrochemicals.

Many countries in the developing region of ESCAP have not been able to implement their plans for establishment of petrochemical industry on account of international economic conditions, limitations of market size and uncertainty about exports. These countries include Indonesia, Philippines, Thailand and Pakistan. Constraints of financial resources is also a factor. Among technological constraints may be mentioned selection of technologies, technological innovation, non-availability of local machinery and equipment manufacturing capability and limitation of availability of skilled manpower.

End petrochemicals consumption showed a tendency of high growth in the world during 1965-1975, with less growth in later years. With recessionary conditions, diversification of industrys' base from consuming areas to oil rich countries and exhaustion of substitution opportunities in industrialized countries the world petrochemical industry is not expected hereafter to show impressive growth. The oil producing region will use to their advantage the available cheap and currently wasted raw material to make the international market highly price/cost competitive. The developed countries would however continue to have advantage of their existing technological infrastructure.

With successful implementation of programmes for establishment of petrochemical industry, the developing countries may show high growth in this sector when compared with other regions in the world. Thermo-plastics and polyester fabrics will remain dominant among the petrochemical markets. By the end of 1990, ESCAP region capacity is expected to expand considerably with facilities becoming operational in Singapore, Iran and Indonesia and extension of capacities in India and South Korea. The major expansion will be of ethylene and its derivatives. Deficits will continue in almost all end petrochemical particularly thermo-plastics and polyesters. By 1990, the region will require ethylene production capacity of about 1.2 million tonnes, with polyester capacity of 1 million tonnes.

India, South Korea and Singapore are expected to lose competitiveness for export purposes which will affect capacity utilization and hence reduce expansion plans. This requires active regional co-operation so that the regions of existing petrochemical producers are saved from high cost burdens (with low capacity utilization) and new entrants in the field get requisite assistance in operating and marketing their products.

Based on projected petrochemicals deficits of ESCAP region by 1990, four sizeable petrochemical projects can be considered for implementation under regional co-operation arrangements. This co-operation is necessary also for introducing specialization in petrochemical production. Governments of these countries would need to provide tariff protection giving special treatment to imports originating from regional projects. The success of regional co-operation programmes would depend also on the benefits that would accrue to member countries in these arrangements.

The region has a sizeable market of petrochemicals. However, feedstock from oil and gas resources is limited to Iran, Indonesia, Malaysia and Thailand. The region is net importer of petrochemicals and this situation is not expected to change by 1990.

The impact of petrochemical industry on overall economic development relate to:

a) strengthening of linkages between agriculture and industry (forward linkages in insecticides and pesticides manufacture, for example and backward linkage in ethanol manufactured from molasses recovered from sugar);

b) development of industry to satisfy basic needs of the poor (e.g. clothing, household items etc. and by releasing land for agricultural purposes instead of for cotton, wood etc.);

c) development of small-scale industries and their linkages with large and modern industries (example are plastic processing, textile weaving);

d) dispersal and location of industries away from metropolitan areas (locations being near gas fields and refining facilities; moreover manufacture of consumer foods is wide-spread).

World basic petrochemicals production during 1965-1981 is at table 6. Regional break-up is at table 7. During 1970-1975 the growth was at an annual compound rate of 6 per cent as compared to 18 per cent in 1965-1970. Table 8 indicates the growth of many end products. Plastics account for more than half of world's end petrochemicals production followed by synthetic detergents and fibres. In basic petrochemicals production, developing countries had a share of 8 per cent and in end petrochemicals a share of about 12 per cent.

Petrochemical industry had earlier been based on hydrocarbon resources starting with coal, then shifting predominantly on petroleum based resources including natural gas. Petrochemical feedstocks in general are categorized as gas based or liquid feedstock. Synthesis fuel (coal), coking liquid as well as biomass ethanol are also classified as liquid feedstocks.

Plastics is the leading end petrochemical product group and accounts for about 60 per cent of total tonnage of end petrochemicals. During 1965-1970, its consumption increased at compound growth rate of 14 per cent but growth

TABLE - 1 6

WORLD PETROCHEMICALS PRODUCTION

BASIC PRODUCTS

(MILLION METRIC TONS)

	1965 (a)	1970 (a)	1975 (b)	1979 (b)	1981 (c)&(d)
- Ethylene	8.000	18.500	24.400	37.630	35.253
- Propylene	4.400	9.530	12.590	19.720	18.445
- Butadiene	1.900	3.130	3.445	5.060	8.201
- Benzene	4.780	8.820	11.310	17.180	16.501
- Xylenes	N.A.	N.A.	3.770	6.110	9.512
- Methanol	N.A.	N.A.	7.540	11.720	N.A.

Source:

a) First World-wide Study on the Petrochemical Industry 1975-2000 UNIDO/ICIS.83 12 December, 1978.

b) Second World-wide Study on Petrochemicl Industry: Process of Restructuring ID/WG.336/3 19th May, 1981 and Annex.Ref. ID/WG.336/3/Add.1 20th May, 1981.

c) The Development of Petrochemical Industries in the Developing Countries, Paper presented by UNIDO Secretariat at Joint UNIDO/OPEC/OPEC FUND Seminar on Petrochemicals Vienna 7-9 March 1983.

d) Hydrocarbon Processing, Gulf Publishing Co. USA, August 1983.

TABLE : 7 WORLD PETROCHEMICALS PRODUCTION

ANNEXURE-2.1

BASIC PRODUCTS

(THOUSAND METRIC TONS)

COUNTRIES	ETHYLENE			PROPYLENE			BENZENE			BUTADIENE			XYLENES			METHANOL		
	1975	1979	1981	1975	1979	1981	1975	1979	1981	1975	1979	1981	1975	1979	1981	1975	1979	1981
DEVELOPED COUNTRIES																		
- Japan	3400	4800	3644	2300	3100	****	1600	2000	****	530	670	****	580	860	****	700	900	****
- West Europe	7900	12350	10699	4100	6500	****	3130	4850	****	1080	1710	****	960	1390	****	1950	3000	****
- North American	9700	14300	14400	4400	7200	****	3670	6400	****	1250	1750	****	1450	2330	****	2500	3650	****
- USSR and East Europe	2000	3000	3000	1200	1500	****	2150	2600	****	300	400	****	600	800	****	2100	2800	****
- Other Industrialized Countries	250	500	700	120	230	****	80	140	****	75	110	****	20	30	****	****	50	****
TOTAL:	23250	34950	32443	12120	18530	****	10630	16040	****	3235	4640	****	3610	5450	****	7250	10400	****
DEVELOPING COUNTRIES																		
- Africa	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
- Middle East - North Africa	****	100	****	****	****	****	****	****	****	****	****	****	****	****	****	****	400	****
- Middle East - West Asia	****	50	210	****	30	****	****	****	****	10	20	****	****	****	****	****	****	****
- Asia	250	900	1600	200	450	****	180	360	****	80	110	****	30	320	****	90	401	****
- China	300	430	****	70	210	****	200	220	****	40	80	****	****	20	****	140	210	****
- Latin American	600	1200	1200	200	500	****	300	520	****	80	210	****	130	320	****	110	310	****
TOTAL:	1150	2680	3010	470	1190	****	680	1150	****	210	420	****	160	660	****	340	1320	****
WORLD TOTAL:	24400	37630	35253	12590	19720	18445	11310	17190	16501	3445	5060	8201	3770	6110	9512	7590	11720	****
Share of Developing Countries in World Total(%)	4.71	7.2	8.54	3.7	6.0	****	6.0	6.7	****	5.8	7.4	****	4.2	10.8	****	4.5	11.3	****

SOURCE. - Annex to Second World-wide Study on the Petrochemical Industry; Progress of Restructuring ID/WG.336/3/Add.1 dated 20th May,1981.

- The Development of Petrochemical Industries in the Developing Countries, Paper presented by UNIDO Secretariat at Joint UNIDO/ECE/OPEC FEN Seminar on Petrochemicals Vienna 7-9 March,1983.

- Hydrocarbon Processing, Gulf Publishing Co., USA, Aug.1983.

**** Denotes data not available.

TABLE - 8

WORLD PETROCHEMICALS PRODUCTION

END-PRODUCTS

(MILLION METRIC TONS)

	1960 (a)	1970 (a)	1975 (a)	1979 (b)	1981 (c)
- Plastics	7.000	30.200	38.500	41.165	37.436
- Synthetic fibres	0.700	5.100	7.500	10.040	12.069
- Synthetic Rubbers	2.000	5.900	7.400	6.390	8.494
- Detergents	3.500	9.000	10.800	N.A.	N.A.

Source: a) First World-wide Study on Petrochemical Industry 1975-2000 UNIDO/ICIS 83 12 December, 1978. The individual product groups include all categories of products.

b) Annexes to Second World-wide Study on Petrochemical Industry: Process of Restructuring UNIDO ID/WG.336 3/Add.1 20 May 1981. The individual product group cover major products e.g. in case of plastics only thermoplastics are included.

c) The Development of Petrochemical Industries in the Developing Countries. Paper presented by UNIDO Secretariat at Joint UNIDO/OPEC/OPEC FUND Seminar on Petrochemicals Vienna 7-9 March 1983. The individual product group cover major products e.g. in case of plastics only thermoplastics are include

rate dropped to 8 per cent in 1970-1975. Thermo-plastics (LDPE, HDPE, PP and PS) in 1975 showed annual compound growth rate of 13.6 per cent. In 1979, developing countries share of plastics consumption was 16 per cent of world consumption.

Synthetic fibres consumption during 1965-1975 increased at rate of 13 per cent while synthetic rubber consumption grew at a rate of 8 per cent. The developing countries share in three leading synthetic fibres (polyesters, acrylic and polyamide) was around 25 per cent in 1979. Developing countries consumed 20 per cent of total world synthetic detergents. Western Europe dominated the world trade in plastics followed by Japan and United States. The share of developing countries in world trade of chemicals, petrochemicals has been about 5 per cent in 1978. In recent years, some exports (namely fertilizers and natural gas derivatives and ammonia) have been undertaken.

In the developing ESCAP region, chemical and petroleum sectors during the last decade were fast growing industrial sectors. The share of chemical industry (without petroleum refineries and products) in total MVA (manufacturing value added) has been 10-13 per cent. Table 9 shows the country-wise data about chemical/petrochemical industrys' contribution to GDP, employment along with mean size of establishments. Though the region has net deficits in basic as well as end petrochemical products, it has sizeable petrochemical base consumer products manufacturing capacity. Plastic products and synthetic wearing apparel industry are examples, wherein there are substantial exports to developed and developing countries of the world, mainly because of cheap manpower availability factor.

The capacity utilization in case of basic petrochemicals in 1980 was 60-70 per cent. Among end petrochemical highest capacity utilization rate around 80 per cent was observed for synthetic fibres followed by synthetic rubber (75 per cent) and plastics (70 per cent). Most of the plants are composite having ethylene, polyethylene, aromatics and fibre intermediate production facilities and hence data on production is scanty - the industry being of an integrated nature.

ANNEXURE-V

DEVELOPING ESCAP REGION

CHARATERISTICS OF PETROCHEMICAL INDUSTRY

COUNTRIES	YEAR	VALUE ADDED '000 US$	NUMBER OF EMPLOYEES	MEAN SIZE OF ESTAB-LISHMENT
AFGHANISTAN				
Industrial Chemicals	1980	-	3,830	3,830
Other Chemicals	1980	-	402	80
Petroleum Refineries	1980	-	-	-
Misc. Petr. & Coal Products	-	-	-	-
Plastic Products.	1980	-	771	25
BANGLADESH				
Industrial Chemicals	1979	44,673	5,300	279
Other Chemicals	1979	55,166	23,750	67
Petroleum Refineries	1979	1,609	450	450
Misc. Petr. & Coal Products	1979	-	-	-
Plastic Products	1979	386	640	23
HONG KONG				
Industrial Chemicals	1979	34,476	1,500	12
Other Chemicals	1979	62,298	5,400	12
Petroleum Refineries	-	-	-	-
Misc. Petr. & Coal Products	-	-	-	-
Plastic Products.	1979	416,532	87,900	19
INDIA				
Industrial Chemicals	1978	736,109	165,000	106
Other Chemicals	1978	849,799	262,000	79
Petroleum Refineries	1978	138,967	10,000	303
Misc. Petr. & Coal Products	1978	103,065	30,000	102
Plastic Products.	1978	736,109	165,000	106

ANNEXURE-V Cont'd

	YEAR	VALUE ADDED '000 US$	NUMBER OF EMPLOYEES	MEAN SIZE OF ESTABLISHMENT
INDONESIA				
Industrial Chemicals	1979	129,760	12,700	126
Other Chemicals	1979	95,840	38,100	132
Petroleum Refineries	-	-	-	-
Misc. Petr. & Coal Products	-	-	-	-
Plastic Products.	1979	22,240	16,500	76
IRAN				
Industrial Chemicals	1979	34,340	2,240	172
Other Chemicals	1979	186,883	13,970	155
Petroleum Refineries	1979	577,251	18,400	1,314
Misc. Petr. & Coal Products	1979	1,135	360	120
Plastic Products	1979	112,669	11,710	94
REP. OF KOREA				
Industrial Chemicals	1979	809,666	40,600	57
Other Chemicals	1979	913,999	49,400	84
Petroleum Refineries	1979	334,279	3,600	82
Misc. Petr. & Coal Products	1979	188,419	12,300	42
Plastic Products.	1979	435,306	52,300	53
MALAYSIA, WEST				
Industrial Chemicals	1978	57,476	3,700	46
Other Chemicals	1978	73,034	8,600	63
Petroleum Refineries	1978	75,627	500	100
Misc. Petr. & Coal Products	1978	864	100	17
Plastic Products	1978	41,487	11,500	73
PAKISTAN				
Industrial Chemicals	1976	54,343	11,400	190
Other Chemicals	1976	55,556	40,596	188
Petroleum Refineries	1976	171,344	1,000	250
Misc. Petr. & Coal Products	1976	303	125	125
Plastic Products.	1976	2,222	1,150	44

ANNEX I - Cont'd

	YEAR	VALUE ADDED '000 US$	NUMBER OF EMPLOYES	MEAN SIZE OF ESTAB-LISHMENT
PHILLIPINES				
Industrial Chemicals	1977	49,413	9,400	57
Other Chemicals	1977	148,778	23,300	76
Petroleum Refineries	1976	171,344	1,000	250
Misc. Petr. & Coal Products	1976	4,834	100	11
Plastic Products	1977	31,052	19,200	67
SINGAPORE				
Industrial Chemicals	1980	50,935	2,140	48
Other Chemicals	1980	142,056	4,270	48
Petroleum Refineries	1980	686,916	3,340	334
Misc. Petr. & Coal Products	1980	686,916	3,340	334
Plastic Products	1980	81,308	9,150	47
SRILANKA				
Industrial Chemicals	1979	2,377	769	48
Other Chemicals	1979	16,058	4,469	26
Petroleum Refineries	1979	18,884	4,729	4,729
Misc. Petr. & Coal Products	1979	193	291	291
Plastic Products	1979	3,661	1,543	23
THAILAND				
Industrial Chemicals	1975	119,237	7,979	80
Other Chemicals	1975	126,593	25,951	108
Petroleum Refineries	1975	352,193	2,266	453
Misc. Petr. & Coal Products	1975	1,415	440	88
Plastic Products	1975	23,462	3,821	41

SOURCE: ASIAN INDUSTRY IN FIGURES.
Statistical profile of Key Sectors in Selected ESCAP Countries.
UNIDO/IS.390 15th June,1983.

