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# **INDUSTRY AND DEVELOPMENT**

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The Supervisory Panel of *Industry and Development* welcomes readers' opinions and comments, and will be glad to consider for possible publication articles relevant to the aims and scope of the journal (see "information for contributors", back cover).

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### Explanatory notes

References to dollars (\$) are to United States dollars, unless otherwise stated.

The following abbreviations and acronyms are used in this publication:

<b>ASEAN</b>	<b>Association of South-East Asian Nations</b>
<b>ATE</b>	<b>advanced textile exporter</b>
<b>CECIMO</b>	<b>Comité Européen de Coopération des Industries de la Machine-Outil</b>
<b>CNC</b>	<b>computer numerical(ly) control(led)</b>
<b>CPE</b>	<b>centrally planned economy</b>
<b>DME</b>	<b>developed market economy</b>
<b>EDM</b>	<b>electric discharge machine</b>
<b>EEC</b>	<b>European Economic Community</b>
<b>ESCAP</b>	<b>Economic and Social Commission for Asia and the Pacific</b>
<b>GDP</b>	<b>gross domestic product</b>
<b>GNP</b>	<b>gross national product</b>
<b>GSP</b>	<b>Generalized System of Preference</b>
<b>ISIC</b>	<b>International Standard Industrial Classification</b>
<b>JETRO</b>	<b>Japanese External Trade Relations Organisation</b>
<b>JME</b>	<b>Japanese Machinery Exporters Association</b>
<b>JMTBA</b>	<b>Japan Machine Tool Builders Association</b>
<b>MFA</b>	<b>Multi-Fibre Arrangement</b>
<b>MITI</b>	<b>Ministry of International Trade and Industry (Japan)</b>
<b>MMF</b>	<b>man-made fibre</b>
<b>MTA</b>	<b>Machine Tool Trades Association</b>
<b>MVA</b>	<b>manufacturing value added</b>
<b>NC</b>	<b>numerical(ly) control(led)</b>
<b>NIC</b>	<b>newly industrializing country</b>
<b>ODE</b>	<b>other developing economy</b>
<b>OECD</b>	<b>Organisation for Economic Co-operation and Development</b>
<b>R and D</b>	<b>research and development</b>
<b>RCA</b>	<b>revealed comparative advantage</b>
<b>SITC</b>	<b>Standard International Trade Classification</b>
<b>VER</b>	<b>voluntary export restraint</b>
<b>VW</b>	<b>Volkswagenwerk AG (Federal Republic of Germany)</b>

**INDUSTRIAL DEVELOPMENT AND INDUSTRIAL POLICY IN THE  
REPUBLIC OF KOREA, WITH SPECIAL EMPHASIS ON  
ENGINEERING INDUSTRIES**

**Wilfried Lütkenhorst\***

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**Introduction**

The economic development of the Republic of Korea has become a focus of attention both for development researchers seeking to identify the roots and determinants of the country's rapid growth process and for policy-makers in their attempts to emulate what they consider to be a general recipe for success. The fact that the Republic of Korea's economic development indeed constitutes an impressive case of successful late-comer industrialization is beyond dispute; recognition of the country's remarkable economic performance cuts across radically different schools of thought, including the dependency school, which generally has tended to be sceptical about the prospects of developing countries improving their position within the existing international economic system [1].

Within the limited scope of this article, no full-fledged review can be undertaken of overall economic development in the Republic of Korea. Rather, the intention is to take a closer look at the contribution and prospects of the industrial sector, which has proven to be the most dynamic force behind the country's economic rise. In doing so, the paper is broadly structured along the following lines. While section A.1 provides an overview of industrial development in the Republic of Korea in general, section A.2 focuses on the increasing significance of engineering industries in particular. This analytical survey is followed by an account of the general principles of the country's industrial policy approach (section B.1), which is complemented by a more detailed discussion of selected priority areas of industrial policy with a view to removing some imbalances currently facing the country's engineering industries (section B.2).

**A. Industrial development in the Republic of Korea**

**1. General trends and performance**

The Republic of Korea has gone through a process of very rapid industrialization that has resulted in a well-diversified industrial structure and the mastery of advanced production technologies, as well as in substantial increases in income and living standards of the population.

The country's per capita GNP surpassed \$2,000 in 1984 and reached almost \$2,300 in 1986. Hence, the Republic of Korea - apart from Hong Kong and Singapore, which had exceptional development pre-conditions - is second only to China (Taiwan Province) in terms of per capita income among all Asian developing countries.

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\*Industrial Development Officer, UNIDO, Vienna, Austria.

The rapid transformation from a war-impooverished agricultural country to a semi-industrialized one during the last three decades has led many economists to consider the Republic of Korea as a model case of economic development based on an outward-oriented economic strategy. Since the early 1960s the country's economic strategy has continuously been determined by outward-looking, industry-oriented policies and measures. The average annual long-term growth rates of GDP (10.0 per cent during 1965-1973, 7.2 per cent during 1973-1984) indicate that the country has been able to cope with the major challenges confronting economies heavily reliant on manufactured exports for the world market, such as the persistent need to carry out the required structural changes in order to make the optimal use of its specific comparative advantages *vis-à-vis* the international economy. In doing so, the Republic of Korea has not had the advantage of significant natural resources, including energy resources (excepting moderate reserves of coal). As a consequence, import requirements have always been very high and have virtually pushed the country into export production.

As far as the sectoral structure of the GNP is concerned, the recent decades of high, sustained economic growth are characterized by a clear trend (table 1). The share of agriculture in GNP decreased from 29.3 to 13.8 per cent between 1970 and 1986, while manufacturing has proved to be the economy's most dynamic sector. With the exceptions of 1982 and 1985, manufacturing has consistently increased in relative importance, increasing its GNP share from 15.4 to 33.3 per cent. The Republic of Korea thus is one of the few countries in the world where manufacturing accounts for more than 30 per cent of the GNP. Apart from agriculture, a relative decline was experienced by the services sector (from 45.3 to 39.6 per cent). Utilities and construction (the latter accounting for 8.6 per cent of GNP in 1986) have gained in importance.

Table 1. Distribution of GNP by sector of origin (at 1980 constant market prices), 1970, 1975, 1980-1986 (Per cent)

Year	Agricul- ture a/	Industry			Utili- ties	Services
		Mining and quarrying	Manu- facturing	Construc- tion		
1970	29.3	2.1	15.4	7.0	1.0	45.3
1975	24.4	2.0	22.8	6.8	1.3	42.8
1980	15.1	1.4	30.6	8.6	2.1	42.2
1981	17.3	1.6	30.8	7.8	2.2	40.4
1982	16.9	1.5	30.5	8.7	2.1	40.2
1983	16.7	1.5	30.6	9.3	2.5	40.1
1984	14.9	1.5	32.4	9.1	2.8	39.3
1985	14.8	1.5	31.9	9.0	3.2	39.6
1986 b/	13.8	1.4	33.3	8.6	3.4	39.6

Source: [2].

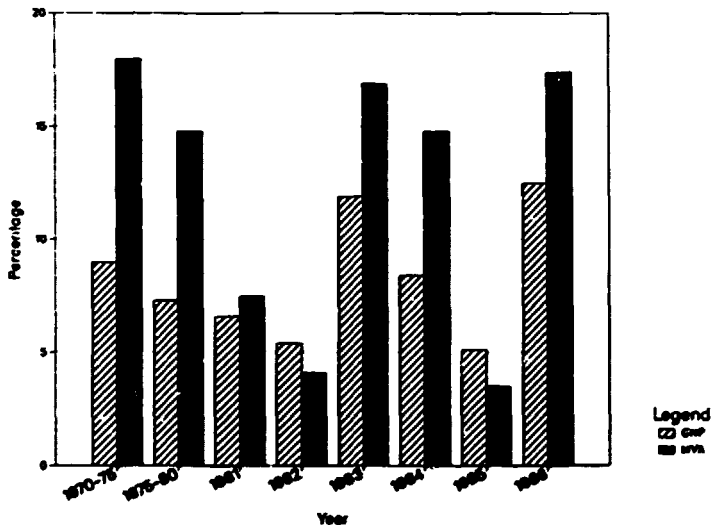
a/ Including forestry and fishing.

b/ Provisional.

Within the overall industrial sector (mining and quarrying, manufacturing, construction and utilities), it is manufacturing,\* the most dynamic segment of industry, which has most clearly gained in importance, accounting in 1985 for 70 per cent of all industrial activities (up from 58 per cent in 1970).

As can be seen from the figure, the real growth rates of manufacturing value added (MVA) have, with very few exceptions, been greater than 10 per cent and in most years have substantially surpassed those of GNP. After the sluggish performance in 1985, record growth rates for the decade were achieved in 1986 (12.5 per cent for GNP; 17.4 per cent for MVA).

Real Growth Rates of GNP and MVA, 1970-1986  
(In constant 1980 prices)



Another way to gauge the role of the manufacturing sector in the country's development is to look at its contribution to the creation of employment. Except for the period of the Fourth Five-Year Plan (1977-1981), this contribution has always been very high, ranging from 23 per cent of total additional employment during the Second Five-Year Plan period (1967-1971) to as much as 62 per cent during the Third Five-Year Plan period (1972-1976) and 58 per cent during the Fifth Five-Year Plan period (1982-1986) ([3], p. 60).

\*This paper deals exclusively with the manufacturing sector.

Drastic changes have taken place in the composition of MVA in the course of development. Table 2 provides in summary form the basis for an understanding of the structural changes that occurred between 1975 and 1985.

Table 2. Composition of gross output and MVA, 1975 and 1985 (Per cent)

Sector (ISIC code)	Share in total value of gross output at current prices a/		Share in total MVA at 1980 prices	
	1975	1985	1975	1985
	Total manufacturing (300)	100.0	100.0	100.0
Food products (311)	9.9	8.7	6.7	7.2
Beverages (313)	3.8	2.0	2.1	1.5
Tobacco (314)	2.4	2.7	0.7	0.3
Textiles (321)	16.0	10.3	14.8	10.0
Wearing apparel, except footwear (322)	4.7	3.8	5.8	4.7
Leather products (323)	1.3	1.0	0.8	0.6
Footwear, except rubber or plastics (324)	0.3	0.7	1.3	0.9
Wood products, except furniture (331)	3.1	1.4	1.8	0.6
Furniture, except metal (332)	0.2	0.5	0.3	0.5
Paper and products (341)	2.4	2.5	2.3	1.9
Printing and publishing (342)	1.4	1.5	2.6	1.5
Industrial chemicals (351)	6.2	5.8	8.6	6.3
Other chemicals (352)	3.7	3.4	4.0	4.6
Petroleum refineries (353)	11.2	10.3	4.2	2.2
Miscellaneous petroleum and coal products (354)	1.4	1.4	1.6	1.4
Rubber products (355)	2.5	2.3	2.4	2.8
Plastic products (356)	1.0	1.9	1.8	1.8
Pottery, china, earthenware (361)	0.1	0.2	0.2	0.3
Glass and products (362)	0.7	0.6	1.4	1.2
Other non-metallic mineral products (369)	3.2	3.2	5.5	4.0
Iron and steel (371)	6.5	7.9	4.9	7.3
Non-ferrous metals (372)	1.0	1.6	0.6	1.6
Fabricated metal products (381)	2.1	3.3	2.4	3.6
Machinery, except electrical (382)	2.0	3.3	5.6	8.3
Machinery electric (383)	6.2	9.5	6.9	15.0
Transport equipment (384)	4.5	7.9	4.6	6.6
Professional and scientific equipment (385)	0.6	0.7	1.0	1.0

continued



Table 2 (continued)

Sector (ISIC code)	Share in total value of gross output at current prices a/		Share in total MVA at 1980 prices	
	1975	1985	1975	1985
Other manufactured products (390)	1.4	1.5	4.8	2.5
Total manufacturing (millions of dollars)	...	...	6 275	23 085

Source: UNIDO data base.

a/ Current prices had to be used due to unavailability of constant price times series for gross output.

The following changes emerge:

(a) Total MVA at 1980 constant prices increased from \$6.3 billion in 1975 to \$23.1 billion in 1985, an increase of 267 per cent, implying a growth rate of 12.9 per cent per annum;

(b) The following branches declined in relative importance as far as gross output is concerned: food, beverages, textiles, clothing, leather products, wood products, printing, chemicals, rubber products and glass. In broad terms a similar pattern emerges for MVA shares;

(c) The following branches increased in relative importance as far as gross output is concerned: footwear, furniture, paper, plastic products, pottery, iron and steel, non-ferrous metals, fabricated metal products, machinery (all kinds), transport equipment and professional and scientific equipment;

(d) Of more interest, however, are the sectors that are relatively important in the total and that experienced relative increases in MVA: other chemicals, iron and steel, fabricated metal products, machinery (all kinds) and transport equipment.

The Republic of Korea has thus undergone, in less than a decade, a substantial shift in the production mix from relatively unsophisticated, low-value-added items to more complex, high-value-added items, from simple consumer goods to consumer durables and capital goods, and from labour-intensive to skill and technology-intensive industries. (Notwithstanding this general trend, textiles and clothing together still accounted for some 15 per cent of MVA in 1985). This result is confirmed by a look at the manufacturing production indices provided in table 3: at a higher level of aggregation (2-digit ISIC), basic metals and fabricated metal/

machinery/transport equipment are the only branches displaying above-average increases in the 1980-1986 period.

Table 3. Indices of manufacturing production, 1981-1986  
(1980 = 100; constant prices)

	1981	1982	1983	1984	1985	1986
Food, beverages and tobacco	105	113	125	134	141	149
Textiles, clothing and leather	116	118	126	133	133	147
Wood, wood products, including furniture	112	120	150	159	148	144
Paper, printing and publishing	108	111	121	125	130	156
Chemicals, fuels, rubber and plastic	102	106	124	141	147	165
Non-metallic mineral products	100	107	135	147	150	166
Basic metals	132	142	163	180	188	213
Fabricated metal, machinery and transport equipment	126	137	171	227	242	331
Others	103	105	122	150	149	183
Total	113	119	139	161	167	199

Source: [2].

As mentioned above, since the early 1960s the industrial development strategy of the Republic of Korea has clearly been export-led. There has been a considerable increase in the relative importance of trade in the country's GNP over the past two decades: in 1968 foreign trade (i.e. exports plus imports) constituted 35 per cent of GNP, whilst by 1985 this share had risen to 61 per cent. Despite the strong expansion of exports there was a persistent deficit in the balance of trade until 1985, when it became negligible, and 1986, when a trade surplus of \$3.2 billion was recorded. Not surprisingly, manufactures have provided the bulk of all exports, accounting now for around 95 per cent of the total. At the same time, the share of manufactured exports in manufacturing gross output since 1975 has remained fairly stable at some 28 per cent. Of these, some 70 per cent are destined for developed country markets, with the United States market alone absorbing close to 40 per cent of all manufactured exports of the Republic of Korea.

The overwhelming importance of the United States market for exports of the Republic of Korea is causing increasing concern in both countries. The United States has announced that as of 1989 it

will no longer grant its Generalized System of Preference (GSP) concessions to the Republic of Korea, and it is also exerting pressure on that country to liberalize imports and to revalue the won. For its part, the Republic of Korea is attempting to diversify its export markets and is paying increasing attention to the European Community. Although Japan takes 16 per cent of its total exports, there is a feeling in the Republic of Korea that the Japanese market could be opened up further, to reduce the extremely large bilateral trade deficit with Japan (estimated to have been between \$5 billion and \$6 billion in 1986).\*

Also of importance to the diversification of export markets is the necessity of reducing the economy's high dependence on exports as a whole. A rethinking has been forced on the Government by the clear signs of growing world protectionism. The Republic of Korea considers that it is becoming the prime target for those countries that impose restrictions on imports from developing countries. A list published by the International Monetary Fund in 1985 indicated that 14 major countries (the European Community as a whole was considered to be one of these) imposed trade measures against exports of the Republic of Korea in 1984. These measures have ranged from anti-dumping duties to unilateral, bilateral and global quotas. A comprehensive range of commodities was involved, from textiles (an overall "textiles" bilateral quota was imposed by the United States) to cosmetics (Japan used an administrative guidance to restrict imports from the Republic of Korea [4]).

In view of the prevailing protectionist attitudes in most developed countries, the future of industry in the Republic of Korea has become increasingly vulnerable. The country has evidently reached a stage of development in which further high growth cannot be sustained by reliance on external markets alone; rather, it will have to complement its hitherto successful strategy of export orientation with policies aimed at strengthening the domestic market.

## 2. Increasing significance of engineering industries

One of the most remarkable features of industrial development in the Republic of Korea has been the rapidity of the structural changes that have accompanied - and in fact driven - the country's growth process. In about two decades, an industrial sector largely dependent on simple consumer goods produced by light industrial branches has been transformed into a highly diversified set of industries using increasingly sophisticated processes to produce high-tech products. In this, the rapid rise of engineering

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\*In November 1986, the Government of the Republic of Korea announced special measures to reduce the trade deficit with Japan as well as the trade surplus with the United States. Various privileges, including loans at favourable rates and tax cuts, would be offered to importers who shifted their sources from Japan to other countries, particularly the United States.

industries\* has been a key determinant. This section provides a brief statistical analysis of their performance and goes on to review recent developments in the most important engineering industries.