End petrochemicals consumption in the developing ESCAP region has grown as seen from table 10. Plastics as a group is the major tonnage item and this patterr is in line with the world consumption trend. The per capita consumption of the region is still the lowest in the world (2 kg against 20-45 kg in 1980 in five leading thermo-plastics).

The basic petrochemical production facilities of the region currently are in South Korea and India. Singapore has started operations recently while Iran has partly constructed its facilities. The region has fairly developed oil/gas based industry. India and South Korea which possess sizeable capacity are net energy importer and major proportion of capacity is based on naphtha feed. Singapore facilities are expected to utilize a blend of naphtha, gas oil, LPG and refinery gases as feed. Indonesia plans have temporarily been suspended while Thailand's plans are being finalized. Philippines, Pakistan and Hong Kong have not been able to implement their plans due to international economic conditions, market size, resource and feedstock availability constraints.

Establishment of petrochemical industry in a country requires their Governments acceptance for setting it up accompanied by decisions/institutional measures for successful operations relating to:

a) allocations of special funds for industrys' development;
b) import duty concession;
c) tariffs and other type of protection;
d) tax incentives;
e) promotion of investment in down-stream industries;
f) assistance in manpower training;
g) encouragement of local demand, and
h) supporting services.

Government patronage on these lines are forthcoming in India and South Korea.

Table 10: End petrochemicals consumption in developing ESCAP region[1/] (1965-80)
(Million metric tons)

	1965	1970	1975	1980
Plastics	0.289	0.765	1.279	1.909
Synthetic fibres	0.067	0.228	0.460	0.845
Synthetic rubber	0.052	0.102	0.201	0.225

This industry has to be treated as import substitution measure, except oil exporting countries. But with prevailing depressed market conditions, new investment in non-oil exporting developing countries cannot be justified. There is dumping from West and East European countries. In oil exporting countries this industry, with low domestic demand can only be export-oriented using cheap wasted raw material like flared gas. The small domestic market size of developing countries and their inability to assess realistically the magnitude of potential demand has acted as an obstacle in setting up of petrochemical industry. Pakistan is an example. Similarly, developing countries in comparison with international companies (engaged in petrochemical exports) have limited technical back up with hardly any experience of export markets. There is also disparity between size of domestic manufacturer in a developing country and its international competitors. With the present dumping operations, price competition in export markets is unequal.

Down-stream activity would have to be encouraged by providing imported material liberally until the domestic petrochemical industry is constructed - which takes 4-5 years. Specialization, to avoid duplication, has to be a co-ordinated effort among countries on a regional basis. Each country need not produce whole range of petrochemical products. Developing countries should also opt for technologies meant for small size plants rather than world scale plants. Infrastructure facilities would also have to be built up. Being highly capital intensive financing becomes crucial, particularly to meet large foreign exchange requirements. Co-financing through joint-ventures has to be seriously considered.

Continuous technological development taking place in the developed world has made acquisition of right type of technology quite difficult. Technology which is adaptable to the country concerned should be accepted. Technical back-up services have to be evolved - for operation and maintenance of petrochemical facilities (basic and down-stream) and also marketing of final products. For this as well as local manufacture of equipment, regional co-operation is essential. Suitable regulations for controlling water and air pollution would have to be prescribed. A massive training programme for getting skilled manpower would also have to be drawn-up and speedily implemented. While negotiating technology transfer agreements, emphasis should be laid on its duplication and further development locally.

The developing ESCAP region has considerable scope for petrochemicals, with its large population and fairly developed processing industry e.g. plastics and fibres. The demand growth is expected to remain highest among the developing world during this decade. The present industry is mainly petroleum based. Facilities in South Korea are naphtha based and also for India, though India has also biomass (mollasses - ethyl alcohol - ethylene) and coal. Singapore facilities have flexibility of utilizing naphtha, LPG and gas oil. Iran will initially have gas based petroleum ventures. The future complexion will be mainly governed by hydrocarbon availability apart from markets. Among the hydrocarbons, natural gas (both associated and non-associated) will have a significant edge over petroleum feed in view of yield advantage, indigenous availability and uncertainity about crude oil supply and prices.

The period 1985-1990 is expected to see enormous expansion in basic and down-stream petrochemical facilities. Iran's facilities are expected to be operational by late eighties. Thailand, Indonesia, Philippines and Pakistan are possible addition to existing petrochemical producers. By 1990 only Indonesian and Thailand facilities are expected to be operational.

The future demand/supply position of the region (supply based on 90 per cent of production capacity by 1990) is as per table 11. If India and South Korea plans are not fully implemented, the deficits can be higher. The situation calls for highly activated regional co-operation with respect to setting up/expansion of petrochemical industry. Joint-venture could be set up for establishing petrochemical facilities. SARC can also provide support. As stated earlier four large petrochemical facilities can be established on the basis of regional co-operation. It could be reduced to two if Saudi Arabia's world scale plants projects materialize. These four complexes will be of the configuration/indicated in table 12.

The experience of India would be of relevance to countries in this region. From less than 1 million tonnes of petrochemical in 1951 the production in 1983 was about 180 million tonnes. Engineering plastic and polymers and fibre reinforced materials are emerging - as new materials to provide high strength, light weight, resistance to corrosion, low heat and electrical conductivity, low frictional resistance, high smoothness and gloss

TABLE 1

DEVELOPING ESCAP REGION

PROJECTED PETROCHEMICALS DEMAND/SUPPLY (END-PRODUCTS)

(THERMOPLASTICS - 1990)

(THOUSAND METRIC TONS)

COUNTRY	P V C			H D P E			L D P E			P P			P S		
	SUPPLY	DEMAND	SURPLUS/ (DEFICITS)	SUPPLY	DEMAND	SURPLUS/ (DEFICITS)	SUPPLY	DEMAND	SURPLUS/ (DEFICITS)	SUPPLY	DEMAND	SURPLUS/ (DEFICITS)	SUPPLY	DEMAND	SURPLUS/ (DEFICITS)
Afghanistan	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Bangladesh	***	17.29	(17.29)	***	0.98	(0.98)	***	8.15	(8.15)	***	***	***	***	***	***
Burma	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Hong Kong	***	77.80	(77.80)	***	36.71	(36.71)	***	81.45	(81.45)	***	31.44	(31.44)	60.00	227.07	(167.07)
India	168.30	232.74	(64.44)	27.00	142.30	(115.30)	100.80	175.10	(74.30)	27.00	54.24	(27.24)	21.60	36.91	(15.31)
Indonesia	135.00	217.71	(82.71)	54.00	151.46	(97.46)	162.00	166.22	(4.22)	33.30	141.91	(108.61)	***	34.08	(34.08)
Iran	135.00	173.01	(38.01)	54.00	61.55	(7.55)	90.00	90.72	(0.72)	45.00	28.40	16.60	***	28.91	(28.91)
S.Korea	270.00	351.97	(81.97)	126.00	175.79	(49.79)	288.00	368.78	(80.78)	104.50	350.37	(165.87)	180.00	101.75	78.25
Malaysia	22.50	52.06	(29.56)	***	49.71	(49.71)	***	64.76	(64.76)	***	63.12	(63.12)	6.00	31.24	(25.24)
Nepal	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Pakistan	4.00	47.06	(43.06)	***	10.64	(10.64)	***	54.29	(54.29)	***	32.41	(32.41)	***	7.11	(7.11)
Phillipines	45.00	59.17	(14.17)	***	23.65	(23.65)	***	43.19	(43.19)	***	70.95	(70.95)	11.70	36.91	(25.21)
Singapore	***	37.86	(37.86)	72.00	18.92	53.07	108.00	30.23	77.77	90.00	70.95	19.05	***	34.08	(34.08)
Srilanka	***	10.78	(10.78)	***	***	***	***	4.88	(4.88)	***	***	***	***	***	***
Thailand	45.00	42.62	2.38	***	47.34	(47.34)	66.60	64.76	1.84	***	42.58	(42.58)	20.70	42.58	(21.88)
TOTAL:	824.80	1320.07	(495.27)	333.00	719.06	(386.06)	815.40	1152.53	(337.13)	379.80	891.37	(511.57)	300.00	580.64	(280.64)

*** Denotes data not available.

TABLE - 11.12

CONFIGURATION OF PROPOSED PETROCHEMICAL COMPLEX

FACILITIES	CAPACITY[a] (IN THOUSAND METRIC TONS)	CAPITAL COST[b] (IN MILLION US$ 1980 PRICES)
- Ehtylene	300	630
- Propylene	150	-
- LDPE	100	185
- HDPE	100	105
- PVC	100	225
- EG	100	104
- PP	160	273
Total:	1910	1522

(a) The conversion factors (tons of starting material per ton of product) used are as follows:

- LDPE	1.05 Ethylene	HDPE	1.05 Ethylene
- PP	1.07 Propylene	PVC	1.06 Vinylchoride &
- Ethylen glycol	0.70 Ethylene		0.50 Ethylene for Vin-ylchorid

Source: The Petrochemical Industry, UNIDO/1 06,1973.

(b) Opportunities for Cooperation among the Developing countries for the Establishment of Petorchemical Industry. UNIDO/IS 16 March,1983.

for clean surfaces, transparency, crease resistance and durability. The development of the entire industry is based on production of aromatics and olefins and this is where India has concentrated its efforts. Large complexes were set up for this purpose, not on turn-key basis but by maximum utilization of indigenous capabilities. Detailed engineering, local procurement and inspection, substantial proportion of foreign procurement, construction and commissioning and finally the operations have been carried out in India with the major role in projects being played by two public sector companies viz Engineer India Ltd. and Indian Petrochemicals Corporation Ltd. Bharat Heavy Electricals, Bharat Heavy Plates and Vessels Ltd., Garden Reach Workshops and several private sector engineering and fabrication companies were involved in the huge task of implementation of the Vadodra Petrochemical Complex. The setting up of this complex has given a fillip to the entire engineering and fabrication industry to attain high degree of sophistication and development of high order of skills in construction and project management. This has also facilitated development of new technology in product applications. It has not only resulted in high degree of self-reliance but with assistance of University Research Departments and National Laboratories, the basis for research and new developments have been firmly laid.

In India with increased local availability and liberalization of imports a number of processing units have been set up. Reduction of exise duty and some import duties has further helped the industry. Consumption has exceeded local production and materials e.g. benzene, xylenes, DMT, Caprolactum, ethylene glycol, detergent alkylate, polyester fibre and filament yarns, nylon, high density polyethylene, PVC etc. are being imported to supplement local manufacture. Demand is therefore on the rise.

The discovery of offshore gas in India has provided an opportunity to meet the increased demand for petrochemical products. With high value added, setting up of petrochemical plants will also lead to rapid growth of small-scale industries and the rural economy as a whole. There is larger use of modern petrochemical adhesives and surface coating which enable wood chips and fibruous by-products of agriculture to be made into board to replace wood. Polyester/cotton combination for clothing are in great demand. Polyester filament and acrylic fibre are being used in the handloom and hand

knitting sector quite widely. Reinforcement of natural rubber tyres and building blocks by strong fibres e.g. nylon and polyester cord and polypropylene fibre are also popular. There is therefore great opportunity to use petroleum wisely to enhance the value of renewable resources in a unique manner. The energy crisis emphasizes more than ever the need to replace petroleum fuels by other energy sources and conserve petroleum for high value essential applications through production of petrochemicals.

The energy requirements for producing and shaping metals and alloys are high and availability of natural materials are limited. Only about 7 per cent of petroleum is converted presently into petrochemical products and as alternative energy sources develop, petroleum including gas could be conserved to meet the needs of petrochemical products for many years to come.

III CAPITAL GOODS INDUSTRY

The South-East and East Asia (SEEA) countries comprise of Thailand, Singapore, Philippines, Malaysia, Republic of Korea, Indonesia, Burma and Hong Kong. This region has witnessed a dramatic development in the capital goods sector in the last 15 years with products ranging from electronic components to light aircrafts. Exports of capital goods in 1980 from SEEA was estimated at $13,000.6 million. The present decade is poised for further intensive developments in this sector of industry. Singapore dominates this region in terms of percentage of manufacturing value added from capital goods industries (in 1980). Table 13 indicates the structure of manufacturing value added at constant (1975) prices in capital goods industries for selected years in percentages. While Singapore, Korea and Malaysia have done well, the capital goods industry has made the least contribution to manufacturing value added and employment in Indonesia.

Singapores major capital goods products in terms of output, value added and direct exports are oil and gas field machinery and equipment, semi-conductors, TV sets, radios, audio and video sets and ships, tankers and other ocean-going vessels. After independence in 1959, a thrust for industrialization came up to solve the unemployment problems and the results forthcoming were commendable.

Malaysia too developed its capital goods sector in recent years. The three largest contributors to Malaysian manufacturing value added in 1968 were food products (22 per cent), wood products (15.2 per cent) and rubber products (12.5 per cent). In 1978, the third place was taken by electrical machinery contributing 12 per cent, with the tremendous growth of electronics industry in the early 1970s. Presently Malaysia is the third largest exporter of air conditioners, having exported more than 100,000 units valued at $26 million.

Electrical machinery is the largest sub-sector in the capital goods industry in Korea in terms of value of production in 1979. This sub-sector accounted for nearly 40 per cent of the total value of production in the capital goods sector.

TABLE ~~2~~ 13

STRUCTURE OF MANUFACTURING VALUE ADDED, AT CONSTANT (1975) PRICES IN CAPITAL GOODS INDUSTRY, SELECTED YEARS, SOUTHEAST AND EAST ASIA (PERCENTAGES)

COUNTRY	VALUE ADDED AT CONSTANT (1975) PRICES							
	Non-Electrical Machinery (ISIC 382)		Electrical Machinery (ISIC 383)		Transport Equipment (ISIC 384)		Capital Goods Industry (ISIC 382-384)	
	Year I*	Year II*	Year I*	Year II*	Year I*	Year II*	Year I*	Year II*
Hong Kong	1.81	2.59	10.77	10.89	4.13	2.95	16.71	16.43
Indonesia	1.24	0.65	2.28	2.85	3.15	1.44	6.67	4.94
Malaysia	2.49	3.09	6.04	12.00	1.06	2.52	9.59	17.61
Philippines	0.78	1.53	2.96	2.35	4.56	5.09	8.30	8.97
Korea	4.20	2.76	2.35	12.58	1.32	5.04	7.87	20.38
Singapore	5.33	8.73	3.68	28.28	7.41	16.21	16.42	53.22
Thailand	0.86	0.95	0.19	0.76	7.66	6.94	8.71	8.65
Weighted Average	2.17	4.09	8.09	14.87	3.94	7.41	12.67	26.13

*Note:

	Year I	Year II
Hong Kong	1973	1976
Indonesia	1975	1979
Malaysia	1968	1978
Philippines	1963	1977
Korea	1963	1979
Singapore	1967	1980
Thailand	1963	1975

(There is no data on Burma).

Source: UNIDO

Table 14 indicates value added of the capital goods industry in SEEA region, with Korea, Singapore and Hong Kong accounting for 84.2 per cent of the total value added in the region. Philippines was the lowest in this respect. Similarly, Korea, Singapore and Hong Kong accounted for 72.4 per cent (745,000) of the total employment in this sector in the region.

The value added per employee, again, is highest in Singapore ($13,261) followed by Korea ($7,934) and Thailand ($6,656). Philippines is the lowest with $2,506 or 19 per cent of Singapore level. Singapore's labour productivity in 1977 was of the level that of Philippines but with rapid modernization and introduction of high technology industries, Singapore quickly overtook Philippines.

Table 15 shows that lowest value added per employee in most countries in respect of electrical machinery, which indicates that the industry is mainly for assembly operations and not manufacturing. The large intake of workers in this sector also supports this contention.

With the exception of Korea, the capital goods industry in SEEA is dominated by foreign investors. In Singapore foreign ownership accounted for 83, 77 and 75 per cent of total capital invested in electronics, electrical machinery and transport equipment industries, respectively. Overall, Japanese enterprises claimed about one third of the total presence of foreign enterprises in selected Asian countries, as per study of Institute of Developing Economics 1982.

Korea's exports are mainly agricultural machinery for soil preparation (76.2 per cent) and tractors (22 per cent). FAO estimates that developing countries account only for 8 per cent of total world production of modern agricultural machinery. SEEAs farming population use mostly traditional agricultural equipment/techniques. To meet food needs of these countries, agricultural production has to be increased by at least 80 per cent, which world require five-fold increase in use of agricultural machinery/equipment. This indicates large potential in SEEA region for development of agricultural machinery industry to take care of requirements for tilling, harvesting, storage, transport, land development and the like.

TABLE 14

VALUE ADDED OF THE CAPITAL GOODS INDUSTRY,
SOUTHEAST AND EAST ASIA, SELECTED YEARS[1]

COUNTRY	Year	Non-Electrical Machinery (ISIC 382)		Electrical Machinery (ISIC 383)		Transport Equipment (ISIC 384)		Total	
		Value ($'000)	%	Value ($'000)	%	Value ($'000)	%	Value ($'000)	%
Hong Kong	1973	27886	9.3	199688	66.8	71568	23.9	299142	100.0
	1979	96169	10.5	730847	79.6	90726	9.9	917742	100.0
Indonesia	1975	19352	17.2	44055	39.3	48851	43.5	112258	100.0
	1979	41280	16.9	92160	37.9	109920	45.2	243360	100.0
Korea	1963	10769	28.6	11538	30.6	15384	40.8	37691	100.0
	1979	854911	23.2	1692468	45.9	1130986	30.9	3686365	100.0
Malaysia	1968	8167	39.1	6534	31.2	6207	29.7	20908	100.0
	1978	66551	17.4	247191	64.5	69576	18.1	383318	100.0
Philippines	1968	6394	8.4	31458	41.4	38107	50.2	75959	100.0
	1977	26191	13.9	80194	42.7	81544	43.4	187929	100.0
Singapore	1967	4574	21.9	5227	25.0	11107	53.1	20908	100.0
	1980	348131	19.4	946729	52.9	495327	27.7	1790187	100.0
Thailand	1963	1793	18.9	2072	21.8	5619	59.3	9484	100.0
	1975	20236	5.3	217859	56.6	146808	38.1	385003	100.0

[1]Data for Burma are not available.

Source: See Table 2.4.

TABLE ~~3.8~~ 15

VALUE ADDED PER EMPLOYEE IN THE CAPITAL GOODS INDUSTRY
SOUTHEAST AND EAST ASIA, SELECTED YEARS[1]

COUNTRY	Year	Non-Electrical Machinery (ISIC 382)	Electrical Machinery (ISIC 383)	Transport Equipment (ISIC 384)	Weighted Average $
Hong Kong	1973	2383	2773	4113	2,959
	1979	7071	6209	6434	6,312
Indonesia	1975	2199	4236	2531	2,916
	1979	3753	3268	4056	3,671
Korea	1963	792	1154	801	881
	1979	8823	6813	9547	7,934
Malaysia	1968	1305	3267	1696	1,754
	1978	5942	4086	5436	4,536
Philippines	1963	1683	2886	3314	2,899
	1977	1647	2352	3262	2,506
Singapore	1967	2358	2810	2607	2,594
	1980	17320	10805	18157	13,261
Thailand	1963	836	1066	2634	1,525
	1975	2620	5963	10820	6,656

[1]Data for Burma are not available.

Source: See Table 2.4.

The direction of growth of the electronics industry in SEEA has been affected by the strong dominance of foreign investors (except in Korea). Most electronics component factories perform mainly soldering iron operations and concentrate in assembly of integrated circuits and transistors. Material required for assembly is imported from parent companies. Their technology transfer is minimal and the operations remain at low level of technology. There are also hardly any backward and forward linkages and therefore this has been aptly described as an enclave industry. Korea, Singapore, Malaysia and Hong Kong are endeavouring to move out of low-cost, high-volume consumer electronics into the fast expanding world of semi-conductors, telecommunications and computers. This is mainly for:

a) developing their own products and not remaining assemblers for overseas manufacturers; and

b) getting over the problem of increasing labour costs, which has ceased to be an advantage.

Lower-cost producers in Malaysia, Indonesia and Thailand are moving quickly into consumer electronics. China, Japan and United States would be concerned about these developments in SEEA.

Table 16 indicates the position of export of motor vehicles by SEEA countries in 1980. Singapore and Hong Kong are in the field of re-export, while other SEEA countries (except Korea) export mainly bodies, chassis and frames of motor vehicles. Korea exports its own passenger cars. Indonesia, Malaysia, Philippines and Thailand assemble motor vehicles from imported ckd packs. In Korea there has been a rapid localization of parts and components, with Government recognizing this as a potential export industry and therefore encouraging ancilliarization. Instead of moving towards co-ordination for manufacture of a regional car industry, SEEA countries are taken in by the glamour of having their own car industries. This is suicidal as the small demand in each country cannot sustain manufacture of vehicles. Regional co-operation in this sector could be the fore-runners for other similar industrial co-operation schemes. A serious effort needs to be made for this purpose.

TABLE 10

EXPORTS OF MOTOR VEHICLES (SITC 732) SOUTH EAST AND EAST ASIA, 1980

Country	$'000	%
1. Hong Kong	838	0.2
2. Indonesia	4109	1.1
3. Malaysia	6766	1.8
4. Philippines	31534	8.2
5. Korea	118964	30.9
6. Singapore	211244	55.0
7. Thailand	10794	2.8
Total	384249	100.0

Source: See Table 2.4.

In the last decade, SEEA import of capital goods has increased by about nine times at current prices, as may be seen from table 17. The value of export of capital goods between 1970 and 1980 are in table 18; this includes substantial re-exports from Singapore and Hong Kong.

The problems that need to be overcome to enable the capital goods sector to develop further in SEEA relate to product selection, lack of linkages, subcontracting, quality control, R+D, managerial and technical capability, shortage of skilled manpower and lack of design adoptation. Motor vehicles and aircraft manufacturing are examples of inappropriate capital goods industry in SEEA. Government intervention in the capital goods sector is called for, if it is of requisite quality, as is done by Japan's MITI and their Industrial Structure Council. Decisions on industry and technology policies cannot be taken in an ad hoc manner on the basis of inadequate analysis.

Further, electronics industry symbolizes the hollowness of the capital goods industry in SEEA, with its relatively few backward or forward linkages. A purely assembly operation is not of much significance in the long run. Shipbuilding industry in Korea is another such example, wherein there is hardly any advantage of local design capability and of producing associated deck equipment etc.

In the machinery sector in advanced countries subcontracting has proved to be important in reducing costs. An extensive subcontracting network has to be envolved, even on a regional basis, for getting the best out of industrial growth in SEEA. Governments fiscal and other policies would have to be directed towards speedy growth of the small and medium sector industries to provide the ancilliary support to the capital goods sector.

With small and heavily protected markets in the region, SEEA countries would have to depend on exports for which quality products are a must. Quality emphasis would have to be ensured in each of the SEEA countries. Similarly R+D and training of personnel would need high priority in the scheme of industrialization.

TABLE 17

IMPORTS OF CAPITAL GOODS, SOUTH EAST AND EAST ASIA, SELECTED YEARS, AT CURRENT PRICES[1]

($'000)

Year	Non-electrical Machinery (SITC 71) Value	%	Electrical Machinery (SITC 72) Value	%	Transport Equipment (SITC 73) Value	%	Total Value	%
Hong Kong								
1970	160025	33.5	248754	52.0	69205	14.5	477984	100.0
1975	406214	35.7	582109	51.1	150050	13.2	1138373	100.0
1980	1578999	32.4	2317763	47.6	971391	20.0	4868153	100.0
Indonesia								
1970	149687	49.0	52262	17.1	103419	33.9	305369	100.0
1975	824254	46.5	395724	22.3	552944	31.2	1772922	100.0
1980	1855004	51.0	748641	20.6	1030176	28.3	3633821	100.0
Malaysia								
1970	169096	43.2	63581	16.3	158440	40.5	391117	100.0
1975	489360	42.5	354849	30.8	306912	26.7	1151121	100.0
1980	1418409	34.0	1676563	40.2	1073529	25.8	4168501	100.0
Philippines								
1970	242587	56.6	64952	15.2	120736	28.2	428275	100.0
1975	685262	57.0	170065	14.1	347350	28.9	1202677	100.0
1980	1017910	51.5	400529	20.2	559784	28.3	1978223	100.0
Singapore								
1970	275456	49.1	160328	28.6	125554	22.4	561338	100.0
1975	990351	46.5	793287	37.2	346643	16.3	2130281	100.0
1980	2511163	35.6	2894547	41.0	1647380	23.4	7053090	100.0
Korea								
1970	305858	51.9	132892	22.5	150773	25.6	589523	100.0
1975	849508	44.5	512358	26.8	547400	28.7	1909266	100.0
1980	2319091	46.6	1606057	32.3	1049559	21.1	4974707	100.0
Thailand								
1970	220148	47.9	104677	22.8	135078	29.4	459903	100.0
1975	579160	50.8	192106	16.8	369412	32.4	1140678	100.0
1980	984211	42.0	678654	29.0	678592	29.0	2341457	100.0
Burma								
1970	29658	60.5	6628	13.5	12711	25.9	48997	100.0
1975	45648	56.0	9669	11.9	26244	32.2	81561	100.0
1980	62506	52.2	15325	12.8	41984	35.0	119815	100.0
Total	SITC 71		SITC 72		SITC 73		SITC 71-73	
1970	1552515	47.6	834074	25.6	875916	26.8	3262505	100.0
1975	4869757	46.3	3010167	28.6	2646955	25.1	10526879	100.0
1980	11747293	40.3	10338079	35.5	7052395	24.2	29137767	100.0

[1] Data for Burma not available.

Source: See Table 2.4.