In the recent past, the engineering industry of the Republic of Korea has ranked first among all industries in terms of production, MVA growth and productivity increases [2]. Its labour productivity index increased from 100 in 1980 to 214 in 1985 (for electrical machinery to 250), as compared to only 177 in 1980 for the overall manufacturing index. Tables 4 and 5 provide more detailed data on the changing position of the engineering sector relative to all industry. Three facts emerge:

(a) In 1985, engineering industries contributed more than one third (34.5 per cent) to the country's MVA. This remarkably high proportion, which approaches the proportion in industrialized countries, has mainly been the result of developments in the 1980s. Electrical machinery is the top performer (15 per cent of MVA in 1985), followed by non-electrical machinery and transport equipment;

(b) In 1985, engineering industries were responsible for 28.5 per cent of all manufacturing employment, with electrical machinery alone contributing more than 10 per cent. Additional employment generated in the 1975-1985 period was greatest, however, in transport equipment;

(c) In 1986, engineering industries generated slightly more than two fifths of all industrial exports. This implies an increase of 10 percentage points within just five years, again predominantly due to the buoyancy of the electrical machinery branch (and, within this branch, in particular electronics).

At this point, however, a first reservation needs to be voiced. It is noteworthy that whereas gross export figures are impressive, the engineering industries of the Republic of Korea have remained highly import-dependent and, as a whole, show a rather low revealed comparative advantage (RCA), as is demonstrated in table 6. In this table, "net exports over total trade" has been taken as a simple indicator of RCA. This indicator can take values between -100 and +100; it points to the relative strength of exports and imports within specific product groups. As can be seen, of the three most important product groups (ISIC 382-384), only electrical machinery and transport equipment display clearly positive RCA values (with the latter being in the leading position), whereas non-electrical machinery (which is indeed just a nascent export industry) has remained at a highly negative RCA

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\*Engineering industries are defined here to include fabricated metal products, electrical and non-electrical machinery, transport equipment and precision instruments, i.e. all branches belonging to category 38 of the International Standard Industrial Classification (ISIC).

value. Engineering as a whole has slightly improved its RCA value and has turned from the negative to the positive side.

Table 4. MVA and employment contribution of engineering industries, 1975, 1980 and 1985  
(Per cent)

Engineering industry	1975 <u>a/</u>	1980	1985
<b>Share of total MVA (1980 prices)</b>			
Fabricated metal products	2.8	3.1	3.6
Non-electrical machinery	6.6	4.9	8.3
Electrical machinery	9.1	10.0	15.0
Transport equipment	3.6	4.2	6.6
Precision instruments	<u>4.4</u>	<u>1.4</u>	<u>1.0</u>
<b>Total engineering</b>	<b>22.5</b>	<b>23.6</b>	<b>34.5</b>
<b>Share of manufacturing employment</b>			
Fabricated metal products	3.7	...	5.1
Non-electrical machinery	3.3	...	4.5
Electrical machinery	9.0	...	10.9
Transport equipment	3.7	...	6.6
Precision instruments	<u>1.2</u>	...	<u>1.4</u>
<b>Total engineering</b>	<b>20.9</b>		<b>28.5</b>

Source: UNIDO data base.

a/ The MVA share refers to 1976.

Table 5. Share of engineering industries in total industrial exports, 1981 and 1986  
(Per cent; current prices)

Engineering industry	1981	1986
Fabricated metal products	5.4	5.5
Non-electrical machinery	2.1	2.6
Electrical machinery	11.2	19.4
Transport equipment	9.7	11.5
Precision instruments	<u>1.6</u>	<u>1.3</u>
<b>Total engineering</b>	<b>30.1</b>	<b>40.2</b>

Source: [5].

Table 6. Net exports as a percentage of total trade a/ in engineering products, 1981 and 1986

Engineering industry	1981	1986
Fabricated metal products	44.7	27.6
Non-electrical machinery	-67.6	-63.3
Electrical machinery	7.1	27.3
Transport equipment	14.3	45.4
Precision instruments	<u>1.5</u>	<u>-13.0</u>
Total engineering	-2.5	6.1

Source: Calculated from data given in [5].

$$\underline{a/} \quad [(X - M)/(X + M)] \times 100.$$

Before turning to questions about the overall industrial policy of the Republic of Korea, some recent developments in the most important engineering branches are briefly reviewed.

(a) Electrical machinery

The electrical (particularly electronics) industry has so far clearly been the backbone of the country's recent export drive. In 1987 exports are expected to have totaled more than \$10 billion, claiming one quarter of total exports. The Republic of Korea thus has become the sixth largest exporter of electronic goods in the world, after the United States, Japan, the Federal Republic of Germany, the United Kingdom and France, and for the first time is ahead of China (Taiwan Province) ([6]; [7], p. 6). Ministry of Trade and Industry projections put electronics production value at \$20 billion in 1991 and \$72 billion by the year 2000; as of 1988, electronics items are expected to surpass textiles as the most important export item. In descending order of magnitude, the greatest export values were recorded for semiconductors, radios, automatic data-processing machines, colour television sets and video tape recorders. A shift towards higher quality, more expensive consumer electronics products is foreseen for 1988 and beyond; the companies have already proven their ability to discover market niches and market their own brand name products.\* Despite these successes in a still-booming market, vigorous efforts are under way to diversify into the more promising but also technologically more demanding area of industrial electronics and, particularly, office automation products [8]. The Government is providing massive

\*Compact disc players are a case in point. The Republic of Korea is one of the few countries producing these products and increased its exports of them ten-fold between 1985 and 1987, to some 200,000 units.

support both to establish a favourable infrastructure (e.g. through science parks) and to allocate resources to business-academic joint efforts such as the Korea Electrotechnology Telecommunications Research Institute.

It is noteworthy, however, that the country's electronics industry, like the other industrial branches, displays an extremely high degree of concentration, with the top 15 companies controlling three quarters of the market. Moreover, despite technological advances, the country has continued to depend on imports of parts and components (e.g. tuners, integrated circuits, switches), predominantly from Japan ([9], p. 19). The recent appreciation of the yen (which has, for example, doubled the production costs for cordless telephones) has resulted in a heavy burden.

(b) Non-electrical machinery

Non-electrical machinery, sometimes also referred to as "industrial machinery", is one of the most important branches in terms of industrial linkages and technology and skill spillovers.\* It is the true machine-building sector and includes such product groups as agricultural machinery, construction machinery, textiles machinery, machine tools and industrial pumps. The machine tool industry, which serves as industrial nucleus and establishes the basic capability to produce machines, occupies a "spider in the web" position ([10], p. 44) and can legitimately be regarded as the "key industry in the capital goods sector ... crucial to a country's technological development" ([11], p. 13).

Clearly, the Republic of Korea's non-electrical machinery industry, though of considerable size and well-diversified in its product range, has not yet emerged as a major foreign exchange earner. In fact, its export figures have remained marginal (\$0.9 billion in 1986) when compared to those of electronic goods. With the growing emphasis on automation and on energy saving, however, the country's numerically controlled (NC) machinery, including lathes, milling machines and machining centres, have made their first inroads into some export markets. The technological level of the leading firms (Daewoo Heavy Industries, Tongil and Swachon) is only moderate compared to state-of-the-art technology, but the firms are continually introducing more advanced items, using a mix of foreign technology and locally developed know-how [12]. By drawing on key foreign components and designs (both obtained mainly from Japan), some quite advanced manufacture takes place. But there is also a clear recognition by the Government that more local content can be achieved and that this must come on the material side as well as on the design side. A recent assessment of the trade situation concluded that machine tool producers in the Republic of Korea had so far presented little

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\*It must be noted, however, that with the rapidly increasing importance of computer numerically controlled machinery, the traditional distinction between electrical and non-electrical machinery becomes more and more blurred.

threat to indigenous European producers. However, in open markets with a relatively weak domestic industry, like that of the United Kingdom, low-cost products from the Republic of Korea and from China (Taiwan Province) had tended to disturb prices at the bottom end of the market [13].

In this context it is particularly noteworthy that one firm, Tongil, has recently acquired majority ownership of a machine tool company in the Federal Republic of Germany, Heiligenstädt, aiming thereby to get rapid and full access to the latest computer numerically controlled (CNC) technologies and products. This "reverse" foreign investment may signal a new means being used by the Republic of Korea and other newly industrialized countries to upgrade their technological capabilities and subsequently penetrate developed country markets. It is indeed remarkable that total overseas investment by firms from the Republic of Korea doubled within just three years, to reach almost \$900 million as of mid-1987 ([12], p. 34, and [9], p. 28).

(c) Automobiles

Developments in the Republic of Korea's automotive industry took a decisive turn in 1974, when the Government announced a long-term development plan to lift the production of cars from an assembly stage that had low levels of local content [14] to a stage that had a higher domestic value added. The crucial policy objective was to promote efficient suppliers who would rapidly increase the local sourcing of parts and components. Within this overall policy, priority was given to the production of smaller cars. With a view to rationalizing the industry's structure, each of the three largest firms was allocated a specific segment of the passenger car market to avoid market fragmentation. Under this plan, Hyundai and Saehan (now Daewoo Motors) produced 1,300 cc and 1,400 cc engine models, respectively, while Kia produced 1,000 cc sub-compact models. As a consequence, and given the existing favourable circumstances (such as considerable experience in machine-building, a large pool of skilled manpower and, last but not least, the high degree of protection granted to the car industry), the Republic of Korea has given an almost unique example of how to achieve internationally competitive production under a régime of forced localization. After further Government intervention in 1981,\* Daewoo and Hyundai were the only passenger car producers in the country until 1987, when Kia re-entered the car market. In 1983, these three companies made their first inroads into export markets. Since that time, they have been capturing small but increasing shares, particularly of the Canadian and United States markets. General Motors recently entered into an agreement with Daewoo for the production of 170,000 sub-compact cars annually as of 1986, with 50 per cent being earmarked for exports ([15], p. 60). In 1987 for the first time, the ratio of exports to domestic sales of cars was

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\*In that year Kia was given a monopoly position for the production of trucks while its production of passenger cars was completely stopped.



greater than 1 as the result of a 75 per cent increase in exports compared to a 58 per cent increase in production. The United States market alone absorbed 260,000 cars from the Republic of Korea in 1987. Future ambitions are reflected in the current plans of both Daewoo and Hyundai to revamp and expand their facilities to produce 1 million units per year in 1988\* and to develop original car models by 1990 ([9], p. 7).

## B. Industrial policy in the Republic of Korea

### 1. The general approach

Since the early 1960s, a series of five-year plans has shaped the framework for the Republic of Korea's industrial priorities, policies and performance. During the first two planning periods (1962-1971), emphasis was placed on the expansion of labour-intensive industries. The third planning period (1972-1976) showed a shift in emphasis to the promotion of heavy and chemical industries, which was to continue through the fourth planning period (1977-1981). Other major objectives of the Fourth Five-Year Plan, such as self-sufficiency in investment financing and the achieving of a current account surplus, had to be abandoned as a result of the crisis-affected economic environment and disruption of the socio-political order. In response to the deteriorating economic performance, the targets of the Fifth Five-Year Plan (1982-1986) were relatively modest in quantitative terms. The preoccupation with qualitative targets reflected increased concern about correcting unbalanced growth patterns. The main aims were to regain price stability through tight monetary control, to promote greater industrial efficiency in view of reduced international competitiveness and to reduce the foreign loan component in domestic development financing. The Fifth Five-Year Plan listed as a priority objective the improvement of social welfare and equity, the first time a plan had done so.

The main themes of the Sixth Five-Year Plan (1987-1991) are the introduction of social welfare schemes such as national pension and medical insurance schemes; improvements in the balance of payments and the foreign debt situation (1987 was an extremely successful year in both regards); and continued industrial restructuring, aimed at achieving an important role for science and high-tech-based industries. The manufacturing sector is projected to continue to grow in relative terms. By the Plan's final year, 1991, the industrial sector is to account for a 38.3 per cent share of GNP, which would correspond to \$52.5 billion in 1984 prices. MVA alone would come to more than \$50 billion. It is only during the 1990s that the manufacturing sector is expected to lose its relative growth momentum, declining to about 33 per cent of GNP by the year 2000, while services are expected to experience accelerated growth.

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\*Hyundai alone expects a total production of 750,000 cars in 1988, of which 450,000 are earmarked for export.

In the past two and half decades, a régime of medium-term planning has been of key importance to the economic and industrial achievements of the Republic of Korea. The planning process in general and the so-called "administrative guidance" in particular have been the chief means of ensuring strong co-operation between Government agencies and the private sector. It is only during recent years that the comprehensive scope of plan-guided development has been somewhat curbed in favour of private decision-making prerogatives.\* With regard to the directive strength of plans, it is to be noted that the planning régime has not been mandatory but has always skillfully combined binding and indicative elements.

Because the first three five-year plans (from 1962 to 1976) were very successful in attaining and surpassing their main targets, it is not surprising that planning was accepted as the foundation of economic advancement. During the Fourth Five-Year Plan (1977-1981), however, the 1979-1980 economic crisis was aggravated by the inflexibility of planning. Against this background, the country has since endeavoured to find a new balance between planning and private sector autonomy that is more appropriate to the present stage of economic development. Essentially, the plans have become less comprehensive, more open to revision and more qualitative in nature.

As mentioned before, the concept of planning in the Republic of Korea is largely indicative rather than mandatory: private sector activities have not, as a general rule, been strictly determined by administrative precautions but have been steered by material incentives into the desired priority or strategic sectors. To this end, a comprehensive set of incentives was created and, from time to time, adjusted to serve the prevailing industrial policy objectives [16].

The centrepiece of the incentives policy has been the financial system, which has perhaps been more purposefully designed and systematically used as an instrument for targeted industrial development promotion in the Republic of Korea than in any other developing country. Indeed, it was public-sector control of credit allocation that was able to bring private activities into line with Government intentions, above all by providing so-called low-interest "policy loans" to priority sectors (shipbuilding, steel, machinery etc.). These policy loans, at times accounting for some 50 per cent of total bank lending, assumed particular importance since the unorganized financial market (kerb market) was initially a very thin market extending loans at interest rates 3-6 times the official rates. The policy loans were also of importance to the large industrial firms, which have traditionally been characterized by very low equity/debt ratios.

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\*The strong inclination of the economic policy-makers towards planned development has often been attributed to the influence of Japan, both geographically and as an economic mentor. Indeed, it is frequently suggested that Japan has served as the model for catching-up in domestic and international economic development.

On the other hand, harnessing the financial sector for industrial development was only one of several major concerns of industrial policy. Further measures have included fiscal incentives (tax exemptions and reductions; accelerated depreciation allowances; tariff exemptions for and tax rebates on imports required for export production), protective measures (quantitative import restrictions and import prohibitions on domestically produced items) and direct Government investment in industrial estates and export processing zones. Most of these incentives were aimed at export promotion, as, for example, was exclusively the case with additional export promotion funds, preferential foreign currency loans for export financing, and export-import link systems.

It is difficult to calculate the combined quantitative effect of the various incentives. Orders of magnitude, however, can be gauged: according to an estimate made by Hong (quoted in [3]), the ratio of total interest subsidies to total fixed capital in manufacturing exceeded 25 per cent in 1972. Furthermore, time-series data are available on the ratio of export subsidies to total export value, indicating that between 1962 and 1978 this ratio fluctuated between 16 and 45 per cent, with an average figure of 23 per cent for the years 1970-1978 ([17], p. 47).

Taking into account the fact that these quantitative material incentives have always been complemented by various qualitative incentives (public recognition of and awards for excellency; moral suasion; administrative exhortations), it is hardly possible to establish a firm causal link between the extent and quality of policy interventions on the one hand and the performance of the industrial sector on the other. Empirical evidence does suggest, however, that in the Republic of Korea, efficient, well-designed, coherently implemented policy measures have to a large extent contributed to the country's economic success ([18], [19]). In this regard, the following are worthy of note:

(a) There has always been substantive State involvement in organizing, focusing and directing economic development. Despite frequent allegations to the contrary, the Republic of Korea has not been a paradigm for a free-market, laissez-faire approach to development; yet it should be noted that Government policy has tried to use market signals;

(b) The State has exerted influence on industrial development less by claiming a large share of public enterprises in manufacturing (some 15 per cent of total manufacturing during the 1970s) but more by persuading and/or directing private industry to enter the desired sectors and activities. The success of this strategy seems to imply that, as a rule, "guidance", not "ownership", is essential;

(c) This approach, which is based on a long-term industrial "vision", has resulted in a largely targeted development pattern and the substantial subsidization of priority sectors.