TABLE ~~3~~ 18

EXPORTS OF CAPITAL GOODS, SOUTH EAST AND EAST ASIA,
SELECTED YEARS, AT CURRENT PRICES

($'000)

Year	Non-electrical Machinery (SITC 71)		Electrical Machinery (SITC 72)		Transport Equipment (SITC 73)		Total	
	Value	%	Value	%	Value	%	Value	%
Hong Kong								
1970	15359	6.4	213287	88.9	11383	4.7	240029	100.0
1975	98176	14.6	562237	83.7	11694	1.7	672107	100.0
1980	515971	21.6	1849038	77.3	27260	1.1	2392269	100.0
Indonesia								
1970	3584	100.0	n.a.	-	n.a.	-	3584	100.0
1975	14766	46.1	12948	40.4	4345	13.6	32059	100.0
1980	4095	3.8	97143	89.2	7724	7.1	108962	100.0
Malaysia								
1970	12211	44.4	4726	17.2	10556	38.4	27493	100.0
1975	84599	35.4	126556	53.0	27620	11.6	238775	100.0
1980	101393	6.8	1281406	86.3	102399	6.9	1485198	100.0
Philippines								
1970	655	82.0	30	3.8	114	14.3	799	100.0
1975	6777	57.6	2234	19.0	2761	23.4	11772	100.0
1980	12312	10.0	77171	62.4	34213	27.7	123696	100.0
Singapore								
1970	61931	36.4	62100	36.5	46116	27.1	170147	100.0
1975	375008	30.7	620356	50.8	224637	18.4	1220001	100.0
1980	1157667	22.7	3120613	61.1	827208	16.2	5105489	100.0
Korea								
1970	8082	13.5	43733	73.0	8105	13.5	59920	100.0
1975	76276	10.9	440868	62.9	183602	26.2	700746	100.0
1980	364796	10.6	1917558	55.9	1149984	33.5	3432338	100.0
Thailand								
1970	334	42.4	399	50.6	55	7.0	788	100.0
1975	3995	14.0	23283	81.6	1245	4.4	28523	100.0
1980	27502	7.4	331045	88.8	14133	3.8	372680	100.0
Total								
1970	102156	20.3	324275	64.5	76329	15.2	502760	100.0
1975	659597	22.7	1788482	61.6	455904	15.7	2903983	100.0
1980	2183736	16.8	8673974	66.6	2162921	16.6	13020631	100.0

Note : n.a. = not available.
Data for Burma are not available.

Source: See Table 2.4.

However, the fact remains that in SEEA, capital goods sector is growing faster than many other sectors. Till 2000, there are indications that this upswing would be maintained. Under Koreas Five Year Plan (1982-1986), development of high-technology industries, such as electronics, is one of the countrys' key objectives. Singapore is planning reorientation of fiscal incentives for promotion of highly skill and capital intensive producing technologically sophisticated products e.g. computers and peripheral equipment, instrumentation and industrial controls, precision machine tools and accessories, photographic and optical equipment, oil field equipment, aircraft components and special industrial chemicals. Philippines, in turn, is endeavouring to provide a broader and more competitive export base and to promote the development of an efficient domestic intermediate goods industry. Other SEEA countries have less ambitious plans but emphasis would be on agricultural machinery. There is thus not only import substitution but a definite export promotion drive in evidence in SEEA. There are also comparative advantages in this region in production of certain types of capital goods.

Small computers have the brightest potential for growth in SEEA. So also prospects for non-electrical machinery are good. Pumps, heating and cooling machinery, calculating machinery and agricultural equipment can grow fast. There is need to modernize agriculture in this region and as such locally produced agricultural machinery with simple designs would be appropriate. With construction activity picking up, growth of construction machinery sector can also be planned. Instead of motor vehicles, SEEA could focus on automobile components some of which they are already exporting. Other possibilities include ships and boots, trucks, motorized rickshaws and bicycles. The experience of Singapore, Korea and Malaysia in developing their capital goods industries should provide valuable guidelines to assist the other countries in the region.

We now take up the position/prospects of capital goods industry in South Asia. Table 19 shows the position of manufacturing as per cent of GDP in the countries in this region. The share of capital goods industry in manufacturing in Bangladesh, India, Iran and Sri Lanka is contained in tables 20, 21, 22 and 23 respectively. Characteristics of manufacturing sector in Afghanistan are at table 24.

Table 7

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

MANUFACTURING AS PER CENT OF GDP

Country	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Afghanistan*	19.9	20.8	21.4	20.8	22.7	23.1	22.0	...	...	...
Bangladesh	6.0	6.7	7.6	8.2	7.2	7.1	7.1	7.5	7.5	...
India	14.1	15.6	15.6	16.1	15.9	17.0	17.9	17.2	17.2	...
Iran	12.4	10.0	10.7	10.8	11.8	...	...	...	6.1	...
Nepal	9.7	10.0	4.0	4.0	4.3	4.0	3.8	4.0	3.8	3.9
Pakistan	16.0	15.9	16.7	16.6	16.4	16.0	15.8	16.5	16.9	16.7
Sri Lanka	...	...	24.6	23.6	25.5	22.6	19.8	18.2	16.6	...

* Manufacturing includes Mining and Electricity, Gas & Water

Source : 1) Indicators of market size for 131 countries, Dec. 9, 16 & 23, 1983, Business International

2) Key Indicators of Developing Member Countries of ADB, ADB, April 1983

3) Yearbook of National Accounts Statistics, Part-I and Part-II, United Nations, 1975 - 1980

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

SHARE OF CAPITAL GOODS INDUSTRY IN MANUFACTURING - BANGLADESH

		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	A. GROSS OUTPUT AS PERCENTAGE OF MANUFACTURING OUTPUT										
382	Non-electrical Machinery	0.8	0.6	...	0.8	0.3	0.7	0.5	0.7	0.5	0.6
383	Electrical Machinery	1.1	1.0	...	1.0	0.5	1.0	1.2	2.7	2.5	2.5
384	Transport Equipment	1.0	0.3	...	0.7	0.3	1.6	1.7	2.0	2.0	1.3
	B. VALUE ADDED AS PERCENTAGE OF MANUFACTURING VALUE ADDED										
382	Non-electrical Machinery	0.9	0.5	...	0.8	0.3	0.7	0.6	2.0	0.5	0.5
383	Electrical Machinery	1.2	1.1	...	1.3	0.5	1.4	2.0	4.0	3.0	2.8
384	Transport Equipment	1.3	0.2	...	0.6	0.3	1.4	1.3	3.2	2.6	1.9

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

SHARE OF CAPITAL GOODS INDUSTRY IN MANUFACTURING - INDIA

		1970	1973	1974	1975	1976	1977	1978
	A. GROSS OUTPUT AS PERCENTAGE OF MANUFACTURING OUTPUT							
382	Non-electrical Machinery	5.5	7.3	6.1	6.1	6.4	6.1	6.1
383	Electrical Machinery	5.3	6.0	5.7	6.1	6.1	5.6	5.8
384	Transport Equipment	6.7	6.0	5.6	5.2	5.2	4.7	5.2
	B. VALUE ADDED AS PERCENTAGE OF MANUFACTURING VALUE ADDED							
382	Non-electrical Machinery	6.8	5.2	7.7	8.1	8.7	8.6	8.2
383	Electrical Machinery	6.2	8.3	6.9	7.7	7.1	7.3	7.1
384	Transport Equipment	8.2	7.6	7.1	7.0	7.1	6.9	7.3

Table 22

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

SHARE OF CAPITAL GOODS INDUSTRY IN MANUFACTURING - IRAN

		1971	1972	1973	1974	1979	1980
	A. GROSS OUTPUT AS PERCENTAGE OF MANUFACTURING GROSS OUTPUT						
382	Non-electrical Machinery	1.3	2.4	2.7	2.6	2.8	3.1
383	Electrical Machinery	6.3	5.6	6.7	6.8	7.3	4.9
384	Transport Equipment	9.5	11.7	9.8	9.0	8.3	7.5
	B. VALUE ADDED AS PERCENTAGE OF MANUFACTURING VALUE ADDED						
382	Non-electrical Machinery	1.1	2.2	2.4	2.4	2.0	2.6
383	Electrical Machinery	6.2	7.1	7.5	7.4	8.3	4.8
384	Transport Equipment	9.3	6.8	6.4	5.8	5.2	4.9

Table 23 UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

PERCENTAGE SHARE OF GROSS OUTPUT OF CAPITAL GOODS INDUSTRY IN MANUFACTURING - SRI LANKA

Year	382 Non-Electrical Machinery	383 Electrical Machinery	384 Transport Equipment
1970	4.8	3.7	1.0
1971	4.2	3.7	1.0
1972	3.3	4.0	0.9
1973	3.2	3.9	1.0
1974	2.5	3.5	1.0
1979	0.7	2.4	2.3

EXHIBIT-14

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

CHARACTERISTICS OF MANUFACTURING SECTOR - AFGHANISTAN

Sl.No.	Characteristic	Unit	1973	1974
	3 MANUFACTURING			
1	Number of Establishments	Numbers	136	143
2	Average number of persons engaged	Numbers	22743	28138
3	Wages & Salaries of Employees	Million Afghanis	...	715.3
4	Gross Output	Million Afghanis	...	6496.2
	321 TEXTILES			
1	Number of Establishments	Numbers	38	36
2	Average number of persons engaged	Numbers	12555	14243
3	Wages & Salaries of Employees	Million Afghanis	...	290.4
4	Gross Output	Million Afghanis	...	3252.8

contd...

Bangladesh has jute, cotton textile, paper and food products as the main manufacturing industries. A wide range of non-electrical and electrical machinery items were imported. Under transport equipment major imports were rail coaches, passenger cars, automobile engines, bicycles, ships and boats, valued at $89 million in 1979.

In India, engineering industry has achieved steady growth over the years and it has emerged as the ninth industrialized nation with the third largest reservoir of technical and scientific manpower in the world. Self-sufficiency has been achieved in plant and equipment required in the cotton textiles, jute, sugar, chemicals, paper, cement, electrical and a wide range of consumer food industries. The production range includes ships, locomotives, vehicles, general purpose and sophisticated special purpose machine tools, power generators, industrial machinery, agricultural machinery and implements, office equipment etc.

The economy of Iran is predominantly agro-based since the mid-fifties, an industrial climate has been created and at present a wide range of products relating to automobiles, electrical appliances and machine tools sector are being manufactured. Import of transport machinery in 1977 was to the extent of $1.411.9 million constituting 22 per cent of total import of machinery and transport equipment.

Nepal is basically an agricultural country and the main industries are those having backward linkages with agriculture. The production of non-electrical, electrical and transport equipment is negligible. Out of a total import of Rs.1,448.9 million, 31 per cent was for import of machinery and transport equipment.

Bulk of exports of Pakistan relate to agriculture. During 1960-1970, Pakistan's industrial production increased at an average rate of 12.4 per cent but dropped to 3.2 per cent in the first half of the seventies. Of the total import of machinery and transport equipment in 1980, the share of non-electrical and transport equipment was 87 per cent.

A major portion of import of capital goods of Sri Lanka relates to non-electrical machinery. While the private sector covers a wide range of light consumer goods industries, the public sector industries are manufacturing cement, paper, textiles, steel, petroleum refining and fertilizers, mainly for the domestic market. Transport equipment imports were to the extent of $185 million.

Table 25 contains information on import of capital goods in South Asia. Efforts would need to be made by all the countries to achieve import substitution. This is how capital goods industry took roots in Singapore, Korea and Hong Kong. The next step was a quick pick-up of industry leading to exports of capital goods. A cautious approach is required to avoid the mistakes committed by SEEA countries, as enumerated above. In some of the South Asian countries there is not even the existence of a proper infrastructure for industrial growth. These countries should on priority create the infrastructure so that capital goods manufacture could be initiated. Having created the industrial climate - through incentives and the like, and with a proper industrial infrastructure, these countries would come somewhat on par with those which have already acquired it and have even the requisite technological/industrial base.

Regional co-operation in South Asia would help optimal utilization of limited resources of each country - financial, raw material, power etc. Developing countries of this region cannot afford duplication of industrial facilities. Each country with its master plan for industrial growth should try to integrate it with those of the neighbouring countries. UNIDO could provide its expertise for achieving this co-ordination which is so vital for economy in use of effort and resources and also for achieving rapid growth. Lack of this co-ordination created the problems, referred to above, in SEEA countries. The respective Governments would have to provide full support for such an effort.

To relate the experience of India in some detail, it can be said that a very wide industrial base has been created in the country in the last 25 years. Industry is in a position to set up complete power projects on a turn-key basis, build a wide variety of vessels both for defence and

EXHIBIT-28.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

STUDY ON CAPITAL GOODS INDUSTRY IN SOUTH ASIA

IMPORTS OF CAPITAL GOODS

('000 U.S. $)

Country	Year of Reference	Non-electrical Machinery	Electrical Machinery	Transport Equipment	Machinery & Transport Equipment
Afghanistan	1977	9210	14915	28553	52679
Bangladesh	1979	192468	90684	89205	372357
India	1979	861598	288789	312852	1463240
Iran	1977	3549204	1432498	1411944	6393646
Nepal	1980	24244	21869	26686	72798
Pakistan	1980	575429	177450	604931	1357811
Sri Lanka	1980	226454	95002	185052	506509

Source : Asian Industry in Figures, UNIDO/IS. 390 dated June 15, 1983.

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commercial needs and manufacture complete textile mills and sugar plants. This has become possible because of Governments' single-minded pursuit of a policy of import substitution and self-reliance. Capital goods industry accounts for more than 33 per cent of the countrys' annual engineering exports.

The principal demand, in India, for capital goods came from governmental agencies i.e. railways, power, ports, ships and construction organizations. Government ensured steady rise in the allocation of resources for purchase of capital goods, which laid strong foundations for growth of this sector in the future. The engineering industry is in a peculiar position of being both the manufacturer and user of capital goods. A cautious import policy had to be followed which would provide for selectivity in approach in regard to industries that could be exposed to foreign competition. Import should be allowed in special circumstances only e.g. a sudden upsurge in demand which cannot be adequately met by indigenous producers or when the need was for a higher range of products where manufacture was not yet established or the case of products with more modern and economical manufacturing technologies. Custom duty could be varied in such cases of non-availability of machines.

Quite often high cost of indigenous production is due to heavy excise and import duties levied on raw materials. Cost of copper is perhaps 100 per cent higher for the indigenous manufacturer in relation to its counterpart in highly developed countries. So also sometimes with zinc, steel, stainless steel etc. Under-utilization of capacity is also a reason for high cost - may be for lack of demand in view of high cost of power, for instance. Industry would have to play its part in cutting down on costs e.g. standardization and productivity. Institution of national awards to give recognition to workmen/organizations which achieve highest productivity could be useful. Enlightened and progressive managements adopt efficiency - improvement methods including material conservation, training of manpower etc., to ensure complete consumer satisfaction.

If the capital goods industry has to be strong to face emerging challanges the following broad steps would be required:

a) emphasis in training of personnel;

b) take up sub-contracting to an optimal extent;

c) reduce costs through utilization of improved technical processes;

d) improving customer-seller relationship;

e) improvement in sales techniques, provisions of after-sales service and production of literature comparable to standards anywhere in the world;

f) service equipment users in terms of quality, reasonableness of price and delivery rather than reliance on extensive protection;

g) shift emphasis from import substitution to export expansion with units having economies of scale. There is no need to manufacture everything: but countries should specialize in few types based on international requirements: which would also assist in import of required capital goods;

h) constantly update technology and to start with identifying technology gaps. Imported technology should be competitive and a judicious decision should be taken in regard to undertaking R+D indigenously to bridge these gaps vis-a-vis import of technology;

i) co-ordination between national laboratories, universities and industrial units having R+D facilities is necessary;

j) special attention should be given to inventory control: with thorough analysis of requirements of raw materials and spares;

k) soft loans should be provided by financial institutions for replacement/modernization/rehabilitation purposes. These institutions should also assist the manufacturers in improving their liquidity position through adequate provision of packing credits etc;

l) for creating demand, development rebate should be provided as it is a good incentive for promoting industrial growth through capital generation. While investment allowance would attract investment in areas at a given time, for general industry as such, indigenous equipment and machinery could be allowed to be written off in a short period;

m) instead of depreciation on historic cost basis, it should be possible to allocate for depreciation every year, a higher amount commensurate with increase in prices of equipment by suitable system of indices published by government; and

n) deferred payment facilities should be provided for expansion of export.

Capital goods sector of industry is a very vital one which needs to be helped to grow in a scientific and systematic manner. Any wrong steps would be too costly for the economy; which developing countries can ill afford.

IV CHEMICAL INDUSTRY

The growth rate of chemical industry has sharply declined in developed countries - from 11 per cent in the sixties to 2 per cent or less in 1980-1982 mainly due to recession. The projected share in world production in 2000 AD is likely to shift - a decline from 32 per cent to 24 per cent for each of North America, Western Europe and Japan with an increase from 12 per cent to 23 per cent in the rest of the world. Even if the growth overall is less than 3.5 per cent, the share of the less developed countries and resource-rich areas will become inevitable. Trade as a percentage of production would go up from 18 per cent in 1979 to 33 per cent in the eighties and the nineties. The world's chemical market has grown to a $450 billion - a third of it in United States, a third in Europe, a fourth in Japan and the balance in the rest of the world. The export centres of major commodity chemicals may shift to the resource-rich countries viz West Asia, Mexico, Canada and others in the developing ESCAP region e.g. Indonesia, Malaysia, Brunei in South East Asia. The enormous quantities of natural and associated gas which is flared in West Asian and other developing countries like Thailand, India, Pakistan, Bangladesh is an attractive prime feedstock for chemical industries.

There has to be a shift from commodity chemicals to specialities e.g. cosmetics, toiletries, cleansing compounds, paints, printing inks etc. Water treatment and special grade chemicals for the electronic industry and engineering plastics are promising areas of specialization. There has been a reduction of about 8.8 per cent in the input of fuel and power by the chemical industry as a whole in the seventies. In the last 10 years, improvements in efficiency of energy use has been about 23.7 per cent. The new technology for polyolefines not only uses less energy for polymerisation but also needs less power for conversion into fabricated products.

This industry showed a more favourable quantitative growth curve in 1975-1980 than in 1970-1975 in the world as a whole. It confirmed that its traditional capacity to grow is more rapid than industrial output as a whole in view of its typical diversification, difficulty of replacing its products in practically all industrial sectors as well as some consumption sectors, and the particularly innovative characteristics of its products.

In the second half of the seventies, there was a sharp drop of nearly one third in capital investments of the chemical industry in many countries due to completion of investment programmes based on high rate of anticipated consumption. Profitability conditions were also in keeping with the large financial resources made available.

The value of world chemical exports in 1980 rose to $22.1 billion; with an annual average growth rate for the period 1975-1980 at 19.2 per cent against 22.6 per cent for 1970-1975.

Gas oil is the most important raw material next to naphtha. Its share of liquid feedstock for olefine production will be about 20 per cent by 1990. Another prospective feedstock for ethylene production could be methanol as it can be economically produced by countries possessing low cost natural gas. World consumption of methanol is projected to grow at an average annual rate of 4.8 per cent from 10.1 million tonnes in 1979 to 17 million tonnes in 1990. Natural gas will continue to be the main raw material for the production of ammonia, urea, methanol and formaldehyde.

For developing countries chemical industry products account for about 14 per cent of their total import of manufactures and semi-manufactures. Imports constitute 70 per cent of apparent consumption of chemicals in developing countries. Such imports accounted for almost 30 per cent of world trade in chemicals in 1975. The chemical industry made a significant contribution to world trade accounting for about 9 per cent in 1974.

Important inorganic basic heavy chemicals include nitrogen, sulphuric acid, alkalies, chlorine, phosphorous and potash. The organic basic heavy chemicals include lower olefines (ethylene, propelene, butadiene) and the aromatics (benzene, tolene and xylenes). The use of chemicals in the manufacturing sector is expanding rapidly as evidenced by the use of plastics in vehicle manufacture and also building and construction materials.

The chemical industry in developing countries has been characterised by low levels of production confined to a narrow range of products, principally of those basic chemicals required for use in traditional industries e.g.

textiles, leather, food preservatives, and pharmaceuticals, fertilizers, pesticides and paints. Major exporters in developing countries were Republic of Korea and India which exported inorganic and organic chemicals, basic plastic materials, soaps and pharmaceuticals. Indonesia exported basic chemicals, both organic and inorganic and urea fertilizer.

Table 26 indicates the share of world production of finished fertilizers in 1965-1966 and 1984-1985. The world pharmaceuticals production, consumption and trade figures for 1980 are in table 27.

In developing ESCAP countries import of pharmaceuticals is growing fast. In establishing domestic pharmaceutical industries, these countries generally start with formulating. Along with manufacture of pharmaceutical specialities is the increase in import of active ingredients. Production of active ingredients is limited by lack of a developed chemical industry as well as of skilled manpower. India and Republic of Korea have developed a large pharmaceutical base. Significant growth can be foreseen in the developing ESCAP region, mainly in the field of specialities, while also increasing their production of active ingredients.

The development of world pesticides production during 1975-1980 was as follows:

1975	$5.5 billion
1978	$8.7 billion
1980	$11.8 billion

Consumption of pesticides in developing ESCAP region will probably reach an annual increase of 7.8 per cent. Synthetic organics would account for more than 90 per cent of pesticide shipments in 1990. Pesticide production of developing Asian/Pacific countries is mainly characterised by formulations. Substantial capacities have been created in India, Republic of Korea, China and a Pesticide Fertilizer Authority has been set up in the Philippines.

In the ESCAP region, total fertilizer use is largely determined by the results obtained in China and India which together account for about 80 per cent of the regional fertilizer market. Fertilizer use in the region has increased, with urea as the most widely used fertilizer product. India and

Table 26

Shares of world production of finished fertilizers, 1965/66 and 1984/85.

	Nitrogen		Phosphate		Potash	
	1965-66	1984-85	1965-66	1984-85	1965-66	1984-85
Market economies						
Developed	68.2	40.8	74.8	48.2	86.1	51.4
Developing	5.9	19.5	4.1	18.3	0.2	1.7
Centrally Planned economies						
Europe and USSR.	21.2	27.8	17.6	26.8	30.8	45.3
Asia	4.7	11.9	3.5	6.6	0.9	1.5

1/ Trans-National Corporations in the Pharmaceutical Industry of Developing Countries and Trans-National Corporations in the Fertiliser Industry, 1982.

U.N. Centre on Trans-National Corporations, New York, 1983.

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Table - 27

World Pharmaceutical Production, Consumption and Trade, 1980 ($ US million):

	Production 1980 a/		Consumption 1980 b/		Trade 1980 c/		
	$ million	Per cent.	$ million	Per-cent.	Imports	Exports	Balance.
Developed market economies.							
North America	18,600	22.1	14,700	19.6	1,159	2,150	+991
Western Europe	27,440	33.0	25,350	33.8	6,822	10,620	+3,798
Others**	11,970	14.3	12,454	16.6	1,492	418	-1,074
Centrally Planned economies.							
Eastern Europe	15,960	19.1	12,150	16.2			
Total Developed countries.	73,970	88.5	64,650	86.2	9,473	13,187	+3,714
Developing countries:							
Africa	470	0.6	1,730	2.3			
Asia*	4,690	5.6	5,320	7.1			
Latin America.	4,400	5.2	3,300	4.4			
Total Developing countries:	9,560	11.5	10,350	13.8	4,530	602	-3,928
Total World Market	83,530	100.0	25,000	100.0	14,003	13,789	

Source:

a/ United Nations Industrial Development Organisation (1980), Global Study of the Pharmaceutical Industry, (ID/WG.331/6).

b/ SCRIP No.509, 28 July 1980, using the "market" as proxy for consumption.

c/ United Nations: 1980 Yearbook of International Trade Statistics.

* Excluding China.

** Including Japan, Southern European countries and Oceania.

-/-

China are also the only major countries where SSP is the preferred product. The use of mixtures and also chemical compounds is significant in the Republic of Korea, Thailand, India, Malaysia and Sri Lanka. The use of potassic fertilizers in the region is much less intensive than the average for the world. In most countries fertilizers use per hectare has doubled, trebled or expanded even more rapidly during the past decade. The projected demand in the developing market economies of Asia is expected to expand at an average annual rate of 6.6 per cent - a rate which is much faster than the world average. The developing countries in Asia will remain net importers of all fertilizer nutrients. Potash supplies are expected to be significantly increased but demand will continue to grow, thereby increasing the dependency of the region on import.

In the market economies of developing Asia, a large expansion in supply capability of nitrogen fertilizer is foreseen. This increase may be to the extent of 3 million tonnes (from 6 million tonnes nutrients in 1982-1983 to 9 million tonnes in 1986-1987) or 50 per cent over a 4-year period. The largest increase would be India's contribution. Significant expansion of nitrogen capacity is also expected from Indonesia, Pakistan and Bangladesh and to some extent from Burma and Malaysia. This may reduce this region's dependency on nitrogen import but there may be no scope for export. In phosphates, regional demand will increase faster than supply, which is expected to expand after new plants become operational in Indonesia and Philippines.

Many developing ESCAP countries have been pursuing import substitution policies for development of the chemical sector. Several of them have started by importing basic raw materials and intermediates and are engaged in formulations, packing of drugs and pharmaceuticals; in case of fertilizers the accent is on granulation. So also with pesticides. In the case of basic heavy organic chemicals, methanol, phenol, acetone, based on ethyl alcohol and inorganic chemicals, caustic soda, soda ash, India, Republic of Korea, Pakistan, Indonesia, and Iran have set up indigenous capacities. Republic of Korea has a policy of export promotion and has generated large exports of various organic and inorganic chemicals and also drugs and pharmaceuticals. India exported chemicals including plastics, soaps and detergents to the tune of $350 million in 1983. Indonesia exports nitrogen fertilizers. Singapore

and Hong Kong are also export oriented within their small chemical sector. Thailand, Malaysia, Philippines, Bangladesh and Sri Lanka are mainly following a policy of import substitution so as to become self-sufficient in various sub-sectors and also to generate employment. This industry has both forward and backward linkages, with downstream activities in textiles, leather, cement, paper, paints, printing inks, synthetic and man-made fibres and petrochemicals. It has close linkages with agriculture and the health sectors. It is also highly capital intensive and many large multi-nationals are attempting to locate their traditional chemical specialities in the developing region of ESCAP. With increasing regional trade and economic co-operation and greater complementation in ASEAN and SARC there are good prospects for vertical and horizontal integration in this region. Much more needs to be done to foster closer links and overcome attitudinal barriers and the information gaps existing between the various developing ESCAP countries in regard to capabilities that they have achieved in different sub-sectors in recent years.

Twenty five leading chemical multinationals dominate the world market in terms of technology transfer and foreign investments. Most advanced technologies require setting up of large plants which are highly automative and capital intensive. Developing ESCAP region requires medium and small scale plants which can cater to domestic demands and not be capital intensive or highly automated. In some cases technology exported to developing countries has been out-dated. India and South Korea have since developed an R+D base and may be able to share a more appropriate type of technology suited to developing ESCAP countries; with their experience and expertise. There is thus need to start regional institutions to foster greater adaptation for technology transfer and also strengthen ESCAP transfer of technology centre at Bangalore.

Republic of Korea and India can also provide to other sister nations in the region, indigenous technological back up services in tender preparation, pre-investment and feasibility studies, market analysis, selection of contractors, project planning, personnel training, supervision and commissioning. There has to be an effort for technology for development; including development of design and engineering capabilities in process

industries and for greater absorption and development of process know-how through increased R+D. Opportunities for such technical co-operation between developing country institutions and enterprises in design engineering and process know-how need to be fully explored and developed for achieving self-reliance in technology and promoting greater economic co-operation. India and Republic of Korea could help others in their efforts.

In institutes of technology with foreign colloboration set up in India large number of persons have been trained in chemical engineering, process designs and related fields. Other countries in the region have also large trained manpower in this field. There could be sharing of technical educational training and management expertise and facilities among developing countries for setting up chemical technology and management institutes. Large centres of excellence in the field of development of skills, education and training could be set up on regional/sub-regional basis.

Infrastructural base has also to be speedily developed so that chemical and other industries could thrive. So also is the role of financial institutions in view of capital intensive nature of this industry. These institutions must be strengthened, wherever necessary by the concerned Governments.

The chemical industry being a catalytic segment has a significant bearing on the national industrial strategy of ESCAP countries. Its rate of growth has been about 50 per cent higher than the industry growth rate as a whole and it has both backward and forward linkages with agriculture, industry and public health. By 2000 AD, the developing countries would have over 72 per cent of world population (6.5 billion) and ESCAP region accounts for more than half of the global population. To feed the growing population, a massive spurt in fertilizer and pesticides usage will become inescapable. The growth of fertilizers and pesticides industry as well as pharmaceuticals (production, formulation, packaging and distribution to maintain increasing standards of public health) will be of paramount concern to the developing ESCAP countries during the eighties and the nineties.