The formulation of economic policy in the Republic of Korea has been characterized as based on pragmatism (a willingness to

experiment undogmatically with policy tools), particularism (application of tailor-made policy decisions with a low level of generality), centralization (policy "made in Seoul") and openness (the discussion of various opinions before decisions are made). To these four essentials can be added a high degree of corporatism, i.e. interaction between the Government and numerous economic interest groups in preparing and implementing industrial policy. This interaction has also had what has been called an "announcement effect", that is, it has been instrumental "in articulating leadership commitment and giving the general guidelines and implicit promises of support that facilitate private planning" [18]. It is this linkage of public and private institutions, in striking similarity to the Japanese approach, that permits one to describe the country's economic system as being, almost paradoxically, a "centrally guided and co-ordinated market economy".

In recent years, a number of important industrial policy changes have been introduced to liberalize the domestic market (both for goods and financial services), to enhance market mechanisms and, generally, to move away from sector-specific policies towards functional policies.\* This shift in policy, following import substitution and export promotion as the first two restructuring phases, is now sometimes considered as having launched the third post-war restructuring of the economy.

One essential element in this new industrial restructuring attempt is the emphasis on small and medium-scale industrial enterprises. As the following and final section will show, this emphasis has particular relevance for the country's engineering industries.

## 2. Policies to strengthen the engineering sector

Notwithstanding their dynamic and successful development, the engineering industries of the Republic of Korea have been suffering from structural imbalances that have only recently become obvious. As mentioned before, they have continued to be highly import-dependent, with growth of machinery imports having regularly exceeded the average growth rate of total imports. As a result, policy-makers are now calling for measures to increase the local content ratio of the country's machinery production.

What is the main reason for this continued reliance on crucial inputs from abroad? Above all, until the early 1980s too much emphasis was placed on promoting assembly operations at the expense of generating capability in parts/components production, which is

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\*Some of the more important measures include the Foreign Capital Inducement Act of July 1984 (with its switch to a "negative list" system); the liberalization of import licenses; anti-collusion measures against market-dominating enterprises; the participation of foreign investors in the domestic stock exchange; and an increased scope for operations of foreign banks in the Republic of Korea (for details see [3]).

an activity typical of medium-sized supplier firms. This has led to a processing pattern biased in favour of final assembled products, has perpetuated the need to import crucial, more sophisticated components (particularly in the fields of electronic instrumentation and control systems) and has been one of the main inhibitors of domestic design capabilities in areas such as heavy machinery. It is noteworthy that in China (Taiwan Province), for example, industrial priorities have been different; there, a powerful domestic parts/components industry was stressed, and it is out of parts manufacturing that the assembly sector has subsequently grown.

The relative backwardness of parts/components manufacturing in the Republic of Korea has been the consequence of an industrial policy that focused for too long on strengthening large industrial enterprises at the expense of vertical specialization [20]. Until 1980, the country's giant business conglomerates, the so-called chaebol,\* were the prime target of wide-ranging support measures, from selective import restrictions to subsidized bank loans and generous export financing. For two decades these giant business groups were allowed to penetrate sectors traditionally the domain of smaller firms and to swallow up firms that could not compete. The logic was "the bigger, the better". While these companies have contributed substantially to the phenomenal economic growth,\*\* they have also reduced the flexibility to adapt to rapid changes in international markets. Indeed, it was the large companies that were most seriously hit by the recession of the early 1980s. This was due partly to their heavy dependence upon bank lending and partly to the fact that power within the chaebol tends to be highly concentrated (they are often family-based) and functional separation of capital and management is insufficient to improve operational efficiency.

It is only in the last five years or so that the Government has clearly recognized the biased industrial size structure. Consequently, it has started to withdraw the privileges enjoyed by "big business" and to restrict growth and diversification of the chaebol. Small and medium-sized firms are now being promoted as they are seen to provide a "safety net" in times of recession and to be capable of substantial innovation and introduction of new technologies.

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\*A typical chaebol encompasses a large variety of companies and activities, from as many as some 30 in one case to between 10 and 20 in most other cases. One example is the Samsung Group, which spans business lines from food seasonings to aircraft engines and 256K DRAM semiconductor chips.

\*\*Between 1973 and 1978, the five largest chaebol alone doubled their share of the country's GNP from 9 to 18 per cent; the GNP share of all 46 chaebol went up from 32 to 43 per cent in the same period ([3], p. 39).

A ten-year, long-term promotion plan for small and medium industry was adopted in 1982 to raise the value added and employment shares of small and medium industry by 1991 to 45 and 63 per cent, respectively, of national totals. The Small and Medium Industry Promotion Corporation (SMIPC) plays a central role in formulating, initiating and co-ordinating support measures.\*

A further initiative, the Industrial Systematization Project, was introduced by the Ministry of Trade and Industry in the late 1970s. This project, which covers more than 3,000 small companies, addresses the problem identified above, that is, the high level of imported inputs for the country's engineering industries. It essentially seeks to integrate small parts manufacturers and large prime manufacturers, most of these making items related to automobiles, machinery and electronics, into closely knit production units. Financial support and tax privileges are provided to participating companies, including, for example, a reduction of tax payments by 10 per cent in the case of domestically purchased machinery and by 8 per cent in the case of imported machinery and equipment for laboratory and inspection purposes. Furthermore, expenses on required technical consultancy services are tax-deductible.

The system has numerous problems, however. Prime manufacturers are inclined to demand price cuts from their parts makers, payments are often delayed by several months and prime makers sometimes suddenly reduce or stop orders. Hence, many problems remain for the producers of parts and components, and these call for various kinds of functional support. A systematization promotion council within the Korean Federation of Small Business has the tasks of, inter alia, examining business transactions on a quarterly basis and of taking measures to avoid disputes between large firms and their suppliers.

Further industrial policy measures aimed at strengthening smaller enterprises include market reservation schemes\*\* (these, however, are of less relevance for engineering products than for light consumer goods) and, more recently, special support in technology acquisition, financing, marketing etc. for export-oriented small and medium enterprises. Exports of the small and medium enterprises now make up more than 32 per cent of the country's total exports and are projected to reach a 45 per cent share in 1991.

Whereas this strong emphasis on building up viable small and medium supporting industries is basically a phenomenon of the

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\*For a detailed review of recently established small industry promotion schemes in the Republic of Korea, in particular of the activities of SMIPC, see [21].

\*\*Under these schemes, the production increases of large firms in specified product groups require prior Government approval.

1980s, the Republic of Korea's industrial policy, at least from the early 1970s onwards, has been characterized by determined efforts to promote domestic R and D activities [22]. The objective, which has been achieved to a considerable degree, was to create an autonomous industrial innovation capacity, again within the framework of public/private sector co-operation. In 1984, the ratio of total R and D expenditures to GDP stood at 1.6, which was far higher than in almost all developing countries and even exceeded the corresponding ratio for a number of OECD countries, such as Austria, Finland and Spain. It is the private sector which contributes the most (some 80 per cent) to total R and D expenditures (excluding military and defense-related expenditures). This high share may be partly due to the substantial fiscal incentives available under the Technology Development Promotion Act (promulgated in 1973 and amended in 1977 and 1981). As to the sectoral distribution, private sector R and D expenditures are heavily concentrated in the engineering industries, which in recent years have accounted for more than 50 per cent of the total (electrical machinery alone was the beneficiary of approximately one third of all private R and D expenditures).

In 1981, the extensive system of public research institutes was rationalized, reducing the total number of institutes from 15 to 9. These research institutes are geared to respond to the research needs of industry and to generate practical solutions to the problems of developing and/or commercializing innovative production processes or new products. While they cover a number of different fields (as listed below), there is a noticeable emphasis on engineering industries:

Korea Advanced Institute of Science and Technology (KAIST)  
Korea Institute of Energy and Resources (KIER)  
Korea Institute of Machinery and Metals (KIMM)  
Korea Electrotechnology and Telecommunications Research  
Institute (KETRI)  
Korea Standards Research Institute (KSRI)  
Korea Institute of Electronics Technology (KIET)  
Korea Research Institute for Chemicals Technology (KRICT)  
Korea Ginseng and Tobacco Research Institute (KGTRI)  
Korea Advanced Energy Research Institute (KAERI)

Complementing the system of public research institutes, many private companies have endeavoured to set up their own R and D centres. The first such centre was established in 1970; by the end of 1984, there were more than 150 private R and D centres, with chemical and engineering industries accounting for almost three quarters of the total. Four of the chaebol have established R and D outposts in California; these focus on the design of computers and semiconductors [23].

As to the overall policy framework, there appear to be at least three sets of measures that have exerted a positive long-term influence on the creation and progress of engineering industries in the Republic of Korea: (a) tariff and non-tariff protection

granted to the manufacture of capital goods;\* (b) the introduction of minimum domestic content requirements, with a view to discouraging machinery imports; and (c) the enhancement of vocational training by, *inter alia*, making in-plant training compulsory for all industrial enterprises with 300 or more workers ([23], p. 39).

Domestic R and D efforts have been complemented by a technology acquisition strategy that focuses on the build-up of local know-how and capabilities. With the notable exception of electronics, the other branches of engineering have relied to only a limited degree on foreign direct investment as a source of technology transfer, and then only in a strictly screened and controlled manner. Rather, licensing in selected technology areas has been used to generate technological competence.

In the long run, just as in the case of the country's automotive industry, this may prove to be a suitable means of achieving domestic mastery of technologically advanced production processes without becoming too dependent on foreign companies.\*\* Seen from a different angle, licensing agreements may help prepare the ground for subsequent joint ventures in which the domestic partner, because he has already attained a certain level of development, will have relatively strong bargaining power. Seen this way, the recent policy emphasis on attracting foreign investment would be a logical step on the country's industrial development path rather than a mere reaction to high levels of foreign indebtedness.

All in all, it appears that once the prevailing imbalances in the sector's structure - a lop-sided size pattern that favours large industrial conglomerates, a biased processing pattern that favours final products, and an insufficient degree of horizontal specialization - have been overcome, engineering can be expected to remain the leading growth sector of the country's economy for a long time.

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\*Until 1984 the liberalization ratio of engineering products (51 per cent) was significantly lower than the average liberalization ratio (80 per cent) ([3], p. 102).

\*\*"Foreign technology provided the initial base, but local technical personnel and R & D activities assimilated imported technology and broadened and deepened local capabilities. In other words, human resource development and domestic R & D activities to develop indigenous technological capabilities were viewed not as an alternative but complementary to imports of foreign technology." ([3], p. 65)



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RECENT DEVELOPMENTS IN THE MACHINE-TOOL INDUSTRY:  
THE PROSPECTS FOR FOREIGN DIRECT INVESTMENT  
WITH PARTICULAR REFERENCE TO  
ASIAN DEVELOPING COUNTRIES

Peter O'Brien\*

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A. An overview of the machine-tool industry

1. Defining the subject

More than most industrial branches, that of machine tools is defined in different ways according to the purpose intended. The Japan Machine Tool Builders Association (JMTBA) describes machine tools simply as "machines for making other machinery equipment". 1/ An analysis in a UNIDO document is more precise, stating:

"A machine tool is a power-driven tool, non-portable while in operation, used for carrying out, individually or in combination, the operations of machining, forming and electrochemical processing of metals, wood, glass, plastic and similar materials." 2/

The document notes the wide range of machine tools encompassed by the definition, ranging from simple drilling machines and lathes to machining centres with tool changers and flexible machining systems, and the set of operations involved in metal cutting and metal forming that give rise to hundreds of different kinds of machine tools.

Quantitative studies of machine tools usually confine themselves to major groups 381 and 382 of ISIC 3/ and/or divisions 71-74 of SITC, 4/ although sometimes the apparent rigour is weakened by references to non-electrical machinery. Whatever the details, the points to be kept in mind are:

- (a) Machine tools are tools for making machines and/or the components of machines;
- (b) Their source of power can be mechanical or electrical;
- (c) The materials so fashioned can be quite diverse, although most references are to metal working;
- (d) The huge differences in the complexity of manufacture and operation mean that machine tools can be made in highly advanced factories or simple workshops.

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\*Consultant to UNIDO. This article is an edited version of UNIDO/PPD.53 (16 September 1987).

The production of an advanced machine tool (which is itself made by using other machine tools) not only draws on the traditional (yet ever more sophisticated) disciplines of metallurgy and mechanics, but increasingly on electrical science and, above all, electronics. The chairman-designate of Brown Boveri recently indicated that the electrical-electronic component in the costs of manufacturing machine tools was about 30 per cent. 5/ This shift in the nature of the product is, within the main member States of the Organisation for Economic Co-operation and Development (OECD), altering the character of the industry and the activities of the firms within it.

Leading firms engaged in the substantial buying-in of components, especially electronic control systems, have to use large teams of design engineers, including computer software specialists, to solve their clients' problems (packaged solutions), make sizeable R and D expenditures, and produce a wide range of items (the coverage of product series seems to be a key factor in market success). Yet the industry still retains remarkable heterogeneity with respect to the size of firm and the technological vintage of production methods and outputs, which suggests that any country trying to attract foreign direct investment to the branch has many different segments to look at. Which segment it concentrates its efforts on will depend on the kind of items it wants to manufacture, the markets it wants to sell in, and the kinds of local resources it capitalizes on.

Machine-tool output does not represent more than a small fraction of manufacturing value added (MVA) in any country. Table 1 shows that the machinery and equipment industries in seven major countries account for just under one half of MVA in the leading OECD countries as against just under one third in the leading developing countries; that about two fifths of the output of machinery tends to come from metal products and non-electrical machinery; and that, as indicated by the figures for Japan in the footnote to table 1, machine-tool output is usually not more than about one tenth of that of metal products and non-electrical machinery. The share of machine tools in MVA, therefore, is probably around 2 per cent for the leading OECD countries and from 1 to 1.5 per cent for the leading developing countries. In absolute terms, machine-tool production is a much smaller activity than most of those that have been in the forefront of foreign direct investment during the past decade and its importance derives from the strategic nature, rather than the absolute value, of its output. Its strategic nature, in turn, stems from the pivotal role played by the branch in relation to other major industries within the producing countries. Up to now, there is no instance of a country that has engaged in notable machine-tool production without having a sizeable and diversified industrial structure.

## 2. The world-wide production of machine tools

The majority of the world output of machine tools originates in some 35 countries: table 2 summarizes the data for 1986. The total output for 1986 was over \$29 billion (the highest-ever recorded value of production in dollars) of which some 77.5 per cent

Table 1. Machinery and equipment industries within the manufacturing sector,  
selected countries, 1982-1984  
(Percentage)

Country	Share of NVA by country					
	Metal products	Non-electrical machinery	Electrical machinery	Transport equipment	Precision instruments	All machinery and equipment production
<b>Member States of OECD</b>						
Germany, Federal Republic of	6.2	14.7	13.1	14.5	2.4	50.9
Japan	6.6	12.6	14.1	10.8	1.8	45.9
United States	7.3	14.2	10.1	11.6	3.8	47.0
<b>Latin American countries</b>						
Brazil	5.3	11.2	7.1	8.1	0.8	32.5
Mexico	6.9	5.4	6.4	9.2	0.9	28.8
<b>Developing countries in Asia</b>						
India	3.4	8.9	8.0	8.8	0.7	29.8
Republic of Korea	4.4	4.0	10.0	8.5	1.1	28.0

Source: Handbook of Industrial Statistics 1986 (United Nations publication, Sales No. E/F.86.II.B.3).

Notes: The figures given are averages for 1982-1984. All machinery and equipment industries correspond to ISIC division 38; the figures in the last column are the totals for the first five columns, which correspond to ISIC major groups 381, 382, 383, 384 and 385, respectively. Machine tools, tightly defined, are a subcategory of ISIC major groups 381 and 382: in Japan, for example, they account for less than one tenth of ISIC major groups 381 and 382, i.e. less than 2 per cent of NVA.

Table 2. Estimated world machine-tool production, 1986  
(Millions of dollars)

Country	Total	Cutting	Forming	Percentage of world total
<b>Leaders (&gt;\$1,000 million)</b>				
Japan	7 082	5 728	1 354	72.1
Germany, Federal Republic of	5 210	3 642	1 568	24.2
USSR	3 657	2 943	714	17.8
United States	2 830	2 110	720	12.5
Italy	1 645	1 162	483	9.7
Switzerland	1 439	1 269	170	5.6
German Democratic Republic	1 294	1 064	230	4.9
<b>Significant OECD producers</b>				
United Kingdom	728	580	148	4.2
France	693	569	124	2.4
Spain	365	286	77	2.2
Sweden	295	169	126	1.1
<b>Principal developing-country producers</b>				
Brazil	370	280	90	1.3
China excluding Taiwan Province	364	303	61	1.1
China (Taiwan Province)	351	321	30	1.1
India	250	160	90	0.9
Republic of Korea	242	207	35	0.9
Singapore	34	31	3	0.1
Mexico	18	15	3	0.1
Hong Kong	1.2	0.1	1.1	---
World total	29 232	22 640	6 592	100

Source: American Machine and Automated Manufacturing, February 1987.