The share of developing countries may go up to 17-25 per cent of world production of drugs and medicines by 2000 AD. Developing countries are likely to consume 22-34 per cent of global consumption by that year. Among the chemical sub-sectors, fertilizers, pesticides, drugs and pharmaceuticals are expected to show a higher sustained rate of growth than basic and industrial organic and inorganic chemicals in the eighties in ASEAN, SARC sub-regions. The consumption of fertilizers is closely linked with prices obtaining after the second oil shock of 1979. There is comparatively little price elasticity in the case of drugs and pharmaceuticals. In regard to basic and industrial chemicals, price elasticity factor is significant as these products are used in downstream processing. This industry is also subjected to cyclical fluctuations, except drugs and pharmaceuticals, as it has close linkage with other industries and agriculture.

If the region could pool its resources to set up large plants to achieve economies of scale, there is no reason why its exports could not be increased manifold. It would however, be necessary to streamline the working of this industry on an optimal efficiency basis through appropriate and modern technology and the induction of modern systems, practices, planning, monitoring, performance budgeting, apraisal and performance audit. As this industry is highly R+D oriented, stress would be required on R+D to ensure innovation, technological up-grading and avoidance of obsolescence.

Many of the smaller developing countries e.g. Nepal, Bhutan, Maldives, Afghanistan can benefit from the reservoir of skills and expertise together with plant and equipment manufacturing capacities for setting up chemical units from India, Republic of Korea and possibly Indonesia in the fertilizer sector and from India and Republic of Korea in drugs, pharmaceuticals, organic and inorganic chemical sectors.

UNIDO would be in a position to provide technical assistance in development of chemical industry in the areas relating, among others, to feasibility and investment studies, establishing paper, pulp, pharmaceutical, basic chemicals, fertilizers, solar salt and basic chemicals from salt units, petrochemical complexes and improvement in processes involved; improvement in fabrication of plastics and rubbers, market evaluations and quality control,

testing and standards. UNIDO could also assist developing countries in setting up of appropriate demonstration plants and on request in encouraging participation of foreign companies in chemical industries in developing countries. Such assistance should be aimed at promoting arrangement for sharing of technological know-how and managerial skills and marketing of products. It could assist in promoting dissemination of information to enable both developing and developed countries to exchange information on potential projects and encourage dissemination of technical and economic documentation of mutual interest. For fertilizers, role of mineral raw materials is important and here UNIDO could undertake/promote geological surveys; etc.

V WOOD PRODUCTS INDUSTRY

Wood products industry includes manufacture of shaped or simply - worked wood items, plywoods and veneers and other products made chiefly of wood. This industry is based mainly on natural raw materials. The demand for wood products comes from downstream activities e.g. furniture making, construction and hand tool assembly. A relatively minor user of raw materials is a segment of the industry which produces final products such as picture frames, household utensils and decorative items. An important aspect of the industry is the aesthetic value of the end-product and for decorative items, for instance, the artistic appeal content determines the market penetration. Colour, grain, etc. are important factors in exposed/finished woods as in furniture making and construction industries. Thus many countries import certain variety of wood and wood products while exporting others.

The higher income group of developed market economies accounted for almost 90 per cent of world consumption of wood products in 1977; with developing countries being net exporters of wood products, exporting about 7 per cent of their production. Dominant producers of wood products are Canada, the EEC, Japan, Sweden and United States, all of which have their own main supply of natural raw materials. Together they account for almost three fourths of all production. Major producers in developing countries include Argentina, Brazil, Malaysia, Philippines and Thailand. Total exports of developing countries amounted to $2.34 billion in 1977 which is 18 per cent of world trade. Japan, Republic of Korea and Singapore are the major exporters of wood and wood products that base their domestic industries on imported raw materials.

Whereas the development of wood and wood products industry is not seriously affected by trade restrictions in major importing countries, this does not imply that exporters in developing countries can regard the developed market economies as dependable and growing outlets. The main purchaser of wood and wood products is the construction industry. High interest rates and the general economic slow down recently had a serious impact on this industry in one of its biggest markets i.e. United States and elsewhere. Such developments and related demand for new buildings will continue to affect

world demand for wood and wood products in the future. Inspite of these set-backs the industry continues to hold promise for the developing countries, especially those endowed with requisite natural resources.

Although not on the frontries of technology in the same sense as the electronics industry, wood processing sector has had to adapt to both changing economic conditions and supplies of raw materials. This has resulted in changes in technology of production and uses of wood products. Introduction of laminates made from small pieces of wood which would not have been usable for solid wood products a few years ago, is one such instance. New types of panels which are given enhanced structural properties by orienting fibres in ways which give them greater strength than would be the case for ordinary particle board panels, is another example. Both these new developments tend to substitute technology and capital for raw material.

Government programmes in encouraging exports have helped the primary sector in Japan, Republic of Korea, Indonesia and Malaysia. There are in some countries restrictions on log exports and also programmes to assist large scale primary wood processing units. Secondary wood processing has not been as heavily assisted/protected; except for Taiwan which has shown growth in secondary processing viz furniture and joinery products.

The following characteristics deserves special attention for fast development of the wood processing sector in this region:

a) where forest resources are abundant this helps raising living standards;

b) new methods of preservation, harvesting and processing have increased the usefulness of wood raw materials in construction of low cost housing and agricultural and commercial buildings;

c) it keeps rural development in view of its decentralized nature;

d) scale economies do not dominate this sector; hence suitable for developing economies; and

e) it is not capital intensive.

Effective forest management is of great importance for this industry in terms of its long term viability. Government programmes in this respect would be of particular significance.

To an increasing degree the by-products from processing at each stage of the production chain are important raw materials for the particle board, fibre board, oriented stand board industries as well as for use in paper production or as energy raw materials e.g. pelletized compressed sawdust or raw waste wood burned in furnace to provide energy for a kiln or other thermal or even electrical operations. The processing of waste materials into reconstituted wood panels may be referred to as the tertiary processing sector.

The forests of Indonesia, Malaysia and the Philippines have more homogeneous growths of timber species than other tropical Asian countries. These three countries have sold logs to producers in Japan, Republic of Korea, Singapore, Hong Kong and Taiwan. With increasing restrictions on export of traditional timber species (in log form) from timber surplus countries of Asia, problems will arise in the supply of wood to existing manufacturing facilities in timber deficit countries of Asia. There are also problems of rising log prices and declining markets. It is for instance to be seen whether the fairly extensive retooling investment necessary to convert the Japanese plywood industry to softwood raw material will be undertaken. Further R+D facilities have been devoted to determining ways and means of using commercially less accepted species. Developing countries in the region are gradually becoming wood-processors and thus there is a structural shift from the traditional wood processors to new ones.

Indonesia leads in the manufacture of veneer and plywood (primary sector) with the total installed capacity of 2,693,000m^3. More capacity is proposed to be built up. The Philippines and Malaysia in an effort to encourage more advanced wood processing activities have not programmed for any new sawmill or plywood/veneer plants. Both countries may allow modernization and/or expansion of existing capacity. The particle board and fibre board manufacturing industries have not developed to the same extent as plywood and veneer industry among countries in this region due to high capital requirements and also limited market for these products in the developing countries of the region.

The following are the main characteristics of the secondary wood processing industries in the developing ESCAP region:

a) the industry is highly fragmented and thus decentralized - mainly family owned;

b) technology varies from hand tools to fully mechanized factories;

c) product specialization is only in export oriented production;

d) quality levels of products correspond to the minimum quality levels acceptable in the domestic markets;

e) use of inadequately seasoned lumber pre-dominates, leading to low grade workmanship;

f) poor machinery lay-out, undesirable housekeeping practices and antiquated production techniques combine to cause low productivity;

g) packaging of furniture and wood works products is not such as to reduce transportation costs;

h) production costs are high in view of inadequate industrial infrastructure in rural areas; combined also with low productivity;

i) inadequacy of competent designers and product engineers; and

j) R+D findings do not get implemented in view of technical/financial inadequacy of the entrepreneurs.

Table 28 indicates the position of gross outputs value added and gross fixed capital formation in selected Asian developing countries. This shows the trend of growth. Table 29 contains the productive closed broadleaved forests and growing stock of timber in tropical Asia in 1981.

The strategy to be adopted, by developing countries in this region, to achieve optimal results in this sector and rapidly, should take the following factors into account:

a) an integrated planning approach is required to create equitable balance between upstream and downstream industries;

b) a major influencing factor for industrialization is development of infrastructure, which would for instance provide spontaneous growth of furniture industries in rural areas. A spurt in construction activity will boost up this sector, which constitutes about 50 per cent of construction needs;

c) this local material-based industry can provide great impetus to the small scale sectors growth; providing large employment possibilities;

d) commercially viable species, in the present context of improved technology, have to be identified for commercial exploitation;

e) technology application should be such that wastages are minimized if not eliminated;

TABLE 15 GROSS OUTPUT, VALUE ADDED AND GROSS FIXED CAPITAL FORMATION: SELECTED ASIAN DEVELOPING COUNTRIES

	China (million Yuan)	Burma (million Kyats)	India (million Rupees)	Indonesia (million Rupiahs)	Peninsular Malaysia (million Ringgits)	Sabah (thousand Ringgits)	Sarawak (million Ringgits	Papua-New Guinea (thousand Kinas)	Philippines (million Pesos)	Thailand (million Bahts)
I. WOOD PRODUCTS (ISIC-331)										
A.Gross output	Unknown	Producer values	Factor values	Producer values	Factor values	Factor values	Unknown	Factor values	Producer values	Producer values
1970	n.a.	71 a/	780	2,670	332	10,114	92.02	15,701	659	1,168
1977	n.a.	84 b/	1,932	71,300	1,120 b/	60,225	192.60	35,850	1,742	n.a.
1979	2,243 d/	n.a.	2,152 c/	182,100	1,471 c/	72,354 c/	221.55 c/	39,542	n.a.	n.a.
B.Value added	Unknown		Factor values	Factor values	Factor values	Factor values	Unknown	Factor values	Producer values	Producer values
1970	n.a.	n.a.	183	920	118	4,256	38.41	8,205	254	320
1977	n.a.	n.a.	455	25,620	347 b/	24,959	77.55	16,205	505	n.a.
1979	n.a.	n.a.	493 c/	57,400	514 c/	29,376 c/	93.96 c/	21,425	n.a.	n.a.
C.Gross fixed capital formation										
1970	n.a.	n.a.	n.a.	100	39-57	1,601	3,760	n.a.	67.2	n.a.
1977	7	n.a.	94	21,370	74 b/	n.a.	n.a.	n.a.	75.6	n.a.
1979	13	n.a.	n.a.	8,090	4 c/	n.a.	n.a.	n.a.	n.a.	n.a.
II. FURNITURE EXCEPT METAL (ISIC-332)										
A.Gross output	Unknown	Producer values	Factor values	Producer values	Factor values	Factor values	Unknown	Factor values	Producer values	Producer values
1970	n.a.	56 a/	146	640	25	2,183	4.02	326	56	114
1977	8,785	59 b/	184	4,200	60 b/	4,795	6.92	424	410	n.a.
1979	10,011	n.a.	196 c/	5,800	95 c/	6,097 c/	6.47 c/	9,224	n.a.	n.a.
B.Value added			Factor values	Factor values	Factor values	Factor values	Unknown	Factor values	Producer values	Producer values
1970	n.a.	n.a.	42	230	7	1,044	1.73	169	27	44
1977	n.a.	n.a.	48	1,920	23 b/	2,049	2.22	198	133	n.a.
1979	n.a.	n.a.	46 c/	2,500	37 c/	2,605 c/	2.08 c/	4,144	n.a.	n.a.
C.Gross fixed capital formation										
1970	n.a.	n.a.	n.a.	0	0.59	83	125	n.a.	0.7	n.a.
1977	n.a.	n.a.	10	750	4 b/	926 e/	n.a.	n.a.	21.4	n.a.
1979	n.a.	n.a.	8 c/	920	10 c/	n.a.	n.a.	n.a.	n.a.	n.a.

Legend: n.a. - data not available

a/ Data for 1972 used
b/ Data for 1976 used
c/ Data for 1978 used
d/ Data for 1980 used
e/ Data for 1975 used

Source: UNIDO Data Base

Coniferous forests										
Bangladesh	-	-	-	-	-	-	-	-	-	-
Bhutan	340	170	N/A	510	9.10	94	19	-	113	13.65
India	547	123	2,477	3,147	56.14	84	7.5	379	470.5	56.84
Nepal	145	70	-	215	3.84	17.4	4.2	-	21.6	2.62
Pakistan	250	175	410	835	14.89	61	12	66	139	16.80
Sri Lanka	-	-	-	-	-	-	-	-	-	-
SOUTH ASIA	1,282	538	2,887	4,707	83.97	256	43	445	744	89.91
Burma	88	28	-	116	2.07	13.6	2.8	-	16.4	2.00
Thailand	165	N/A	-	165	2.94	10	-	-	10	1.21
CONTINENTAL SOUTHEAST ASIA	253	28	-	281	5.01	24	3	-	27	3.21
Brunei	-	-	-	-	-	-	-	-	-	-
Indonesia	-	160	-	160	2.85	-	12.8	-	12.8	1.56
Malaysia	-	-	-	-	-	-	-	-	-	-
(Peninsular Malaysia)	-	-	-	-	-	-	-	-	-	-
(Sabah)	-	-	-	-	-	-	-	-	-	-
(Sarawak)	-	-	-	-	-	-	-	-	-	-
Philippines	-	190	-	190	3.40	-	18	-	18	2.19
INSULAR SOUTHEAST ASIA	-	350	-	350	6.25	-	31	-	31	3.75
Kampuchea	4	4	-	8	0.14	0.6	0.3	-	0.9	0.12
Lao	100	N/A	-	100	1.78	10	-	-	10	1.21
Vietnam	100	10	-	110	1.96	8	0.6	-	8.6	1.04
CENTRALLY PLANNED TROPICAL ASIA	204	14	-	218	3.88	19	1	-	20	2.36
Papua-New Guinea	35	15	N/A	50	0.89	4.9	1.3	-	6.2	0.76
TROPICAL ASIA - TOTAL	1,774	945	2,887	5,606	100.00	304	79	445	828	100.00

Source: Forest Resources of Tropical Asia, FAO, 1981.