(a) The global total is based on 33 reporting countries; in terms of value they account for 99 per cent of aggregate output.  
 (b) Although the figures are estimates, the experience of preceding years suggests that any subsequent revisions of either individual country data or the global total would be unlikely to exceed 5 per cent.  
 (c) Exchange-rate conversions based on average rates reported by the International Monetary Fund (IMF) during the first nine months of 1986 and on bank transfer rates for the last three months of 1986. Where currencies are controlled, the conversions employed were: China, the commercial rate of IMF; German Democratic Republic, 65 per cent of the rate of the Federal Republic of Germany; and USSR, the official rate.

stemmed from cutting tools. Seven countries (five OECD countries and two countries in Eastern Europe) produced in excess of \$1 billion each and together they accounted for 79 per cent of the global total. The eight leading developing countries, including China, only manufactured just over 5 per cent of the global figure. Combining table 2 with table 3, demonstrates that, while the concentration of world production is on the increase, there has been a dramatic shift in the relative strength of different producers. In 1976 the share of the four chief machine-tool-producing countries of the aggregate figure was about 57 per cent whereas, by 1986, their share was just over 64 per cent. In 1976, however, the production of each of the other leaders was more or less double that of Japan (which accounted then for about 8 per cent of world output); by 1986, Japan manufactured more machine tools than the United States of America and the Union of Soviet Socialist Republics combined. Even allowing for the high rise in the value of the yen during 1986, Japan still remains clearly ahead of both the United States and the Soviet Union (although not when they are taken together).

The map of world production has become multi-centred but with striking shifts in the balance of power. Four areas are currently high-profile producers: (a) Europe, with the 12 European members of the Comité Européen de Coopération des Industries de la Machine-Outil (CECIMO) accounting for around 37 per cent of the total global output, within which the Federal Republic of Germany is the dominant entity by far, followed by Italy and Switzerland, both specialist suppliers; (b) Asia, accounting for some 30 per cent of the total global output, of which Japan accounts for four fifths; China, India, the Republic of Korea and Taiwan Province, China, also account for about 1 per cent each of the total global output; (c) Eastern Europe, accounting for close to 20 per cent of the total global output, which comes mainly from the German Democratic Republic and the Soviet Union; and (d) the United States and Canada, accounting for around 11 per cent of the total global output.

The spread of output is radically different from the mid-1970s and even from the start of the present decade as Japanese production has expanded enormously (about five times measured by constant exchange rates) and the output of the United States has dropped from a peak of close to \$5 billion in 1980 to a total of less than \$3 billion in 1986. How can these changes be explained and what do they imply?

Japan's move to dominance is the result of macroeconomic factors and those specific to machine tools. The macroeconomics of sustained growth at home plus the huge export demand abroad have fuelled the consumption of machine tools. The character of demand for machine tools has been strongly oriented, both within Japan and elsewhere (especially the United States), to items whose production processes depend heavily on investment. Outstanding among these branches has been automobiles: "The industry and its related contractors and sub-contractors account for up to 50 per cent of the output of machine tools in Japan". 6/ Export sales of automobiles, along with direct exports of machine tools, have ensured that a

Table 3. Indicators of growth and fluctuation in world machine-tool production, 1976-1986

Producer	Value of production (billions of dollars a/			Increase/decrease in production b/ (percentage)									
				1976-1980				1980-1986					
	1976	1980	1986	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982	1982-1983	1983-1984	1984-1985	1985-1986
World	13.5	26.7	29.2	+11.9	+26.5	+20.0	+16.6	-1.1	-15.1	-13.0	+2.0	+10.0	+33.3
Germany, Federal Republic of	2.4	4.7	5.2	+8.3	+26.0	+21.2	+17.5	-17.0	-10.3	-8.6	-12.5	+14.0	+64.0
Japan	1.1	3.7	7.1	+36.3	+53.3	+27.2	+35.7	+26.3	-20.8	-8.0	+28.6	+17.7	+32.8
USSR	2.0	3.0	3.7	+10.0	+18.2	+11.5	+7.1	-6.5	-0.5	+6.9	-10.0	+7.1	+16.1
United States	2.2	4.8	2.8	+14.3	+25.0	+33.3	+20.0	+6.3	-25.5	-44.7	+14.0	12.0	+3.7

Source: American Machinist, various issues.

a/ At current prices and exchange rates.

b/ Increase/decrease in production in the second year over the first year, i.e. world production increased by 11.9 per cent from 1976 to 1977.



large part of the demand for Japanese machine tools has come, directly and indirectly, from abroad, which, combined with the persistently high rates of growth at home within an economy strongly oriented to industry as the leading sector, has provided a constant and powerful impetus on the demand side. Yet this factor alone is insufficient to explain the force of the production surge of machine tools in Japan. Owing to the successful incorporation of the technological advances emanating from electronics, the quality of output has changed dramatically over the past decade.

More than any other country in the world, Japan has emphasized the production of numerically controlled (NC) machine tools and particularly computer numerically controlled (CNC) items. A few quantitative indicators underline the extent of Japan's commitment to improved production quality. Table 4 describes the principal kinds of machine tools produced in Japan in 1985 and shows how total output and output of NC machine tools were distributed by type of machine. NC production accounted for two thirds of the total and, within this category, machining centres and lathes absorbed 69 per cent of the aggregate, with electric discharge machines and special-purpose items pushing the total up to around 90 per cent of all NC products. These are precisely the kinds of equipment in heavy demand throughout the OECD countries in the current era of revolutionizing the factory and concentrating on custom-made large-scale output.

Table 4. Japan: Production of metal-cutting machine tools, 1985  
(Percentage of output based on value)

Type of machine	Total production	NC production
Machining centres	25.4	37.9
Lathes	25.3	31.3
Grinding	12.5	2.5
Special purpose	11.0	7.0
Electric discharge	8.9	12.7
Milling	7.0	5.4
Boring	2.4	1.2
Drilling	1.5	0.5
Others	<u>6.0</u>	<u>1.5</u>
Total	100.0	100.0

Source: JMTBA, Machine Tool Industry Japan 1986 (Tokyo, July 1986).

Note: In 1985, NC production was 67 per cent of the Japanese total, a proportion reflected in the shares of machining centres that must, by their nature, be NC items.

Tables 5 and 6 illustrate Japan's concentration on NC machine tools compared with other countries. Table 5 shows the flow and stock position in 1985 for three leading OECD producers and two key developing-countries in Asia. On the basis of annual output, Japan puts a far larger share of its resources into NC production than any of the other countries do. Currently, 67 per cent by value of the machine tools manufactured in Japan are NC, while in both the Federal Republic of Germany and the United States the share is not more than 30 per cent. The fact that Japan has maintained such a high proportion for some years is demonstrated by the stock data (computed on a unit basis) in the last column of table 5, which show that, as the Japanese producers themselves say, the country is now in the "one in four" period: one quarter of all the machine tools installed are of the NC type. Although no reliable data for the Federal Republic of Germany and the United States could be found, there can be little doubt that the shares in these countries are far below the Japanese figures.

Table 5. Production and use of NC machine tools in selected countries, 1985 (Percentage)

Country	NC production as a share of total machine-tool production	NC share of total machine tools installed
Japan	66.9	25.7
Germany, Federal Republic of	30.0	-
United States	28.0	-
Republic of Korea	10.2	-
India	3.7	0.1

Sources: Metalworking, Engineering and Marketing, September 1986; Indian Machine Tool Manufacturers Association, Machine Tool Industry India, (Bombay, 1986); Korean Machine Tool Manufacturers Association, Machine Tool (December 1986); "Deutsche Werkzeugmaschinen sind Spitze", Süddeutsche Zeitung, 30 March 1987, reporting on a study by the Boston Consulting Group carried out on behalf of Verein Deutscher Werkzeugmaschinenfabriken e.V.

Note: Production data based on value; stock data based on units.

Table 6 highlights the position for one of the most important sets of machine tools developed in recent years, CNC lathes. Taking three groups, Japan, the United States and the leading Western European countries (excluding only Switzerland among significant producers), the table sets out the shifts in their relative shares of production, by value and volume, during the period

Table 6. The shares of the OECD countries in the total production of CNC lathes, by value and volume, 1976, 1980 and 1984

Year	<u>Shares at 1976 exchange rates</u>			<u>Shares at current exchange rates</u>		
	Japan	Europe	United States	Japan	Europe	United States
<u>Value (millions of dollars)</u>						
1976	17.8	40.8	41.2	17.8	40.8	41.2
1980	31.8	38.3	29.8	35.3	39.4	25.2
1984	42.1	44.2	13.7	53.8	32.2	14.0
<u>Volume (units)</u>						
1976	41.0	32.8	26.1	-	-	-
1980	60.4	25.8	13.8	-	-	-
1984	72.3	21.0	6.7	-	-	-

Source: Staffan Jacobsson, Electronics and Industrial Policy (London, 1986).

Note: Europe defined as France, Germany, Federal Republic of, Italy, United Kingdom of Great Britain and Northern Ireland and Sweden. Shares according to value calculated according to base year and current exchange rates to show sensitivity of the percentages to currency fluctuations.

1976-1984. The rise of Japan to its position in 1984 from its mid-1970s position, where Europe and the United States dominated in terms of value and Japan's output was worth less than one fifth of the total, could scarcely have been more rapid. By 1984, over one half of the value of the CNC lathes produced (measured by current exchange rates) came from Japan; even with the conversion of currency at 1976 rates, the five Western European countries together (with a market of around 250 million people) were only barely in advance of Japan. On the basis of volume, Japan has always been in the forefront; nevertheless, it has continuously increased its share of world output to reach close to three-quarters by now.

It can legitimately be argued that the disparity between the figures for value and volume is appreciable. Table 7 gives average prices in dollars for 1984 for NC cutting machines and shows items made in the United States selling at double the Japanese prices and machines made in the Federal Republic of Germany selling at one and a half times as much again compared with Japan. While alterations in exchange rates over the past 18 months along with a relative upgrading of Japanese production have certainly narrowed the average price differentials, it is still probably true that the figures for the Federal Republic of Germany and the United States exceed those for Japan. The relevance of price comparisons for machine tools is that relative prices are fairly closely correlated with relative quality (the price tends to reflect the weight of the tool, and the weight itself is a fair approximation of machine power).

Table 7. Unit production and the average price of NC metal-cutting machines in selected countries, 1984

Country	Units delivered	Total production of metal-cutting machines (measured by value) (percentage)	Average price (\$ current exchange rates)
France	1 294	58	-
Germany, Federal Republic of	9 966	49	99 000
Italy	1 520	20	-
Japan	38 036	67	65 000
United Kingdom	2 630	50	-
United States	5 163	39	131 000

Source: American Machinist, February 1986.

The mix of NC machine tools in Japan is thus oriented towards smaller items than those made by its competitors. Within Japan itself, and above all internationally, the thrust has been towards

the production of less than the top size of MC machine tools and this market segment seems to have been very large. To a considerable degree, Japan has created the market and captured it.

The question is whether the developments of recent years are likely to be a reliable pointer to the remainder of the decade. As with some other, related, industrial branches, a crucial element affecting the competitive struggle in the near future is the trade situation between Japan and the United States. Since about 14 per cent of the Japanese production of machine tools is sold in the American market, the application of sharp trade limitations could shift market shares and encourage reactions on the part of Japanese firms. Foremost among those responses would probably be foreign direct investment; section B will examine the evidence on this point.

Production relocation is, however, only part of the picture. The size and geographical origin of demand, as well as its fluctuations, will have a major influence on production shares. Machine tools are producer durables purchased as part of an investment decision in other branches. The sustainable annual rate of demand is, therefore, a function of investment cycles, the economic life of machine tools (which in periods of rapid technical progress depends as much on the real productivity of new vintages of equipment as on physical wear and tear) and the prospects of extending the use of machine tools into new areas. Subsection 3 below looks at trends in consumption.

### 3. The consumption of machine tools

Table 8 shows apparent consumption (production less the trade balance, thus leaving aside any movement in stocks) in 1986 for the six major markets (sales in excess of \$1 billion), the four leading developing countries in Asia, as well as Brazil and Mexico. The world's top four industrial countries stand out on this index: they absorb some 60 per cent of global output. The inversion in the rankings compared with production for the United States and USSR on the one hand and Japan and the Federal Republic of Germany on the other reflect the trade patterns of the countries, as will be shown in the next subsection.

Table 8. Estimated apparent consumption  
of machine tools, 1986  
(Millions of dollars)

Country	Apparent consumption
<u>Main markets (&gt;\$1,000 million)</u>	
USSR	5 072
United States	4 470
Japan	4 400

continued

Table 8 (continued)

Country	Apparent consumption
Germany, Federal Republic of	3 181
United Kingdom	1 256
Italy	1 028
<u>Developing countries in Asia</u>	
Republic of Korea	532
China, excluding Taiwan Province	479
India	396
China (Taiwan Province)	177
<u>Other developing countries</u>	
Brazil	379
Mexico	216

Source: American Machinist, February 1987.

Note: Apparent consumption measured as production plus imports less exports. Exchange-rate conversions are the same as for table 2.

The demand for machine tools is strongly cyclical in character. In the absence of adequate time series for sales, the changes in world output, set out in table 3 above, can be taken as a proxy. They show that the past decade splits into three sub-periods. From 1976 to 1980, the year-on-year shifts were all positive and generally well in excess of 10 per cent (the simple average was +18.7 per cent); the period 1980-1983 was a phase of output falls averaging close to 10 per cent per year; while the period 1983-1986 witnessed another upswing in output, above all in the period 1985-1986, when it rose by one third. The annual absolute shifts (i.e. ignoring the sign of the change) varied substantially among the leading countries, averaging around 29 percentage points in Japan, 20 percentage points each in the Federal Republic of Germany and the United States, and slightly over 9 percentage points in the Soviet Union. For three of these four countries the ratio of rises to falls in percentage points was 8:2, while for the Federal Republic of Germany the ratio was 6:4. The evidence of quite sharp annual changes, therefore, is pretty clear. (Even at constant exchange rates, the Japanese figure would be high, as witnessed by the fact that the latest annual shift, the 12 months in which the biggest alteration in the dollar to yen rate has occurred, is not much above the average).

An industry with these features is very likely to exhibit periods of over capacity and under capacity in production, accompanied by pronounced swings in the rates of utilization, and

probably big changes in stocks and the occasional price war. These points will certainly be put into sharper relief as product quality is altering rapidly owing to technical change. An ongoing process of major industrial reorganization is to be found within, as well as among, the top producers. While complete evidence in the form of detailed series of figures by country is hard to come by, illustrative data abound.

Producers in the Federal Republic of Germany had an extremely difficult time during the first half of the present decade, when many of them collapsed completely. The companies that have done well have been forced to make massive (relative to output) investments and to adopt highly selective product strategies often involving an effective withdrawal from the volume end of machine-tool production. Deckel, for example, which commands about 50 per cent of the market in the Federal Republic of Germany for its principal products (universal milling and boring machines), tripled capital spending in the period 1984-1986 and pushed the MC proportion of its output to 85 per cent today as against some 30 per cent at the start of the decade.

In Japan, the slowing down of investment in new plant (abroad as well as at home) and model retooling by the automotive producers, along with the trade tensions vis-à-vis the United States, are taking their toll. A survey conducted by the Japan Machinery Exporters Association (JMEA) at the end of 1986 revealed that some 76 per cent of the firms interviewed found the situation in which they were placed hard to handle, and had limited scope for reducing their operating costs further. Large firms such as Mori Seiki, for whom exports to the United States have on occasion reached 60 per cent of output, as well as many smaller ones drawn into production during the boom years, will all find the situation tough. MITI reported at the end of 1986 that orders had decreased by 20 per cent, compared with 1985, and a large-scale reorganization of the branch seemed unavoidable.

The story in the United Kingdom is one of massive shifts that are by no means over. In the field of CNC lathes, for which the market in the United Kingdom is about 1,800 units per annum, more than 100 companies offer products but one firm, TI, currently makes more than half the total. Yet the opening of the Yamazaki plant in early 1987 boded an immense upheaval in that market. When full-scale production has been achieved (which was scheduled for early 1988) the annual production of CNC lathes and machining centres is expected to reach 1,200 and TI, despite record orders of some \$38 million in 1986, has already indicated the likelihood of selling off its whole machine-tool business. Since plant managers at Yamazaki nevertheless say that about 80 per cent of its output will be exported, the shock waves will spread to other EEC markets and will probably cause price wars in what will increasingly become cut-throat competition.

The preceding comments have made no reference to upheavals within the United States where the demand for machine tools has been strong, yet domestic output is well below the levels attained at the beginning of the decade. To understand this better and

indeed obtain a full map of competitive tensions in the industry, an examination of trade patterns is required.