TABLE 2. PRODUCTIVE CLOSED BROADLEAVED FORESTS AND GROWING STOCK OF TIMBER IN TROPICAL ASIA
(as of beginning of 1981)

Country	PRODUCTIVE FOREST AREAS (thousands of hectares)					GROWING STOCK (VOB) (millions of cu.m.)				
	Undisturbed	Logged	Managed	Total	% of Tropical Asia	Undisturbed	Logged	Managed	Total	% of Tropical Asia
Broadleaved forests										
Bangladesh	45	10	795	850	0.44	5.5	0.6	62.4	68.5	0.22
Bhutan	860	455	N/A	1,315	0.68	214	47	-	261	0.85
India	4,855	4,033	29,440	38,358	19.99	489	115	1,984	2,588	8.44
Nepal	740	315	-	1,055	0.55	68.7	12.9	-	73.6	0.24
Pakistan	175	45	-	220	0.11	28	2.9	-	30.9	0.10
Sri Lanka	13	1,213	-	1,226	0.64	2.6	73	-	75.6	0.25
SOUTH ASIA	6,718	6,071	30,235	43,024	22.42	800	251	2,047	3,098	10.10
Burma	14,107	5,590	3,419	23,116	12.05	2,536	745	513	3,794	12.37
Thailand	3,915	N/A	-	3,915	2.04	315	-	-	315	1,03
CONTINENTAL SOUTHEAST ASIA	18,022	5,590	3,419	27,031	14.09	2,851	745	513	4,109	13.40
Brunei	270	17	-	287	0.15	81	2.5	-	83.5	0.27
Indonesia	38,915	34,620	40	73,575	38.34	10,311	3,499	-	13,810	45.03
Malaysia	7,529	55,524	2,499	15,552	8.11	2,194	985	556	3,735	12.19
(Peninsular Malaysia)	(1,784)	(3,564)	(459)	(5,807)	(3.03)	(576)	(727)	(119)	(1,422)	(4.64)
(Sabah)	(1,920)	(1,280)	-	(3,200)	(1.67)	(601)	(200)	-	(801)	(2.61)
(Sarawak)	(3,825)	(680)	(2,040)	(6,545)	(3.41)	(1,017)	(58)	(437)	(1,512)	(4.93)
Philippines	3,000	3,700	-	6,700	3.49	915	610	-	1,525	4.97
INSULAR SOUTHEAST ASIA	49,714	43,861	2,539	96,114	50.10	13,501	5,097	556	19,154	62.46
Kampuchea	4,610	510	-	5,120	2.67	1,060	102	-	1,162	3.79
Lao	2,880	N/A	-	2,880	1.50	634	-	-	634	2.07
Vietnam	1,500	2,170	-	3,670	1.91	330	369	-	699	2.28
CENTRALLY PLANNED TROPICAL ASIA	8,990	2,680	-	11,670	6.08	2,024	471	-	2,495	8.14
Papua-New Guinea	13,815	220	N/A	14,035	7.31	1,796	15	-	1,811	5.90
TROPICAL ASIA - TOTAL	97,259	58,422	36,193	191,874	100.00	20,972	6,579	3,116	30,667	100.00

f) marketing being a vital factor, a factories - approach in cluster zones should be encouraged - with centralized marketing through co-operatives, if feasible;

g) dispersal of the industry should be encouraged; away from metropolitan areas;

h) training should be given high priority, for developing rural craftsmen's skills, for instance. Vocational institutions should be set up and inplant apprenticeship encouraged. There should be a shift toward female workers so as to provide supplementary source of family income;

i) product specialization may be aimed on country/region basis;

j) innovative oriental/classical designs of products of continuous process factories be evolved, keeping the price factor in view. If necessary, large firms could purchase design and production techniques from Western companies;

k) industrial design courses in furniture-making may be introduced in technical schools and competitions organized for evolving standards. There could be national awards for furniture designing to boost up exports;

l) roving trade fairs may be organized for sales promotion and also with a view to increasing per capita consumption of wood;

m) middleman should be eliminated by better organization of timber markets;

n) credit, both short and long term, should be easily available for this sector on favourable terms. Extension services should be provided, including for delivery of speedy loans;

o) technical seminars and study tours could be organized with assistance of UNIDO, in addition to technology/design inputs;

p) with hardly any advantages of economies of scale, both large and small scale units can co-exist. There could be low cost automation and quality control: large firms could extend wood seasoning services to small units;

q) a low cost dust collection system be evolved, in the interest of maintenance of health of workers. There should be periodic medical check up also for the workers;

r) adequate light and protective guards should be provided for the workers;

s) UNIDO could help in setting up common facility centres in cluster zones;

t) gluing techniques should be perfected, eliminating the conventional nailing for assembly components. Wet grinding should be implemented instead of the dry process.

By the turn of the century, developing ESCAP countries, with integrated planning, can take a large share of the world trade in wood products. There are advantages of resources as well as manpower and with an efficient small/medium sector operation and effective marketing, there is great scope for rapid growth of this industry particularly in developing ESCAP countries with timber resources.

VI MAIN ISSUES FOR THE WORKSHOP

This internal brief on the developing countries of ESCAP region has been prepared on the basis of the following reports submitted by experts:

Iron and Steel Industry - Dr. G. Mukerjee

Capital Goods Industry - Mr. Lim

Capital Goods Industry - Mr. Dhall

Chemicals Industry - Mr. Agarwal

Petrochemical Industry - Dr. Faruqui

Wood Products Industry - Mr. Weeks

(brief version: detailed report with tables under preparation)

Sections I to V of this brief contains a resume of the observations made by the experts in their above-mentioned reports and other relevant material readily available.

The developing ESCAP region comprises of Afghanistan, Bangladesh, Burma, Hong Kong, India, Indonesia, Iran, Republic of Korea, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka and Thailand. This region has tremendous growth potential as has been clearly brought out by the Sectoral Studies undertaken by these experts. If the Lima Target has to be achieved by turn of the century, this region would have to play an increasingly important role in industrialization of the developing world. Their performance of the recent past, the rich natural and other resources, the committment for growth and the spreading industrial culture gives the confidence that, with requisite technical and financial support, these countries can even now become pace-setters in some industrial sectors. The problems of unemployment in this thickly populated area could be solved to a great extent in the process of setting up mainly small and medium size industries, adopting the most appropriate technologies. The quality of life for the large masses needs to improve in this region and with creation of a proper environment of growth, this could be achieved in the foreseeable future.

Regional co-operation has to become an act of faith, and it makes economic sense too. Sub-regional co-operation, in some respect, already exists. Details have been furnished in Sections I to V.

Though the problems of each of the industrial sectors referred to earlier are different, there are certain common issues which could be dealt with together on a regional/sub-regional basis. Some of these issues which should be tackled on priority, in the context of overall strategy for the decade of the nineties and more particularly for the second half of the present decade, are indicated below:

a) sharing of raw material resources as well as semi-finished/intermediate/finished goods so that complementary manufacturing facilities of optimal size could be set up in each country;

b) entrepreneurial development programmes which could be conducted in specialized institutes set up/to be set up for this purpose. As small and medium industries are viable in most sectors, entrepreneurial skills have to be developed for laying the foundation for healthy industrial units. The educated youth is today looking more towards self-employment rather than taking up jobs. This trend needs to be encouraged for industrialization. The National Institute for entrepreneurship and small business development at New Delhi, for instance, could be utilized on a regional basis, with UNIDO support, for such training programmes;

c) technical education to develop skills is a must. Adequate skilled manpower is not available in all developing countries in this region to take care of increasing requirements and hence the need for strengthening/ establishing a chain of technical institutes, with UNIDO/ILO assistance. In-plant training can also be provided by the relatively large industrial houses in this area as it would be in their interests also. Service sector in electronics for instance, which is a fast growing industry is lagging behind and it would be in the interest of electronics manufacturers to train persons for providing after-sales service etc. in the remote areas by setting up their own small workshops. Similarly for overcoming managerial deficiencies, Institutes of management would have to be set up/strengthened;

d) extension services in this vast region have to be professionalized. The existing machinery has to be upgraded, wherever necessary so that entrepreneurs get assistance in their respective areas at low cost. The experience of Small Industry Development Organization (SIDO) of India, with its network of Small Industry Training Institutes, Test Houses, Product Development - cum - Training Centres, Prototyp Development

Centres, Tool Rooms, Sub-contracting exchanges and the like would be of relevance for repeating on a regional basis. The facilities at Small Industries Extension Training Institute, Hyderabad which is already training persons from various developing countries could be further expanded. SIDO with the assistance of UNIDO could work out details of setting up several complementary facilities in the region;

e) determining size of industrial units to be set up and the technology to be adopted for the purpose. The experience of developing countries could be shared and with UNIDO expertise in technology, appropriate technology could be brought in. World scale plants of capital intensive nature are not necessarily in all fields. Small and medium industries to meet domestic demand to start with are urgently required. Export expansion could also be planned, wherever feasible. UNIDOs activities such as System of Consultancy, Programme of Industrial Studies and Research, Programme for Development and Transfer of Technology including monitoring and disseminating information on emerging technologies through Industrial and Technological Information Bank (INTIB) and its Technological Information Exchange Scheme (TIES) would be of great assistance to the region. UNIDOs technological information exchange network could provide information on:

i) option available for choice of process and technology;
ii) choice of suppliers;
iii) choice of reliable consultants when required;
iv) terms of transfer of technology;
v) modality of transfer, and
vi) steps to be taken for minimizing risks by selecting best option based on information on costs and prices of materials, equipment and services.

UNIDO is also currently working on formulating a set of guiding principles for enterprise to enterprise co-operation among developing countries based upon a framework of more equitable relationships than prevails in the present international order;

f) UNIDOs programme of technical co-operation, particularly offering of expertise and equipment in these important industrial sectors and also industrial planning, project development and preparation of technology policies should be intensified in this region. Regional testing centres

for raw materials such as at UNIDO assisted Sponge Iron (India) Ltd., which brought about a break-through in steel technology, should be fully made use of. Similar facilities could be set up for other industrial sectors. Know-how acquired by these countries should be passed on to others through a system of patent/licenses to be operated by such centres which should also provide consultancy, design development, detailed engineering services and procurement/supply of equipment, installation and commissioning, if required. Integrated assistance has to be offered by UNIDO to industrialize this region, including strengthening of R+D;

g) creation of capacities should be rationalized so as to avoid duplication and consequent waste of effort and investment by developing countries. Self-sufficiency may be a good goal but it need not be achieved in all respects and for all items. In steel for instance, there could be complementarity in production of various qualities and sections of steel so also for chemicals, fertilizers, insecticides etc. The master plans of development of various countries need to be integrated through a process of consultation resulting in consensus. With scarce raw material, manpower and financial resources, rationalization in the matter of creating fresh capacities is a necessity. UNIDOs expertise could be used by developing countries for this purpose too;

h) industrial financing has to be put on a proper footing, by availing of expertise of the relatively developed countries among the developing ones. Development Banks ir the region should have closer consultation so that areas of co-operation could be identified including training of personnel and each country could learn from the experiences of others in the field also of industrial financing. As a matter of Government policy, the resources of financial institutions should be strengthened so that an enlarged programme of term credit can be implemented. Commercial Banks should also be advised to give full support to industries by providing working capital on liberal terms. Export-Import Banks should be set up, wherever required, urgently. Their lines of credit to less developed countries should be such that these can be availed of promptly. UNIDO could provide assistance of foreign financing agencies for capital intensive projects which cannot be fully financed by domestic financial institutions.

Industrial sickness is one area in which exchange of information would be of value, as it would then be possible to avoid mistakes in the future. Special facilities would need to be offered by Development

Banks for modernization/rehabilitation wherever justified. In the modern world, obsolescence is a common occurence and therefore in the choice of technologies which is an important factor, Development Banks should be able to guide the entrepreneurs. The Development Banks and UNIDOs Technology Wing would also need to work together for providing the right direction to technology growth, which should not be just a spin-off of economic development;

i) international sub-contracting exchanges would have to be set up with UNIDO assistance in some centres in this region to bring the buyers and sellers together. International sub-contracting implies all export sales of articles which are ordered in advance and where the giver of the order arranges the marketing. Sub-contracting in technical aspects of production would include sub-contracting processes, components or whole products. The type of firm giving the sub-contract is important that is whether it is producer firm or retailing firm. A wide range of possibilities exist with regard to the business relationship between the principal and the sub-contractor. Developing countries should take advantage of the present situation in which certain costs are high in developed countries which prefer to sub-contract some activities in manufacture to developing countries. This could result in long-term tie-ups giving a spurt to industrial activity in developing countries of this region;

j) UNIDOs expertise in infrastructure development could also be availed of by some countries in this region so as to bring about rapid development of industrial infrastructure which is so necessary for industrial growth. India's experience in backward areas development, with incentives for infrastructure development, could also be of interest to countries concerned;

k) advice would be required by developing countries on setting up/sharing of upstream and downstream industries in the various industrial sectors under consideration in this paper particularly petrochemicals. UNIDO experts could provide some broad guidelines in this respect;

l) sales promotion is a vital activity in the industrial growth process. For petrochemicals sector for instance a massive sales promotion effort is required for downstream industries. There has to be close consultation among developing countries on the methodology to be adopted for sales promotion/marketing so that there is no stagnation in industrial activity.

UNIDO could engage consultants in this area for providing advice sector by sector on a somewhat continuous basis;

m) liberalized licensing and other regulatory procedures and adequate fiscal policy support by the governments would have to be provided for encouraging setting up of industrial units in these five sectors.

In the above context, the forthcoming UNIDO/ESCAP workshop on certain industrial sectors in developing ESCAP countries assumes special significance and relevance. This is the most opportune time to hold such a workshop which could come up with a specific Action Plan for meeting the challenges of growth in these countries. Implementation of the Action Plan would help achieve rapid industrial growth in the second half of the current decade keeping in view the overall strategy for the decade of the nineties. The workshop should be so structured that a consensus could be arrived at on major issues concerning these five vital industrial sectors. The initiative taken by the Sectoral Studies Branch of UNIDO in this respect would bring forth valuable suggestions for an integrated and speedy industrial growth of the area in question. A meeting between UNIDO and ESCAP representatives should take place to work out the modalities for holding the workshop.