#### 4. International trade in machine tools

Earlier sections of this article have brought into relief the striking changes in production and consumption, driven by investment cycles and technological innovation, that continue to redraw the world machine-tool map. International trade flows are the clearest index of the relative positions of countries. Table 9 brings together, for the main producing countries listed in table 2, the ratios for 1986 of exports to production, imports to apparent consumption, and the trade balance compared with the sum of exports and imports. The second column shows that for all the main OECD and Eastern European countries (with the exception of the Soviet Union) the share of output sold abroad in 1986 was high by any standard. The proportion was lowest in the United States, yet even there was close to 20 per cent; for other countries, it ranged from a little more than 40 per cent (Japan) to nearly 90 per cent (Switzerland). By combining the third column with the second, the extent to which machine tools were characterized by intra-trade can be seen. With the exception of Japan, where imports met approximately 5 per cent of local demand, the share of imports in apparent consumption exceeded 30 per cent for every OECD and Eastern European country of weight. For the smaller producers of specialist items (Sweden, Switzerland) the share of imports was about 70 per cent; France and the United Kingdom were not much different; and machine tools produced abroad accounted for almost 50 per cent of machine-tool consumption in the United States.

Table 9. Indicators of international specialization in machine tools, 1986

Country	Exports as a percentage of production	Imports as a percentage of apparent consumption <u>a/</u>	Net trade as a percentage of gross trade <u>b/</u>
<b>Leaders</b>			
German Democratic Republic <u>c/</u>	(100)	-	+87.9
Germany, Federal Republic of	60.0	34.9	+47.8
Italy	56.9	32.0	+48.4
Japan	41.0	5.6	+84.4
Switzerland	88.5	67.9	+58.6
United States	19.4	49.2	-59.4
USSR	6.9	32.9	-73.7

continued



Table 9 (continued)

Country	Exports as a percentage of production	Imports as a percentage of apparent consumption <u>a/</u>	Net trade as a percentage of gross trade <u>b/</u>
<u>Significant OECD countries</u>			
France	45.8	60.6	-29.1
United Kingdom	51.7	71.7	-41.4
Spain	50.0	36.0	-21.5
Sweden	71.2	74.0	-7.1
<u>Principal developing countries</u>			
Brazil	10.5	12.7	-10.3
China, excluding Taiwan Province	2.1	25.7	-87.8
China (Taiwan Province)	69.6	39.5	+55.4
India	8.4	42.2	-77.7
Mexico	5.6	92.1	-100.0
Republic of Korea	10.3	59.4	-84.7
Singapore <u>d/</u>	..	..	..

Sources: Calculations from data in American Machinist, February 1987, and Financial Times, 27 April 1987.

a/ The computation is as follows: imports divided by production plus imports less exports.

b/ The difference between exports and imports divided by their sum; a positive sign indicates a positive balance of trade.

c/ "As usual, the East German export figures are higher than production ... it has sometimes been explained by the differences between GDR marks (in which production is measured) and valuta marks (in which trade with COMECON countries is conducted). This time, the explanation is reported to be mainly that there were exports of unsold stocks of machine tools." American Machinist (February 1987), p. 66.

d/ The importance of re-export, and the difficulty of separating this entrepôt trade from trade based on local production, renders the calculation of the share of Singapore too imprecise to warrant its inclusion in the table.

The trade balance in relation to overall trade brings out the significance of these shares. Among the world's top seven production locations, the Soviet Union and the United States are very

heavy importers while the rest have strong positive balances (ratios from near 50 per cent to above 80 per cent). The negative balance picture carries over to France and the United Kingdom and is even marginally the case for Sweden, which is generally reckoned to have a quite successful specialist manufacturing base and to be a quite rapid innovator and user of foreign innovations. Given that a major part of Eastern European trade tends to be within the region, the figures for the German Democratic Republic and the Soviet Union largely cancel each other out; consequently the present pattern within OECD countries emphatically points to the United States as the dominant absorber of exports stemming from the four producers with high positive ratios of net to gross trade. As this development has become particularly pronounced within the past two-three years it is not surprising that the current position is fraught with tensions.

Where do the developing countries stand as regards trade? For the seven key countries listed in table 9, the findings reveal a mixed set of situations. With regard to the export to production and net trade to gross trade indicators, Taiwan Province, China, is distinct from the rest. It exports \$7 out of every \$10 produced and, notwithstanding an import/consumption ratio that is not small, has a positive balance that compares very favourably with the leading OECD exporters. The other developing countries have negative trade balances and Brazil has an overall participation in trade that is low compared with any of the other countries listed (even the Soviet Union). For India and the Republic of Korea, their industrialization thus makes relatively heavy use of imported machine tools despite the stress laid by both countries, albeit in different ways, on strengthening domestic production capabilities. These data suggest that the trade picture raises rather separate questions for the developing countries and the OECD countries. In the former case, the problem is how to use imports to reinforce local capabilities, whereas in the latter, the current emphasis is not only on developing an export industry, but also on ensuring that domestic output will meet the demands posed by a total reorganization of manufacturing. This subsection looks first at the situation of the OECD countries and then at that of the developing countries.

Just as in automobiles, so in machine tools the key market towards which all producers in this strongly trade-oriented branch are pulled is the United States. Earlier tables have shown how the aggregate value of imports into the United States has risen. Table 10 provides a breakdown, by country of origin, for benchmark years over the past decade. There is both continuity and change. In 1976, the Federal Republic of Germany and Japan dominated as sellers; during the following 10 years their grip strengthened but with a major reversal of roles as, since the start of the 1980s, Japan alone has taken close to half the United States import market. This does not mean that the composition of Japanese exports has been unaltered. As of now, for example, Japan has a share of the whole United States market (i.e. including domestic output) for NC lathes and machining centres of more than 70 per cent and a share of the market for punching and shearing tools of about 45 per cent compared with shares of 50 per cent and 19 per cent, respectively, in

1981. The Japanese trade thrust, therefore, has switched rapidly and decisively to MC items. The share of the United Kingdom is now down to half the level of 1976 while Italy and Switzerland, having lost ground in the 1970s, are slightly stronger than a decade ago; Taiwan Province, China, has now reached fourth place among foreign suppliers, enough to give it the double-edged distinction (as will be seen below) of joining the Federal Republic of Germany, Japan and Switzerland as targets for Voluntary Export Restraints (VER).

Table 10. Imports into the United States of machine tools, by country of origin, 1976, 1981 and 1985

Country	Share in total value of imports (%)		
	1976	1981	1985
China (Taiwan Province)	4	7	7
Germany, Federal Republic of	29	14	14
Italy	5	4	6
Japan	21	49	49
Switzerland	9	6	8
United Kingdom	10	11	5
Others	<u>22</u>	<u>9</u>	<u>11</u>
Total	100	100	100

Sources: World Non-Electrical Machinery: An Empirical Study of the Machine Tool Industry (United Nations publication, Sales No. E.83.II.B.5); Metalworking Engineering and Marketing (Nagoya, Japan), September 1986; American Machinist (New York), February 1987.

Looking at trade flows for OECD countries from another angle, tables 11, 12 and 13 provide information for 1985-1986, by destination of machine-tool exports, for Japan, the European Economic Community (EEC) and Switzerland. Japan is much more dependent on the United States market than other exporters are and yet more diversified in the destinations of its trade. Two thirds of its foreign sales go to the OECD countries, the ratio for the United States/Europe being 2:1. First, few exports of EEC producers go to Japan (certainly less than 5 per cent of the total), second, 15 per cent only go to North America as a whole; and third, intra-trade between EEC members is perhaps less intense (just under one third of total exports) than might be expected. Switzerland, which sells half its exports to EEC, is the trader with by far the heaviest reliance on EEC: its relative sales to the United States are at about the same level as those of EEC.

Table 11. Japan: Breakdown of exports of machine tools by region, 1985

Region	Share (%)
North America	44.9
Western Europe	22.5
Far East	10.3
Eastern Europe	9.3
South-East Asia	6.0
Oceania	3.8
Others	3.2

Source: JNTBA, Machine Tool Industry Japan 1986 (Tokyo, July 1986).

Table 12. EEC: a/ Exports of metal-working b/ machine tools by region, 1985

Region	Share c/ (%)
Intra-EEC d/	31.0
North America e/	15.0
Austria, Sweden and Switzerland	10.0
USSR	7.0
China	4.0
India	2.0
Others f/	31.0

Source: CECIMO, Statistical Survey of Machine Tools 1985 (Brussels, August 1986).

- a/ Excluding Greece, Ireland and Portugal.
- b/ Comprising the majority of machine-tool exports.
- c/ Rounded to nearest whole number.
- d/ Defined to include the 12 members of EEC.
- e/ United States 13 per cent, Canada 2 per cent.
- f/ Partial evidence suggests that the share of Asia (excluding China and India) could have been 6-7 per cent.

Table 13. Switzerland: Machine tool exports  
by region, 1986 a/

Region	Share (%)
Germany, Federal Republic of	28.0
Other EEC countries	22.0
United States	12.0
Japan	5.0
Others	33.0

Source: Financial Times, 27 April 1987.

a/ January to September.

Although a fully disaggregated country breakdown could not be obtained, the evidence indicates that Asian countries probably absorb around 17-18 per cent of Japanese machine-tool exports and perhaps some 13 per cent of those from EEC. Given the current boom in world machine-tool trade, the absolute size represented by those shares is by no means negligible; and if most forecasts of comparative regional growth rates for industry for the next few years are to be believed, the market for machine tools is likely to be one of the fastest to expand.

The question tackled in the next section relates to the question of the Asian countries becoming a production location rather than only an export market and the possibility that they could be employed as sites from which to assemble and export machine tools to other countries as well as to increase domestic self-sufficiency (measured in the crude sense of comparing the number of locally manufactured machine tools to the total number consumed). But if the market for exports in the OECD countries were to become tighter still, the Asian countries (excluding Japan) would probably become a major arena for competition between manufacturers, and a flurry of activities, ranging from trade to foreign direct investment to technology transfer arrangements of various kinds, might well be on the cards. The question of where those deals would be located and what they would consist of is an open one.

The data on trade patterns hints at another aspect of the market behaviour of machine tools on which only sparse information could be obtained, yet which may be of appreciable importance. Japan's rise in the United States market over the past decade, along with the mix of regions to which its foreign sales have been directed, demonstrates that a successful internationalization of its activities has occurred. But that success is due not only to its performance as a producer, in machine tools as elsewhere, but also to the global reach of its marketing.

Marketing has been handled not only by the producer companies themselves, but also by the famous trading houses (Soga Shosha). While it is true that the 10 largest Japanese manufacturers of machine tools account for about one half of the country's output, and that they are strongly export-oriented and probably do most of their own marketing, the aggregate export bias of the industry means that a sizeable share of exports must come from small to medium-size firms that draw on the Soga Shosha as marketers. A good part of the opening up of markets, particularly to relatively small and maybe one-off buyers, must certainly be credited to the trading houses. Furthermore, the last five years have seen substantial foreign direct investment by Japanese firms in automobiles, especially in the United States, and this has brought machine-tool exports through the well-established ties in Japan itself between the automotive producers and machine-tool suppliers.

The demonstration effects of these plants have not only been confined to the much vaunted management and organizational abilities of Japanese producers (e.g. the Honda plant in Tennessee) but have also led to the plants becoming showcases for Japanese machine tools. This form of advertising, by exhibiting the product in action, has certainly added to the marketing impact. Allied to the powerful network of offices of the Japanese External Trade Organisation (JETRO) to be found in all major and a large number of minor markets, the foreign direct investment in associated branches, along with the efforts of the trading houses, provide even fairly small producers with opportunities for increasing their exports. Given that some 69 per cent of the 113 members of JMTBA are small to medium-sized firms (as measured by the number of employees),\* the multi-dimensional marketing effort is probably a major factor in export sales.

Switzerland has been a successful exporter with a similar production structure (108 producing firms, few transnationals, an average payroll of less than 130 employees) but without the other aspects of the recent Japanese push. But in the case of Switzerland, the emphasis on highly specialized machine tools has been an advantage. In 1986, the average price per tonne of exported machine tools was above Swf 50,000, as against an import price of Swf 24,000, while table 14, using comparative data for 1981 and 1985, shows Switzerland to be very much the high-price-bracket producer. Undoubtedly the country's general image as a top-quality supplier of all goods and services has assisted its marketing and contributed to the willingness of buyers to accept even long lags in delivery. At the end of 1986, instances of lags of 14 to 18 months were quoted as having been accepted by foreign firms wishing specif-

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\*The size of JMTBA members in 1985 was distributed as follows: less than 49 employees, 11.2 per cent; from 50 to 99 employees, 17.8 per cent; from 100 to 299 employees, 40.1 per cent; from 300 to 499 employees, 10.3 per cent; from 500 to 999 employees, 13.1 per cent; and above 1,000 employees, 7.5 per cent.

ically to buy Swiss machine tools. For a top-quality producer and a quality-volume producer, therefore, the marketing dimension almost certainly plays a powerful role in the internationalization process.

Table 14. Average value per tonne of metal-cutting machine tools produced by leading European countries, 1981 and 1985  
(Thousands of Swiss francs)

Country	1981	1985
France	30	42
Germany, Federal Republic of	29	37
Italy	20	22 <u>a/</u>
Sweden	11 <u>a/</u>	21 <u>a/</u>
Switzerland	41	48
United Kingdom	-	14 <u>a/</u>

Source: CECIMO, Statistical Survey of Machine Tools (Brussels, April 1983 and August 1986).

a/ Referring to export markets alone. Current exchange rates applied against the Swiss franc each year.

The trade position may be at a turning point owing to developments in the United States market. In 1986, the United States alone absorbed about 23 per cent of world (excluding the USSR) imports and towards the end of that year demanded the introduction of VER by Germany, Federal Republic of, Japan, Switzerland and Taiwan Province, China. The accent was on rolling back their shares of the market.

Specifically, Japanese sales of MC lathes and machining centres were to be put back to the 1981 level of 50 per cent, and shearing and punching equipment back to the 1981 level of 50 per cent, and shearing and punching equipment back to the level of 19 per cent. Similar product targeting can be found in the five-year agreement with Taiwan Province, China. The market share for conventional lathes would be limited to 24.7 per cent (as against the figure of 29.7 per cent recorded in 1985); for MC lathes, 3.2 per cent; for conventional milling machines, 19.3 per cent; and for machining centres, 4.7 per cent. These figures are indeed revealing. Not only were ceilings introduced for the sales of conventional products where low-cost, efficient production had been built up, but also there was advance protection against "quota hopping" for more sophisticated machine tools (i.e. efforts by Japanese and other producers to relocate to Taiwan Province, China, as a device for reducing the impacts on themselves of a VER régime).

Certainly this does not prevent the relocation of production elsewhere but the calculation of the United States was presumably that other sites would be a good deal less attractive (meaning, among other things, that the production of more advanced machine tools was unlikely to be a footloose activity).

It appears that Japan and Taiwan Province, China, have accepted VER and negotiations with the Federal Republic of Germany may have been partially successful. But Switzerland has categorically refused to come to any arrangement.

"Bern turned the request down point-blank and subsequently said it would not consider a proposed ceiling on numerically-controlled cutting and punching units as binding and threatened to 'take steps' if Washington acted unilaterally to restrict deliveries." 5/

The impact of VER policy is unclear for several reasons. First, the restraints are set in terms of shares of the United States market and the overall behaviour of that market is hard to predict. Second, experience with VER where shares are computed in relation to the numbers of units sold shows that the scope for upgrading the quality of a product is usually well used by exporters. Third, the extent to which VER will actually be observed is open to considerable doubt. Fourth, space remains for production relocation, both to the United States and elsewhere, which could ensure that import shares of the American market continue to rise. What the VER approach does signify, however, is a strong warning to foreign producers; their future production and investment strategies will certainly not rely so heavily on sales to the United States. The implications for foreign direct investment are examined in the next section.

The circumstances of the leading developing countries as regards trade are quite different. In Latin America, foreign exchange shortages must certainly have contributed to limiting imports as well as curtailing local output (shortages of components). Thus in Mexico, despite the very high import to consumption ratio, the current level of new investment in machine tools is extremely low while in Brazil, apparent consumption has been severely squeezed and imports kept to a low share of the aggregate.

In Asia, however, the position differs enormously as the leading developing countries have pressed on with industrial investment and sought to upgrade their stock of machine tools. In Taiwan Province, China, the machine-tool branch was designated a strategic industry in the early 1980s and received development subsidies from the Government along with increased tariff protection in those areas where it was felt that local firms could improve their capabilities quickly if some limited (in extent and duration) protection could be given against low-cost imports. 7/

India launched a ten-year plan in 1984 for sectoral development aimed strongly at the CNC segment of the machine-tool industry. But it was clearly foreseen that intensified imports would be necessary to assist in the improvement of local capabilities as well



as to fill the multifarious gaps in existing local production. In arranging its policy in this way, India was following its traditional approach of reinforcing local skills (an approach that has had mixed results in other industrial branches however).\*

An attempt to diversify imports by source has been made, but the list of suppliers does not differ so markedly from that of the OECD countries (i.e. in 1984, around two thirds by value of all imports came from the Federal Republic of Germany and Japan, with Czechoslovakia, the German Democratic Republic, Switzerland, the United Kingdom and the United States as the other significant sources). Import licences are gradually being given to NC/CNC items although, in the main categories of import, the shift is not especially quick. Thus a disaggregation of imports of machine tools for 1984, by volume and value of each product, shows that of 289 grinding machines, 9 were NC/CNC; of 181 lathes, 93 were NC/CNC; of 124 presses, 5 were NC/CNC; of 97 boring machines, 12 were NC/CNC; and of 87 milling machines, 5 were NC/CNC.

With the exception of Taiwan Province, China, the crucial questions for developing countries regarding trade pertain to import strategies rather than export markets. But the growing conflicts over world markets, along with the price cutting and the pressures for reorganizing both industrial structure and production location, mean that the situation in developing countries is affected by fierce competition between leading firms. This is why a fairly complete account of that competition has been necessary.

**B. Foreign direct investment: a response to competitive pressures?**

**1. Machine tools and foreign direct investment**

As the machine-tool branch is small in relation to engineering industries as a whole, it would not be surprising if foreign direct investment in machine tools were but a small fraction of the overall external investment by the leading countries. In fact, available data are generally not sufficiently disaggregated to permit investments in machine tools as such to be identified; instead, the figures usually relate to the much broader categories of machinery and encompass metalworking, fabricated metals. Tables 15-18 set out the pertinent information for the Federal Republic of Germany, Japan, the United Kingdom and the United States, respectively. For both Japan and the United States, the stock position for 1985 could be obtained, and for the Federal Republic of Germany the stock position for 1984, and for the United Kingdom the cumulative investments for the five-year period 1980-1984 inclusive. In addition, table 18 provides net flow data for 1985 for the United States.

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\*The Perspective Plan schedules a production of 800 NC/CNC machines for 1992, equivalent to 25 per cent of total output for that year; in 1985 local manufacture accounted for 65 per cent of apparent consumption.

Table 15. Federal Republic of Germany: Direct investment abroad, stock at the end of 1984 (Billions of deutsche mark)

Sector	Stock
All sectors	DM 145.4
<u>Manufacturing:</u>	DM 62.7, equal to 43.1 per cent of all foreign direct investment
Mechanical engineering	DM 5.7, equal to 9.1 per cent of manufacturing, of which: United States, DM 1.7; EEC, DM 1.4; and Brazil DM 1.1

Source: Deutsche Bundesbank, Monatsbericht, February 1986.

Notes: The totals include direct and indirect investment. Branch classification according to that of the recipient firm. In the case of mechanical engineering, the difference in the total for the branch is considerable compared with a division of branches according to host firm, where the figure is DM 9 billion. Neither classification, however, yields a significant figure for developing countries in Asia: DM 76 million on a recipient basis, DM 147 million on an investment basis.

The tables highlight several key points. First, foreign direct investment in manufacturing machinery is notably less than half the total foreign direct investment for all four major investors: 40-45 per cent for the Federal Republic of Germany, the United Kingdom and the United States and less than 30 per cent for Japan with its well-known concentration on securing access to natural resources by foreign direct investment.

Table 16. Japan: Direct investment abroad, stock at the end of 1985 (Billions of dollars)

Region and sector	Stock
<u>World</u>	
All sectors	\$82.8 (\$47 in 1981-1985)
Manufacturing	\$24 (\$11.7 in 1981-1985), equal to 29.2 per cent of all investment
Machinery	\$1.948 (\$1.077 in 1981-1985), equal to 8.1 per cent of manufacturing

continued

Table 16 (continued)

Region and sector	Stock
<u>Asia</u>	
All sectors	\$19.3 (\$7.5 in 1981-1985)
Manufacturing	\$7.4 (\$2.9 in 1981-1985), equal to 38.6 per cent of all sectors
Machinery	\$0.571 (\$0.307 in 1981-1985), equal to 7.6 per cent of manufacturing, 29.8 per cent of branch

Source: Ministry of International Trade and Industry, The Second Basic Survey on Japanese Firms Activities Abroad: Statistics on Investment Abroad (Tokyo, August 1986).

Notes: The data are based on the benchmark survey carried out in 1983 and supplemented by data for the last three years. The totals are the sum of the investments approved from 1965 to 1985 inclusive. As Japanese sources do not say whether the approvals were actually realized, it is probable that the figures overstate the real investments from Japan itself. Indirect investments are, however, excluded.

Table 17. United Kingdom: Outflow of foreign direct investment, 1980-1984  
(Billions of pounds sterling)

Investment by sector	Amount
<u>Aggregate foreign investment 1980-1984</u>	
All sectors	£19.6
<u>Manufacturing:</u>	£8.96, equal to 45.7 per cent of all foreign direct investment
Metalworking	£0.342, equal to 3.8 per cent of manufacturing
Mechanical engineering	£0.728, equal to 8.1 per cent of manufacturing
<u>Investment in developing countries of Asia</u>	
Manufacturing	£0.478, equal to 5.6 per cent of world total
Metalworking	£0.0046, equal to 1.3 per cent of world total
Mechanical Engineering	£0.0235, equal to 3.2 per cent of world total

Source: Business Monitor (H.M. Stationery Office, May 1986).

Table 18. United States: Direct investment abroad, 1985  
(Billions of dollars)

Investment by sector	Amount
<b><u>Stock at the end of 1985</u></b>	
All sectors	\$232.7
<b><u>Manufacturing</u></b>	\$95.6, equal to 41.1 per cent of all foreign direct investment
Of which:	
Primary and fabricated metals	\$5.5, equal to 5.8 per cent of manufacturing
Machinery except electrical	\$18.7, equal to 19.8 per cent of manufacturing
Of total of primary and fabricated metals branch: stock in developing countries in Asia, \$0.13 billion, equal to 2.4 per cent of the branch; stock in Canada and EEC countries, \$3.8 billion.	
Of total of non-electrical machinery branch: stock in developing countries in Asia, \$0.421 billion, equal to 2.8 per cent of the branch, stock in Canada and EEC countries, \$14.4 billion.	
<b><u>Net flow for 1985</u></b>	
All sectors	\$18.7
<b><u>Manufacturing:</u></b>	\$10.5
Of which:	
Primary and fabricated metals	\$0.410, equal to 3.9 per cent of manufacturing
Machinery except electrical	\$4.3, equal to 41 per cent of manufacturing
In both branches, investment in developing countries in Asia was negligible.	

**Source:** Computed from US Department of Commerce, Survey of Current Business (Washington, D.C., August 1986).

Second, the stock of foreign direct investment in the broad category of machinery industries (or mechanical engineering in the cases of the Federal Republic of Germany and the United Kingdom) is not a large share of the manufacturing total; the share of almost 20 per cent of the United States is more than double that of each of the other three investors where the proportion is in the range or 8-9 per cent. Given that machine tools are but a part of the

machinery industries, the United States is supposedly the only country where, on the basis of stock, past foreign direct investment in machine tools may have been more than 1 or 2 per cent of the manufacturing aggregate.

Third, the shares of investment in machinery in developing countries in Asia have been small save for investments from Japan; while close to 50 per cent of Japan's foreign direct investment in machinery has gone to its neighbours, the other three countries have invested about 3 per cent or less in Asia.

Fourth, the three preceding points strongly suggest that, up till now, the machine-tool sector has not been notable for attracting foreign direct investment and that Asia has not been a major recipient of such investments as may have occurred. (The likelihood is that EEC may have been the key area.)

Fifth, the figures in brackets in table 16 are revealing about Japan's foreign direct investment. On a global basis, around half of the investments were made during the first half of the present decade yet for Asia the proportion tended to be around 40 per cent (although it did exceed one half specifically in the machinery sector). On the whole the trend in recent years has been away from Asia. The data for the United States for 1985, presented in table 18, tend to reinforce the point: although net machinery investments abroad were at the comparatively high rate of 41 per cent of all manufacturing (double the same ratio for existing stock), foreign direct investment in developing countries in Asia was negligible.

Information released for 1986 on flows of foreign direct investment from the Federal Republic of Germany points in a similar direction. g/ It shows a net world-wide foreign direct investment of DM 11.2 billion (some 18 per cent less than 1985), only 6.1 per cent of which went to developing countries (compared with 30 per cent in 1983). Although a precise figure for developing countries in Asia is not available, the data do allow a ceiling to be put on the share: it could not have exceeded 2 per cent. Of particular interest is the share of the engineering industry of only just over 5 per cent, since vehicle manufacture, at almost 20 per cent, was much the most important sector. It may be that the purchase of machine tools to support foreign direct investment in vehicles was reflected in exports from the Federal Republic of Germany. The evidence points to a machine-tool trade effect, rather than a machine-tool investment effect, of the international investment process in automotives.

The evidence so far has concentrated on investments in machine tools in relation to other industrial branches and shown them to be tiny. It might reasonably be argued, however, that a better measure of the industry's propensity to invest would be a comparison of foreign direct investment with total investment or total output in the branch, calculated on an annual basis. As comparable numbers of this type could not be obtained, the best that can be offered is a very rough approximation, drawing on such figures as do exist.

In 1985, the production of metal-cutting machine tools in Japan accounted for 10 per cent of the output of all industrial machinery. If the same proportion holds for foreign direct investment, then about \$220 million was invested globally in metal-cutting machine tools by Japanese firms in 1985. Also, in 1985, Japan produced metal-cutting machine tools worth \$4.4 billion; taken together these figures would put the ratio of foreign direct investment to current output at about 5 per cent. Using similar computations for the United States, that same ratio would come to 4.8 per cent so a percentage figure of 4.5-5 per cent might be the right order of magnitude for the relation between foreign direct investment and current output of machine-tools at the moment. Compared with data for the automotive industry for the first half of the 1980s, this ratio is low as it is against data for most branches of electronics and electrical equipment, not to mention areas that have traditionally been at the core of foreign direct investment in manufacturing; for example, textiles, garments and food processing.

Further evidence on the role of foreign direct investment in machine tools is given in the table below, which tries to ascertain what the behaviour of firms in the Federal Republic of Germany has been as regards foreign direct investment, drawing on information for the period 1961-1983. Although the definitions employed in the basic data bank are not as precise as they might be, the material suggests that 3.2 per cent of all recorded cases of foreign direct investment were related to machine tools. Fewer than one tenth of these (13 cases) were in developing countries in Asia while about three quarters were in four countries traditionally important to the Federal Republic of Germany, namely, Austria, Brazil, Switzerland and the United States. The data show that in 50 per cent of the cases, wholly owned affiliates were formed and only in 20 per cent did minority-owned joint ventures result.

Federal Republic of Germany: Features of the outflow of  
foreign direct investment in machine tools  
and related production activities, a/  
1961-1983\*

Machine-tool investment within the total

Total recorded cases of investment, 1961-1983	3 899
Cases of machine-tool investment b/	124
Machine tools as a share of the total	3.2 per cent
Number of machine-tool firms	71

Destinations of machine-tool investment

Austria	9
Brazil	40
Switzerland	7
United States	34
Developing countries in Asia c/	13
Other	21

\*Computed from data given in Folker Frobel, Jurgen Heinrichs and Otto Kreys, Umbruch in der Weltwirtschaft (Reinbek, 1986), table III-A1.

Dates of establishment of firms abroad

Up to 1970 d/	26
1971-1975	14
1976-1980	41
1981-1983	26
Unspecified	17

Equity share in foreign firms e/

100 per cent	61
50-99 per cent	33
0-49 per cent	25
Unspecified	5

Size of foreign firm (number of employees) f/

Up to 30	51
31-100	31
101-250	21
251-500	12
Over 501	9

Type of machine-tool production g/

General machine-tool production	38
Pumps	19
Machine-building	8
Swaging	6
Lathe production	6
Drilling	5
Milling	4
Other	38

Machine-tool investments, 1981-1983

Brazil	6
United States	15
Developing countries in Asia	1

Investment in small firms (up to 20 employees)

Brazil	9
United States	22
Developing countries in Asia	5

Number of minority joint ventures (equity holding of up to 49 per cent)

Brazil	10
United States	2
Developing countries in Asia	5

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g/ The basic source classifies investment into 10 areas of economic activity (excluding finance and trade). The cases classified as relating to machine tools in this table are defined on the basis of the items actually produced in the foreign affiliate.

b/ Excluding two instances of firms that were established and that subsequently closed.

c/ India, the Republic of Korea and Singapore account for all the cases except one (Pakistan).

d/ Including two firms set up prior to 1961.

e/ The original data do not specify if the equity shares given are the initial ones or the actual ones (if different).

f/ The original source does not specify whether this is initial or actual employment.

g/ The breakdown of products was the fullest that could be made on the basis of the information available.

There is some evidence of an acceleration in foreign direct investment during recent years with an annual rate of some eight or nine cases prevailing since 1976. Although no monetary figures to measure the size of firms are given, the data on employees exhibits a clear inverse trend: the larger the firm, the fewer the number of investment cases. Interestingly enough, the tendency is pronounced for the United States but not so for Brazil (among developing countries the major recipient by far of investments from the Federal Republic of Germany). Using the same cross-comparisons the relative incidence of minority-owned joint ventures is much higher in cases where foreign direct investment is directed to developing countries rather than the United States, but, importantly, the frequency of investments in the United States is considerably greater in the 1980s.

Admittedly, the evidence on patterns of foreign direct investment in machine tools by the leading OECD producers leaves plenty of gaps and tentative conclusions could be overturned by more adequate information. That said, a sketch of the situation would be as follows. The machine-tool branch is only a tiny one in absolute terms for foreign direct investment and the bulk of that investment has been emphatically directed towards EEC countries and the United States; very little has gone to developing countries in Asia. The propensity on the part of machine-tool producers to invest abroad suggests that the branch has not been strongly oriented in this dimension. There is, in short, a dramatic contrast between the internationalization of machine tools, as measured by the degree of intra-trade between producers, and the still circumscribed extent of foreign direct investment.

Furthermore, the partial data available further indicate biases in recent investments towards the main OECD centres (excluding Japan) along with a tendency to put cash into wholly owned affiliates there of small size. By any measure, developing countries in Asia have been marginalized in activities in the last few years; such fragments of information as can be assembled strongly suggest



that, within developing countries as a whole, the preferred countries for foreign investors would be those that already have strong industrial structures and a clear commitment to upgrading technologies, namely, Brazil, India, the Republic of Korea, Singapore and Taiwan Province, China.

From this picture two key questions can be discerned. Are there any reasons to assume that foreign direct investment in machine tools will become a major factor in the reorganization of the branch on an international scale? If foreign direct investment did assume significance, could developing countries that lacked any substantial local capital-goods production enter into the production network by becoming subcontractors of one kind or another? The next sub-section tackles these issues.

## 2. Foreign direct investment and the ongoing reorganization of machine-tool production

Although internationalization has mostly shown itself in the expansion of trade, future patterns of competition could exhibit other forms of cross-border penetration. That the branch will retain its international character seems virtually assured: whatever the trade conflicts or disparities in the rates of innovation and diffusion may be, no country in the next few years will either want, or be able, to erect and maintain crippling barriers to machine-tool involvement in its market by other countries. The reasons are easy enough to enumerate.

First, although the industry as a whole has moved far from the metal-mechanical base it had when the original machine-tool branch was its core, the movements in the machine-tool branch itself have been just as fast. Its incorporation of microelectronics, supported by the internal advances in design, have given modern machine tools such precision and flexibility that they are now a vital element in the new industrial revolution. No country that wants to keep its industrial sector competitive can therefore afford to bypass the use of the most recent vintages of machine tools even if it is not producing them.

Second, the nature of competition in the sector is such that, notwithstanding the number of differentiated products, prices are kept down quite firmly, thereby limiting investment costs for other branches. Consequently an attempt to cut out cross-country transactions would not only impose costs on the domestic machine-tool branch, but also worsen the production costs elsewhere.

Third, all medium-size to large producing countries have so far managed to keep a foothold in one or more niches of the foreign market so that, even in countries where net trade balances are strongly negative, no producing country is trying to eliminate trade altogether.

Fourth, corporate strategies are strongly geared to international business since so many customers are themselves firms with international dimensions. The securing of purchase orders in one country may well be a step towards obtaining them elsewhere and may

imply future international trade, foreign direct investment or some form of licensing arrangement.

Having established the international reach of the machine-tool industry, the evidence so far presented in this article points to a highly conflicting process with the relative roles of trade, investment and licensing arrangements quite unclear. The factors that would encourage production tie-ups of one form or another are as follows. First, the imposition of trade barriers in one or more markets. Such obstacles could lead to foreign direct investment in the countries imposing them, to foreign direct investment in other major markets to pre-empt similar moves there, and to foreign direct investment in locations that, while not important markets themselves, might offer costs or other advantages thereby rendering them suitable sites from which to export to the original market. Second, the need to remain close to good customers at home who, through foreign direct investment, are relocating a large part of their production abroad. Third, the prospect of obtaining easier access to key production components, human or material, the use of which could improve real productivity and/or product quality. Fourth, the opportunity to reinforce control over the relevant parts of the international production network, by building up a local presence in those locations. To what extent is each of these factors likely to operate in the current struggle in the machine-tool branch?