To facilitate evolving consensus among developing countries on important policy and other issues which would finally be implemented by all concerned, it would be necessary that the developing countries at this workshop are represented by their respective Ministers in charge of industries/finance. They could be accompanied by government experts in these sectors and a senior official of their National Development Bank. The workshop after its opening session could be broken up into three groups viz steel and capital goods, chemicals including petrochemicals and wood products. The group reports could be finalized in two days and a combined session could be held on the third day to take final decisions.

Considerable preparatory work would have to be done by UNIDO/ESCAP so that in this three-day workshop requisite decisions could be arrived at. UNIDO representatives in the developing countries of ESCAP would have to suitably brief the Government agencies concerned so that their delegations come fully prepared for the workshop. A small UNIDO/ESCAP working group would have to be set-up to organize follow-up action on the decisions taken.

For the workshop, necessary data has already been collected in the shape of reports of experts and this brief. It should be possible now to prepare a short paper spelling out the main issues for consideration at the workshop, which could be held in mid-1985 at the latest.

N.B. Aide Memoire appended as discussed on 7 November 1984.

November 1984

Appendix I

AIDE MEMOIRE

Workshop of Ministers of Industry of
Developing Countries of ESCAP Region on
Accelerating Growth Through Co-operation in Selected
Major Industrial Sectors

Organized by

UNIDO and ESCAP
in co-operation with
the Government of (Host Country)

(venue), 1 - 4 July 1985

1. Background

UNIDO had recently commissioned a set of Sectoral Studies on iron and steel, chemicals including petrochemicals, capital goods and wood products industries. The major objective of these studies was to provide a review and analysis of past developments (1970-1982), present situation, basic problems and future trends and prospects (1985-1990 and if possible 1990-2000) in these sectors. On this basis, possibilities of extension, modernization and development of local capacities had to be identified, spelling out clearly the main constraints and obstacles. The studies had also to aim at presenting the impact of development of these industries on the overall economic progress including the fulfilment of various specific policy objectives, such as the four major directions of industrial policy reorientation recommended by ESCAP Ministers of Industry meeting held in 1977 as well as other issues related to the role of industry in the implementation of regional strategy for the Third United Nations Development Decade. To recapitulate, the 1977 meeting recommended the strengthening of linkages between agricultural and industrial development, between large and small scale industries, location of industries away from metropolitan areas and orientation of industries to satisfy the basic needs of the population. The regional strategy, on the other part, relates to rapid progress and balanced expansion in industry (the manufacturing growth target for the developing ESCAP region was set at 8.9 per cent annually), production consistent with shifts in demand patterns, increased application of labour-intensive methods, strengthening of forward and backward linkages, etc.

The experts selected for undertaking these studies have since completed the work and have submitted their reports. The reports contain information/suggestions relating to:

a) policy implications, import substitution and export promotion, external and domestic markets, upstream and downstream linkages, specialization and diversification in these sectors;
b) technological issues related to the type of technologies used, degree of adaptation, technological back-up services, research activities, local manufacturing of equipments, etc.;
c) constraints of skill, education and training and the steps to be taken to overcome them;

d) problems of size and scale economies, infrastructure, management, planning, financing, capacity utilization, marketing and quality control;
e) environmental and other special problems;
f) aspects of strategy at the national, sub-regional and regional levels for establishment and development of these industries as a base for co-operation and plan harmonization;
g) relationships between national development strategies and sectoral strategies;
h) development goals, government plans and programmes in these industries in each country, trends observed and specific factors determining demand;
i) medium-term projection of demand (until the year 1990) and thereafter to the extent possible, by individual countries and overall for the region;
j) employment and investment implications for these sectors of industry;
k) characteristics of observed demand (stability, shifts, price elasticities, cycle etc.) and the present supply-demand gap, implications, required activities to reduce gap, project identificatior etc.; and
1) scope for regional and/or sub-regional co-operation and if possible, harmonization.

2. Objectives of the workshop

One of the main objectives of the workshop is to assist officials in charge of national development programmes from different countries in obtaining an awareness about the situation and trends of the selected industrial sectors in other countries of the region. Indeed the awareness of what has happened and is presently happening in the regional and international context can be very important and useful for the setting of national solutions.

The workshop has the following general objectives:
a) to exchange views on the regional situation of the sectors;
b) to provide additional information to the studies being carried out by the two organizations and by various government bodies on the development of the sectors;
c) to exchange information and experiences so that the participants may enrich their operating vision about the national problems and the way to handle them;

d) to identify possible areas for economic, technological and financial co-operation at regional and global levels; and

e) to supply elements of judgement which can contribute to orient technical assistance and other work of the international organizations.

3. Common issues for discussion[1/]

- The ESCAP market for the production of these sectors: structure and trends;
- obstacles to and methods for using the installed capacity for the development of local and regional industries;
- experiences and prospects for regional and international co-operation in the field of production.

The other issues of this workshop would be to:

a) evolve suitable policy approach for the participating countries to achieve on a complementary basis the level of production (and productivity) required to fill the gap between projected demand and supply in the respective sectors;

b) identify appropriate/latest technologies for projects proposed to be set up; in the context also of UNIDOs Programme of Technology for Humanity;

c) suggest programmes for development of skills to build up requisite trained technical manpower to meet the increasing requirements of industry by pooling and supplementing existing resources;

d) arrive at steps required to professionalize and expand extension services to facilitate entrepreneurship development and growth of industries particularly in the rural areas;

e) suggest fields in which regional centres could be set up/strengthened for technical/technological support in establishing industrial units including upstream and downstream industries and also ancilliary industries;

f) identify gaps in industrial financing and suggest manner in which these could be filled through mutual co-operation; and

g) finally to draw up an Action Plan based on regional/sub-regional co-operation for achieving accelerated industrial growth in the region by 1990 and during the decade of the nineties, spelling out the role of various countries and that of international agencies.

1/ For each industrial sector relevant issues have been formulated in the analysis of the corresponding section (Appendix II).

4. Documentation

The reports of the experts would provide the background material for the workshop. A short factual paper on each of the four industrial sectors in question would also be furnished to the participants for their ready reference. In addition, an issue paper would be drafted jointly by ESCAP and UNIDO.

5. The agenda and programme

a) The market for the production of the sectors and its significance to industrial and technological development of the countries of the region;
b) examination of some national experiences in terms of programmes and projects for the development of the sectors;
c) constraints to the participation of the national production of machinery and equipment in the implementation of the investment projects;
d) national mechanisms for promotion and supports; and
e) identification of areas for regional and international co-operation and for technical assistance from the international organizations.

1 July 1985	-	opening
	-	brief statements by the participating Ministers
	-	participants divide into four sector-wise groups (iron and steel, capital goods, chemicals including petrochemicals, and wood products industry)
2 July 1985		
	-	group meetings
3 July 1985		
4 July 1985	-	consideration of recommendations of the groups
	-	adoption of resolutions
5-6 July 1985	-	sight seeing.

6. Participants

The participants will consist of Ministers of Industry of the respective countries and a senior representative each from industry, Government, Chamber of Commerce and National Development Bank accompanying the Minister and Officials of UNIDO and ESCAP.

7. Date and place

The workshop would be held from 1-4 July 1985. (Venue to be decided).

Appendix II

Relevant issues relating to:

a) Capital Goods Sector

- Potential for immediate widening of regional co-operation in the capital goods industry. Main areas where this co-operation could complement North-South and South-South co-operation and compensate for its shortcomings. Main areas where potential for regional co-operation has not been fulfilled and why. Prospects in the medium term.
- Role of the capital goods in the region in the ESCAP region. Linkages of the different sub-sectors of the capital goods, specially those capital goods common to all branches and main distinctive features.
- Impact of micro-electronics and numerical control on the further development of the region capital goods industry from both the production and trade aspects. Effects of these new technological trends on optimal scale production in the capital goods production. Possibilities for a new thrust in the development of the sector through further promotion of optimal scale plants.
- Role played by sub-contracting or to be played in further development of the capital goods industry in the region. Feasible action at regional and national levels to increase the contribution of sub-contracting to the development of the capital goods industry.
- Effects of the current economic crisis on the capital goods industry in the ESCAP countries, both directly and indirectly. Effects of lack of financing to further development of the sectors.
- Prospects for achieving increased self-sufficiency in the capital goods industry in the region. Strategies most appropriated for achieving this and conditions.
- Main policy conclusions for action at the regional and national levels can be drawn from the workshop. Future orientation and development of the capital goods industry so that it achieves maximum impact on the integrated development in the countries.

b) Wood Products Sector

- Work should be done on improving both the amount of processing residues and material left standing in the forest so that a higher percentage of the biomass can be converted to useful wood products.
- The sector has a role to play in rural development and more attention should be given to ways to enhance the advantages of the rural based processing industries.
- Attention should be given to producing utility wood products which would use low cost production methods and compete in international markets on the basis of price. For furniture and fixture the ergonomic and functional aspects should be emphasized and designs should change only in relation to technological change and changes in relative factor prices.
- Marketing arrangements could include a wide mix of strategies including at the more advanced stages the establishment of direct outlet in developed country markets as has been done in the case of some Taiwanese firms.
- The wood processing industry is a dangerous one for workers and attention must be given to worker health and safety. Especially important is the use of the simplest and most cost effective techniques for improving health and safety standards: use of protective guards on machinery, use of protective gear such as goggles and hats, adequate ventilation. It must be pointed out that the problem is generally not the provision of these materials but their use and maintenance.

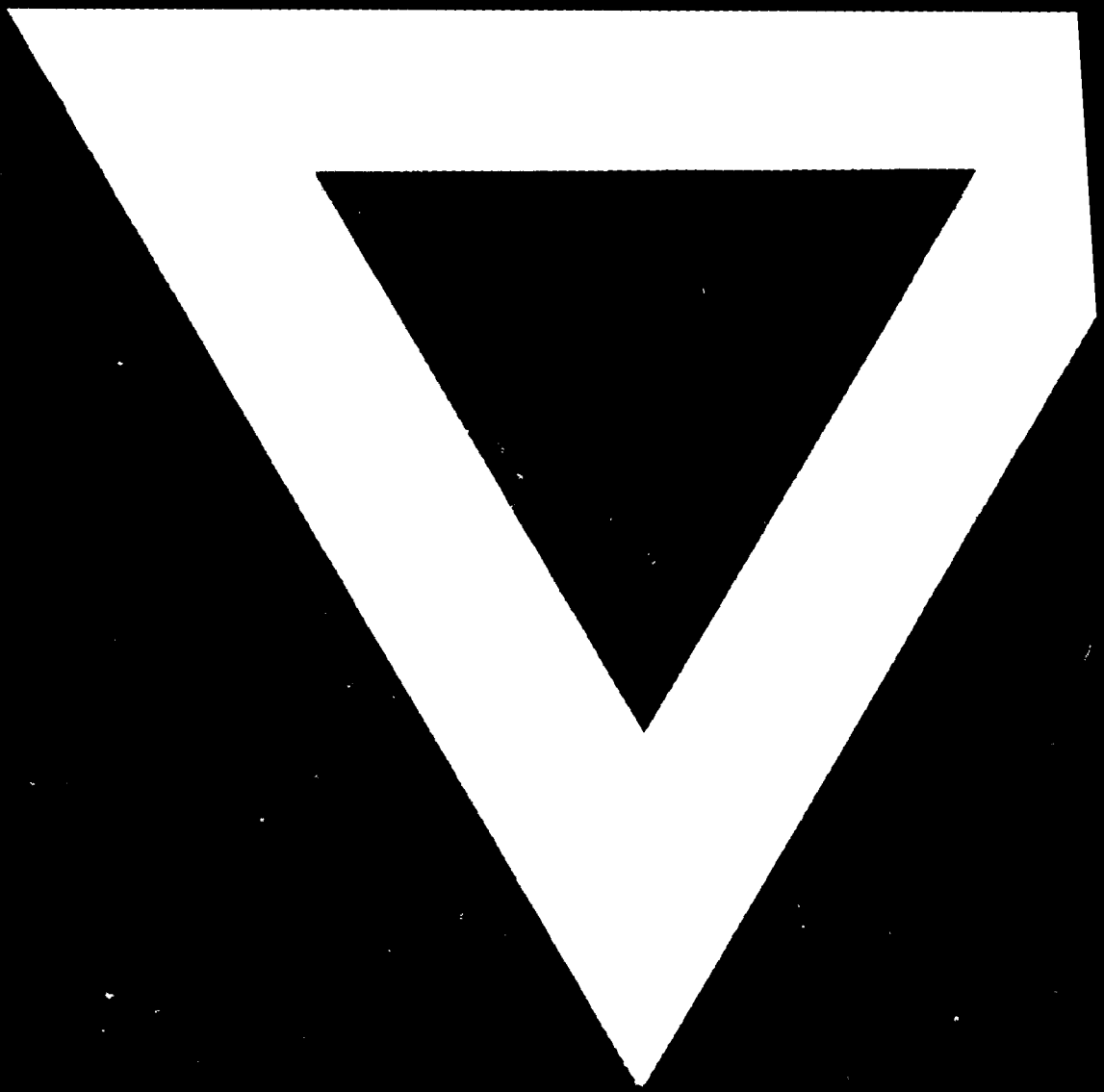
c) Chemicals, including Petrochemicals Sector

- The manner of achieving rapid and balanced growth with small and medium scale linkages.
- Being capital intensive, possibilities of joint ventures; enterprise to enterprise co-operation.
- Marketing strategy to be worked out.
- Maximizing utilization of indigenous capabilities; self-reliance in technology.
- Shift from commodity chemicals to specialities.

- Sharing of technical education training and management expertise.
- Centres of excellence to be set up for skill development on regional/sub-regional basis.
- Organizational problems to be looked at - Governmental and international agency obligations.
- Proper project identification.
- Scope for inter-regional co-operation.

d) Iron and Steel Sector

- Main yardstick for growth; capacity creation to be rationalized on regional/sub-regional basis.
- Planning of downstream - upstream industrial growth.
- Greater use of non-coking coal for steel making.
- Skilled manpower development.
- Transportation needs to be assessed/created.
- Appropriate/latest technology to be adopted suiting raw material base of each country.
- Regional grouping of markets.



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