The push to foreign direct investment, based on trade barriers, has two different strands in the machine-tool market of today; one relates to firms setting up in the United States and the other to investments in EEC countries. For foreign direct investment in the United States, the obvious country to start looking at is Japan, given the size of its exports there (almost 45 per cent of all exports, about 14 per cent of total output), the VER explicitly negotiated and the prevailing atmosphere of trade tensions between the two countries. According to a commentary appearing at the same time as the VER was agreed (November 1986), the Japanese "machine tool makers have moved slowly over the past few years to establish some assembly operations overseas. Most are in the United States and only produce a small number of units". 6/

It is not surprising that the examples are limited if it is kept in mind both how new the trade thrust is and how different machine tools often are in terms of production and marketing processes. Unless producers have solidly founded reasons for anticipating severe trade barriers, they are most unlikely to invest in advance of their imposition and will (in the absence of other driving forces) only invest subsequent to their imposition if the profit is high enough and it is not possible to maintain aggregate exports by switching sales to other markets.

Whether or not Japanese sellers could have been expected to engage in anticipatory investments is open to question. The precedents in the automotive (VER since 1983), steel and semiconductor branches were, it is true, already there but those branches, especially the automotive, were areas where Japan had for some time been the sole target. In machine tools, other countries

have also been in the forefront and Japanese producers could be forgiven for caution. But the argument justifying a slower approach acquires greater force in the context of machine-tool production and marketing.

In all producing locations (not just Japan), proximity is of vital importance to machine-tool manufacturers: proximity to suppliers of high-quality materials and components; proximity to a labour force trained to some extent by the machine-tool industry itself; and proximity to buyers, many of whose orders are of a custom-made type. These are system requirements or external economies that can be reaped by the firm without it having to pay for many (or often any) of the costs of developing them.

As will be seen later in this article, a major barrier to extensive foreign direct investment in most developing countries is the absence of these system advantages. Certainly the United States possesses attributes of the Japanese system, but its system is not the Japanese one and adaptation to it requires significant shifts from well-established modes of behaviour. Japanese machine-tool producers are accustomed to the following: close relations with, and support from, the Government (especially the Ministry of International Trade and Industry (MITI)); a tightly knit producers' association; specific links with suppliers and buyers that facilitate economies over inventories; and labour relations and a type of plant-level hierarchy that are still rare in the United States. The difficulties of adaptation are certainly not insurmountable but the conditions for overcoming them are probably along the following lines: the firm should be fairly large (about 35 machine-tool companies in Japan employed 300 or more people in 1985);\* have a product range with a significant amount of items that can be sold off the shelf; possess sufficient experience of negotiations with the United States to know where to buy as well as to sell; and be willing to invest heavily in training a labour force that is maybe not only unfamiliar with Japanese methods, but also relatively unskilled in the most modern production systems.

For a Japanese company possessing these attributes, foreign direct investment in either a "greenfield" plant or a takeover of a United States company could be interesting although a joint venture, especially of the minority type, might not be too favourable as it would probably complicate, rather than smooth, the adaptation process. These arguments mean that the number of candidates likely to engage in foreign direct investment is fairly limited and, even among them, a further push could be decided by the particular way in which VER (assuming it is adhered to) is distributed among exporting firms. In the automotive branch, for example, MITI has regular discussions with the producers and publishes annual lists of the units each company are permitted to sell in the United

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\*In both Japan and the United States, the top 10 firms produce 50 per cent of the output in each country, while in the Federal Republic of Germany, the same number of firms produce 26 per cent of the output.

States market. Although the leading firms have invested in the United States, they were undoubtedly helped to reach their decisions as far as the details were concerned by knowledge of the export figures. Probably the situation in the machine-tool branch is a good deal more complicated for the two simple reasons that there are many more firms and types of products. Until the real impact of trade restraint is clarified, there may continue to be lags in the foreign investment process.

Investment in EEC countries, unlike in the United States, raises issues of past as well as current responses to trade barriers. The enquiries made of national associations of machine-tool producers in EEC countries, and through CECIMO, did not yield any solid data that would permit a mapping of foreign direct investment within EEC, so evidence is very sketchy regarding the presence of foreign companies.\* It seems probable that the leading United States firms have been installed in some EEC countries for several years. Cincinnati Milacron has subsidiaries in France, the Federal Republic of Germany and the United Kingdom, while Ex-Cell-O, Duplomatic, Litton, Teledyne Landis, Textron and possibly several others have plants in the United Kingdom.

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\*Some of the responses to enquiries read as follows: CECIMO: "Our Committee does not possess information regarding investment by machine tool builders of member countries of CECIMO, whether referring to investments in their European headquarters or investments abroad. But it is possible that some information may be available with member associations of CECIMO ...". The Machine Tool Trades Association of the United Kingdom noted: "You will appreciate that a number of machine tool companies have developed close distributor relations with countries and companies in South-East Asia but the only direct investment of which we are aware has been made by Bridgeport Machines Ltd. This company has established a successful manufacturing plant in Singapore." Syndicat de la machine-outil, de l'assemblage et de la productique associée of France stated that information could not be provided owing to its confidential nature. The National Machine Tool Builders' Association of the United States wrote: "Unfortunately, no such information exists. We cannot track such practices because United States machine tool builders are generally privately held firms who do not report such activity to any central authority. We are aware of a few firms with foreign joint ventures etc. but do not have a complete listing." The Korean Institute for Economics and Technology stated that no Korean firm had been found with experience of foreign investment in other Asian countries in machine tools. One Korean firm, Doo-Son Machinery Co. Ltd., exported to India early in 1987 a technology for producing radial drilling machines. Doo-Son had developed its own model for a radial drilling machine and had been exporting the machines to South-East Asian countries since 1982. The royalty for the technology transfer was 3.1 per cent of total net sales for five years. The National Council of Applied Economic Research in India noted that interviews with Indian machine-tool firms would be necessary to obtain information regarding foreign direct investment; some material might be available as a result of the ongoing study of technological development in the CNC machine-tool industry in India.

Within EEC countries, the focus of the United States is on countries already famous for their own machine-tool industries (limited investment in Italy seems to be the exception); Ireland, a country renowned for offering outstanding facilities to foreign investors, has been ignored by machine-tool firms and of the most recent entrants, Spain, is the only one that might attract firms. Although in most industrial sectors cross-penetration of EEC countries by their investing in each other has been a principal feature of corporate strategy to utilize the wider market, the scanty information on machine tools suggests that this has certainly not been the case for the branch.

On the contrary, there would appear to have been little foreign direct investment worth the name; of the 124 cases of investment by the Federal Republic of Germany examined in the table that appears in the text between tables 18 and 19, not a single one took place in an EEC country (the handful in Greece and Spain date from at least a decade prior to those States joining EEC), while a listing of member firms of NITA in the United Kingdom provides the names of only one or two enterprises in which investment from elsewhere in the Community seems to have occurred. Earlier tables have shown that intra-EEC trade in machine tools has been intensive enough and it is quite likely that internal barriers to trade have been low (with a high degree of concordance between industrial standards). Hence the incentives given to foreign investors by firms from member States may not have been sufficient, given that other ways of exploiting the market were available.

But what of the current situation and in particular the behaviour of Japanese producers? There is one major investment that nevertheless crystallizes the possibilities and conflicts in the present context. Yamazaki, supported by a direct grant of £5.2 million from the Government of the United Kingdom, has set up a non-unionized factory worth £35 million in Worcester, United Kingdom, to produce, at full-capacity output (scheduled to have been achieved in spring 1988), 1,200 CMC lathes and machining centres per annum. This production level is to be reached with a work-force of 180. There are 65 Japanese staff on site, mainly engineers, that are eventually to be reduced to nine.

Of major significance are some aspects of the plant (which began production in early 1987). First, the aggregate production at full capacity is expected to be around one half of the entire output of CMC machine tools by the United Kingdom. The company says that 80 per cent will be exported, chiefly to other EEC members, yet claims that its shares of the machining-centre and lathe markets in the United Kingdom will be approximately doubled from their present levels of 15 and 10 per cent respectively. These figures suggest major tussles in several EEC countries, not only the United Kingdom. Second, it appears that some European firms have bitterly opposed this type of foreign direct investment:

"West German producers - such as the big lathe maker Gildemeister - which have been in a pitched battle with the Japanese on their home turf, fought tooth and nail to prevent Yamazaki setting up in West Germany." 2/

While the balance of interests may favour Japanese foreign direct investment in the United States, the European environment is different and the Federal Republic of Germany/United Kingdom split may be indicative of an overall contrast of outlook. Whereas the Federal Republic of Germany remains a top-line producer with major technologies of its own and does not want either outward or inward investment (demonstrated by the absence of machine-tool plants controlled by the Federal Republic of Germany elsewhere in EEC countries) the structure in the United Kingdom is a reflection, on a minor scale, of events in the United States. Investments by Japanese companies will indeed be conflictive but are likely to be encouraged by both the Government and traditional machine-tool-producing regions where imports have already done much damage.

Third, as with other products made in EEC countries, the thorny problem of local content exists in the machine-tool branch. Yamazaki claims that it will quickly achieve a local content of 60 per cent, defined broadly as encompassing wages and factory operating costs, and that is the threshold figure to satisfy rules of origin of EEC and therefore to qualify for tariff-free sales within the EEC region. Intriguingly enough, even as the dispute about Yamazaki's extent of local content persists, there is evidence that firms in the United Kingdom itself may not satisfy the criterion. Thus "many British machine tool manufacturers use a great many Japanese components. A greater proportion than ever build machines from Japanese kits". 9/ Even Bridgeport, which has the largest turnover of any maker of machining centres located in the United Kingdom, has its horizontal machines designed by Yoruda and makes them mainly from components from EEC countries while TI recently began assembling Takisawa vertical machining centres.

In sum, the investment by Yamazaki is more than the pretty thick end of what could turn out to be a large wedge of Japanese foreign direct investment, for the controversy surrounding it has brought into the open various forces that are moulding the shape of things to come in Europe. Thus there are powerful European firms and groups working against, as well as for, external investment in machine tools; market shares can be dramatically shifted even by a single investment. This suggests that the long-lived structure of many small and medium-sized firms could be giving way to greater concentration, and that transformation could be fast. Foreign direct investment is clearly not the only route that is being used by the Japanese to penetrate markets: the assembly system for high-value advanced technology items has already taken root. Product heterogeneity in machine tools cautions against the uncritical extrapolation of these findings to the whole branch but enough evidence exists to hazard the guess that EEC countries may be changing even faster than the United States.

Since machine tools are a capital goods industry, whose demand emanates from quite a small set of major industries (primarily the automotive, aircraft and military-related ones) that are dominated by a relatively limited number of large firms in each of the main OECD countries, the extent and location of machine-tool output is strongly influenced by shifts in what and where those firms produce. Over the years the automotive industry has been the crucial one:

firms in the United States have engaged in substantial output abroad for a long time and Volkswagenwerk AG has been active for several years. But it is the Japanese automotive industry's international spread during the present decade that generates the most interest in machine-tool investment. Honda, Mazda, Nissan and Toyota have all set up, jointly with motor-vehicle producers in the United States or on their own, large plants in the United States; they all have large facilities producing key components in Mexico as a result of foreign direct investment in the present decade, and some of them in addition to Mitsubishi and, to a lesser extent, Suzuki and Isuzu, have made appreciable investments in EEC countries (United Kingdom), East Asia (the Republic of Korea and Taiwan Province, China) and countries belonging to the Association of South-East Asian Nations (ASEAN) (Malaysia, the Philippines, Thailand).

All these investments set up a large initial (at the time of the factory's establishment) demand for machine tools plus a lower continuous demand to support ongoing production (not to be equated with the demand for automotive components, which is much larger in terms of volume though not necessarily in value). The circumstantial evidence strongly suggests that the Japanese motor-vehicle producers have sourced the overwhelming majority of their machine-tool purchases (probably all machine tools for most of the foreign direct investment) from Japanese firms (this holds true even for the principal joint venture, namely the Toyota/General Motors plant at Fremont, California). It appears that the machine-tool companies have met the orders through export but this pattern may be subject to change. What factors are at work?

On the plausible supposition that the major wave of foreign direct investment in the automotive industry from Japan has already spent itself, it might be thought that machine-tool producers no longer have (at least from this perspective) any incentive to invest abroad; that conclusion, however, would be too hasty.

First, the demonstration effect of these plants, working almost entirely on the basis of Japanese machine tools, is the best advertisement for these products in the United States market and should lead (other things being equal) to enhanced demand from producers in the automotive and other heavy capital investment industries in the United States. That demand is better satisfied by local manufacture rather than exports from Japan because the Japanese producer is involved not only in manufacture, but also in design work and problem-solving jointly with the United States company purchasing the machine tools. For this kind of market, there are appreciable advantages to be gained from producing within it.\*

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\*The point has been put succinctly by the Vice-President for Corporate Planning of Honda, United States. Noting that when production began in 1982 the decision "obviously didn't make economic sense" she stressed that it did "make philosophical sense" and stated: "When you begin to market products in a country and enjoy success you should think about manufacturing there as soon as possible. We don't spend much time in this company discussing the bottom line: the profits will come in the end if you satisfy customers" ... ("Beware the simple solution", Financial Times, 18 May 1987).

To put the point a little differently: the firm exploits the market edge it has obtained by showing itself to be a first-class provider of numerous more or less custom-made items fitting together into a coherent advanced production system and makes itself available permanently, on the spot, to other clients of the same kind. This was not such an imperative for the original Japanese investors in the automotive industry because they and the machine-tool producers had already been working together for a long time in the Japanese context.

Second, the Japanese machine-tool firm stands to benefit, in its own right, from a production presence in a major location because that widens the range of tasks to be confronted and therefore capabilities to be developed. If competition in machine tools on an international scale has hitherto been conducted chiefly by trade, that framework is altering. To remain on the frontier is not only, not even primarily, a question of paring down costs and prices for standard products: it is still more a matter of exhibiting a wide range of design and problem-solving abilities that are tailor-made to meet specific demands in all key markets. For this, foreign direct investment is required.

Third, the prospects for profitable joint-venture arrangements in various international locations between machine-tool producers and their clients seem to be increasing, again owing to shifting patterns in demand. Once more, the demonstration of detailed knowledge of, and experience in, each environment, which are assets acquired from producing and not just selling, is a critical element in becoming a good partner in such deals.

Fourth, the maintenance of sales over time, as opposed to one-off orders, may be affected by requirements regarding local content. Just as Toyota, for example, has to show it is a producer in the United States, so Toshiba Machine may have to demonstrate growing degrees of local content. This means not only local production, but also local provision of the materials for that production. If large firms have usually been able to keep down the pressure for increasing the local content in fairly small and less industrialized countries, there is less likelihood of their being able to do so in the major OECD countries.

The third possible reason for foreign direct investment, given earlier in this sub-section, refers to the prospects of increasing productivity through obtaining access to cheaper and/or better human and material resources for production through relocation. For machine tools, it is unequivocally the leading OECD countries plus a few developing countries in Asia, viz., India, the Republic of Korea, Singapore, Taiwan Province, China, along with Brazil, that offer the system supports for effective machine-tool production capable of meeting international and local demand. Other nations may provide cheap labour but the value of this asset depends on how much the production process can be broken down into labour-intensive segments, on the importance of labour costs in total changes, and the significance of the costs of transport between the locations involved in the production network. What can be said on these issues in relation to machine tools?



A distinction has to be drawn between MC and non-MC machine tools, for the simple reason that the former incorporate a substantial electrical/electronic component while the latter do not. This means, in turn, that firms producing MC machine tools may have to buy in a large part of their production inputs, even more so if the MC items are made of special quality steels and/or other relatively new materials. As the Chairman of Acme-Cleveland, an important manufacturer of machine tools in the United States, succinctly put it: "Industries are moving away from the idea of taking big chunks of steel and machining away the scrap." <sup>10/</sup> To the extent that developing countries supplying cheap labour become effective subcontractors in electronics, and the units made are incorporated into the machine tools produced in OECD countries, then the indirect labour content from developing countries may be appreciable.

Yet that still does not deal with the issue of direct labour. Two possible activities that could be located in developing countries would seem to be metalworking and machining, and assembly. In metalworking, it would be a case of finding a sufficiently experienced work-force to undertake the tasks allocated. Since the countries where cheap labour is available, by definition, exclude places where a reasonably extensive, sophisticated and long-established machine-tool branch exists, there is a conflict between the monetary cost of the labour and its suitability. A training period would be necessary with the benefits accruing subsequently in terms of enhanced real productivity. The absence of detailed breakdowns of the metalworking/machining tasks needed to manufacture standard machine tools, the unit costs of carrying out these tasks and the differences in real labour costs (assuming people rather than machines were carrying out the tasks) comparing, for example, Japan and Sri Lanka, militate against any hard and fast assessment of the prospects for this type of foreign direct investment.

Informed guesswork, nevertheless, can offer some useful pointers. To justify the investment, a foreign firm would need to be producing a fairly large batch of an item (probably of a standard kind) for sale in either its home base or a third market since production that is mainly oriented towards sale in the country carrying out the contracted tasks is unlikely to find sufficient outlets. This means, however, that quality standards will be high in relation to those in the developing country; the hand setting and hand gauging of tools, for example, will probably be inadequate. The inexorable tendency is to shift such semi-skilled operating tasks onto machines and thus reduce the need for human labour. So the scope is probably restricted and becoming narrower rapidly. For any one country to succeed in enticing and keeping foreign direct investment is a daunting task in the present context.

At first blush, assembly work may seem the more promising area for investment, especially since it has been the focus of so much foreign direct investment in cheap-labour countries in the past two decades. Automotives, garments and electronics have all been prime targets; but the question is whether assembly work in machine tools has the same meaning and relevance as in these other branches.

Basically, assembly work is of two sorts: putting together whole kits (in the case of automobiles) and putting together sub-components at the same time as carrying out several specific production operations (a process reaching its fullest expression in garment manufacture where the foreign firm supplies the cloth, the designs and then undertakes the marketing). Common to the two sorts of assembly is the emphasis on large-scale manufacture directed almost exclusively (except for some automobiles) to export markets. The machine-tool branch appears to be in an intermediate position. Recent commentary on industry in the United Kingdom emphasizes the relevance of assembly and, as mentioned above, points to the growing number of machines that have been built in the United Kingdom from Japanese kits. Yet this assembly work is handled by relatively skilled and experienced workers and the products are frequently (probably in most instances) directed at the market in the United Kingdom itself. The purpose of the importing enterprise has nothing to do with earning foreign exchange (on the contrary it is a net user) and everything to do with hanging onto a place among domestic suppliers. Moreover, the assembly of machine tools cannot be a big volume activity: all the figures quoted in the present article for units of output are far below those usually cited for other industrial branches. There may be many stages of assembly yet both these and the handling of parts in general have to an even greater degree been taken over by such advanced equipment as automated guided vehicles and computer-operated stacker cranes. So in this respect, too, there are few grounds for optimism about attracting foreign direct investment from OECD countries to cheap-labour sites.

Observations on the cheap-labour argument for foreign direct investment would be incomplete if they failed to stress the extent to which more advanced countries and enterprises are shifting away from labour and, where they do use it, towards a different type of labour. The massive shakedown in the United States since 1981 has witnessed the demise of 300 out of 800 machine-tool companies and an overall reduction of employment from 100,000 in 1981 to 70,000 in 1986. Even Cincinnati Milacron, one of the foremost companies with strong international links, cut its work-force from 14,000 to 9,000 during the period 1980-1986. Regarding the quality of labour and corporate strategy, the approach of Deckel, the major producer of universal milling and boring machines in the Federal Republic of Germany, is most instructive. The company employs some 2,300 people, and the investment in them has been a critical part of overall investment during the past five years. Given the sharp move to NC products, in-house training has become the corner-stone of personnel development:

"About 30 per cent of its apprentices (120) go through a double or triple programme, which adds electrical and electronics skills to mechanical training. For those doing all three, the learning time is doubled to at least six years, with wages, instruction and equipment costing Deckel some DM 200,000 per person." 11/

As the Chairman of Deckel emphasized: "You can't go out in the open market and find these people. It's clear we had to make this commitment." 11/ All in all, there are few chances that

machine-tool producers of any weight will look for locations for cheap-labour-oriented foreign direct investment: they are investing more in home-based staff and not trying to cut costs by going abroad.

The final reason for foreign direct investment stated earlier is the reinforcement of control over the international production network. In essence, this means locating manufacturing plants and key managerial staff in countries possessing one or more of the following: large markets, the natural resources required for the manufacturing process, and highly innovative enterprises within or without the machine-tool branch from which the investing firm can learn. Undoubtedly, this pull to foreign direct investment partly overlaps with other considerations, especially the tariff-barrier argument and the linkage with large firms at home in related industries. Undoubtedly, also, the key countries named more than once in this article and around which the world market for machine tools rotates are also the only locations that would be seriously examined for this kind of strategic investment. No developing country outside that small set of countries would be considered. If the chances of attracting foreign direct investment for the preceding three reasons are slim, the prospects for attracting it for this last reason are virtually nil.

The emphasis throughout this section has been on investment by major firms and countries. A full picture makes some reference to three other issues necessary, viz., the possibility of foreign direct investment by some leading developing countries in Asia (the so-called newly industrializing countries (NICs)), the nature of co-operation arrangements and the role of incentives and competition between different countries in attracting foreign direct investment. These points are briefly dealt with in the following sub-sections.

### 3. The international horizons of newcomers

After the inclusion of a few of the large to medium-sized Latin American countries in the category of NICs in the 1970s, the focus seems to have returned to the four Asian countries, the founder members of the group, namely, Hong Kong, the Republic of Korea, Singapore and Taiwan Province, China. Of these, Hong Kong will formally revert to becoming part of China in 1977 and is of less interest for the purposes of this article. But the other three have all definitely emphasized the strengthening of their domestic capital goods capability (less so Singapore, which is a much smaller country, in terms of area and population, than the other two) and systematically incorporated ever more advanced technology, as well as extended the international reach of their firms through foreign direct investment. Consequently the three countries and, above all, the Republic of Korea and Taiwan Province, China, have progressively devoted more attention to the production of machine tools and its very international dimensions. The question is to what extent should the global picture be modified to take account of their presence.

Tables 19, 20 and 21 set out what is known about the behaviour of the Republic of Korea, Singapore and Taiwan Province, China, respectively, as regards foreign direct investment. For the Republic of Korea and Taiwan Province, China, the value of the stock of foreign direct investment is partially disaggregated by recipient area and sector, while for Singapore, table 20 classifies the ownership pattern of investments (almost entirely in Asia) and the footnote gives some figures for the value of investments in other ASEAN countries.

Table 19. Republic of Korea: Direct investment abroad, stock in 1984

Country, region and sector	Amount
All countries and sectors	\$444.7 million
	<u>Percentage</u>
Region	
North America	32.5
Asia	22.8
Oceania	18.4
Sector	
Mining	37.9
Manufacturing	16.3
Forestry	13.0
Trade	12.6
Others	20.2

Source: Yoon-Doe Euh and Sang H. Min, "Foreign direct investment from developing countries: the case of Korean firms", The Developing Economies (Tokyo), June 1986.

Note: Data are based on information from the Bank of Korea. Figures refer to realised investments but include real-estate purchases and loans. The real-estate share of the total is 4.5 per cent.

Table 20. Singapore: Foreign direct investment by local firms according to type of investment and recipient country, 1985

Country	Wholly-owned subsidiary	Majority-owned joint ventures	Minority-owned joint ventures
ASEAN members	11	8	36
China	-	-	11
Hong Kong	3	4	7

continued

Table 20 (continued)

Country	Wholly-owned subsidiary	Majority-owned joint ventures	Minority-owned joint ventures
Sri Lanka	-	-	3
Others	<u>2</u>	<u>7</u>	<u>9</u>
Total	16	19	66

**Source:** Pang Eng Fong and Rajah V. Komaran, "Singapore multi-nationals", The Columbia Journal of World Business (New York), summer 1985.

These tables permit comments as follows. To begin with, the stocks are certainly tiny compared with those held by the leading OECD countries. The fairest yardstick is Japan, being an Asian country, which is the closest to the NICs, in terms of income per head, and the latest starter in foreign investment. A summation of investment stock for the three countries, as of the mid-1980s, yields a figure of the order of \$2.5 billion to \$3 billion, or not much above 3 per cent of the Japanese total. As for Japan, the priority destinations for foreign direct investment are Asia and the United States, while fragments of information confirm that investments made by the Republic of Korea and Taiwan Province, China, in the United States, like those made there by Japan, are mostly of post-1980 origin.

In a sectoral breakdown there are divergences, especially between the Republic of Korea and Taiwan Province, China. The former has the sectoral profile of Japan although it is more pronounced: the search has been for natural-resource investments (mining and forestry approaching 55 per cent of the total) with only 17 per cent directed to manufacturing.

Only the data for Singapore (table 20) provide information on patterns of ownership and reveal a marked preference for joint-venture arrangements. Of the cases examined, only 16 per cent were wholly owned subsidiaries while minority joint-ventures made up virtually 67 per cent of the total. The bits and pieces of available information on the other countries tend to corroborate this finding: foreign direct investment from NICs is usually channelled into joint-venture arrangements that are usually of the minority type. There is inadequate data to determine whether the deviations from the overall contours are pronounced for individual branches but there is at least no solid evidence against setting up joint ventures in the engineering branches including machine tools.

The case of Taiwan Province, China is totally different, showing by far the greatest orientation to manufacturing (almost 90 per cent of the total investment) of all the countries for which data on foreign direct investment exist. Within manufacturing, a very

Table 21. Taiwan Province, China: Direct investment  
abroad, stock in 1985 <sup>a/</sup>  
(Millions of dollars)

Recipient country	All sectors	Investment <sup>b/</sup> manufacturing <sup>c/</sup>	Basic metals	Machinery, equipment and instruments
United States	113.3	96.0	0.7	0.8
Indonesia	24.8	24.6	0.4	-
Philippines	10.1	10.0	-	-
Thailand	9.5	8.9	0.8	-
Singapore	9.3	8.9	0.8	-
Malaysia	7.3	7.2	3.2	0.1
Others	<u>35.7</u>	<u>26.7</u>	<u>0.8</u>	<u>0.1</u>
Total	209.9	182.3	6.7	1.0

Source: Che-Hung Chen, "Taiwan's foreign direct investment", Journal of World Trade Law (Twickenham, United Kingdom), November-December 1986.

<sup>a/</sup> The figures refer to all the investments approved from 1959 to September 1985 as published by the Investment Commission of the Ministry of Economic Affairs. Almost three quarters of the total, \$150.7 million, were approved during the period 1980-1985.

<sup>b/</sup> There are major discrepancies between these figures, which are based on information from official sources and publications of recipient countries. Indonesia, for example, gives investment from Taiwan Province, China, for the period 1967-1984 as \$132.1 million, which is more than five times the figure given above. Were this factor to hold true for all kinds of investment (i.e. country and sector) the total for basic metals and machinery would be around \$40 million.

<sup>c/</sup> The dominant branches were those of electronic and electrical appliances, and chemicals, which together accounted for around 60 per cent of all manufacturing (mostly going to the United States).

crude approximation of the importance of engineering goods is given by adding the last two columns of table 21 (basic metals, and machinery, equipment and instruments) and comparing them with the manufacturing aggregate. The combined total of \$7.7 million is some 4 per cent of all manufacturing; within this, basic metals account for the majority, and nearly half the total for basic metals represents foreign direct investment in Malaysia. In the machinery branch, almost all the investment is in the United States, suggesting, once more, the concentration on that country in trade and investment.

What, then, is the state of machine-tool production in these countries and what might they wish to accomplish abroad? In the Republic of Korea, the production of \$350 million in 1986 (cf. table 2) stemmed, officially, from 110 registered firms. Many of these, however, are very small and a large share of the total comes from only a few companies of which Dae Woo Heavy Industries, Tongil and Swachon are the most significant. Their current technological level is, in global terms, only moderate but they are extending continually into more advanced items, using a mix of foreign technology and locally developed know-how. Thus Dae Woo incorporates Fanuc controllers in its products while trying to design and produce its own (a process that the company estimates may require another three to five years). By drawing on key foreign components and designs (both obtained mainly from Japan), some quite advanced manufacture takes place but there is clear recognition by the Government that local content is necessary both as regards material and design. Till now Korean firms have been notably less successful in exporting machine tools than other industrial items, a striking indicator of relative failure being the fact that it has not been necessary to negotiate a VER for the United States market. Government indicative targets for 1987 included a doubling of exports (compared with 1986) to \$55 million and an expansion of domestic output to \$450 million. Fragmentary data on the markets that are earmarked for these exports suggest that the output may be switched quickly to Europe (currently, over half the total goes to the United States) where, it is obviously felt, there may be more scope. A summary assessment of the trade situation concluded:

"Korean machine tools have so far presented little threat to indigenous European producers. However in open markets with a relatively weak domestic industry, like that of the United Kingdom, low-cost Korean as well as Taiwanese products have tended to disturb prices at the bottom end of the market." 2/

The picture for Taiwan Province, China, varies from that of the Republic of Korea in that the former seems to be technically more advanced, with a larger volume of exports (and a proportionately large trade surplus in machine tools) encompassing a higher quality product mix. Although the data in tables 19 and 21 do not permit specific statements on foreign direct investment in machine tools to be made, it seems fair to say that whatever investment abroad has occurred has probably come from Taiwan Province, China.

The preferred destination has been the United States as producers have sought to improve both knowledge about, and trade relations with, the United States.

The question, however, is whether firms in the Republic of Korea and Taiwan Province, China, could look for production bases elsewhere in Asia. Keeping in mind the discussion about reasons for foreign direct investment presented in the previous sub-section, there is one important difference when comparing NICs with their Asian neighbours: at prevailing exchange rates, the wage differentials are small. Thus, while wages in the Republic of Korea might be about double those in several other Asian countries, this gap is insignificant when measuring any of these nations against, say, Japan. It follows that, unless there were trade-barrier reasons for relocating production, for example, the circumvention of quotas, the cost advantages would surely not warrant any foreign direct investment. In the near future, that is to say, in the next year or so, the only reasons for altering that conclusion, therefore, would be a change in trade barriers or a realignment of exchange rates. The latter does indeed seem quite likely: the United States has been exerting considerable pressure on both the Republic of Korea and Taiwan Province, China, to revalue their currencies against the dollar by a sizeable margin.\* The pressure is on account of the trade surpluses both countries have with the United States and its constant efforts to be seen as an industrial workshop rather than an industrial fair where everything can be bought. A shift in the cross rates just referred to would mean, other things being equal, a devaluation of other Asian currencies against those of the Republic of Korea and Taiwan Province, China.

Consequently the other countries would become more interesting as production locations although the shift in exchange rates might not in itself be decisive (cf. the Japanese automotive experience where for some time the exporting companies did not modify dollar prices in the United States but instead accepted lower unit profits themselves; the switch of behaviour occurred as the yen appreciated too much and the VFR régime came in). On balance, however, it is unlikely that currency changes will be enough to encourage foreign direct investment on any scale from the Asian NICs; from this direction also there is unlikely to be much impetus to machine-tool output elsewhere in the region.

#### 4. The nature of co-operation arrangements in Asia

The references to the experience of Asian NICs in machine-tool production and foreign direct investment have explicitly signalled their use of foreign expertise although this has rarely been through foreign direct investment. Despite the paucity of data, then, there does seem to be a good deal of foreign collaboration of one kind or another taking place in the industry. Table 22 summarizes instances of collaborative arrangements involving Asian

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\*Taiwan Province, China, has large reserves of foreign exchange, currently estimated to be in excess of \$50 billion.



countries during the period 1984-1986. The countries selected are the two main ones of the preceding sub-section, plus the three largest nations; the choice was dictated by the fact that the five countries embrace a wide range of technological situations: all either have, or explicitly plan to have, quite large machine-tool industries by the early part of the next decade, and by the pragmatic yet nonetheless illuminating consideration that industry sources rarely mention any other Asian countries.

Perhaps it is not surprising that, of the 15 cases listed, United States partners predominate; four cases involve Cincinnati Milacron and three Cross and Trecker, along with further examples bringing in Flow Systems, Auto Numericals and Ex-Cell-O.

The material presented earlier in this section pointed towards a greater degree of internationalization (in the sense of deals abroad other than exports) by United States firms than those of other countries. What table 22 does is to give some substance to this notion. As can be seen from table 22, licensing arrangements occur frequently, especially when Cincinnati Milacron is the American producer, while Cross and Trecker seems ready to enter into joint-venture arrangements (and in three different countries). The products are heterogeneous yet surprisingly few are NC/CNC (all contracts with the Republic of Korea focus on NC/CNC lathes and the only other CNC arrangements were concluded in China, by Trumpf of the Federal Republic of Germany, and in India, by Beaver of the United Kingdom).

There is clearly a strong drive by various firms in OECD countries to collect returns quickly on their technological assets, probably menaced by the prospect of rapid obsolescence and encouraged by that of selling equipment and components without committing cash of their own. Indeed, the current picture is in several respects a classic one. Companies located in OECD countries where markets are most severely strained by imports and actual-cum-impending foreign direct investment are finding that not only are their market shares falling at home, but also their exports too are subject to a severe battering. With falling sales, especially in an industry where job orders are not easy to organize, a liquidity problem is bound to arise for firms. Funds for foreign direct investment are thus not easy to find, while the competitive strains increase the temptation to increase cash flow by renting intangible assets. Although table 22 is only illustrative and makes no pretence whatsoever of presenting a comprehensive picture, the evidence is fully consistent with the classical pattern: licensing by firms in the United Kingdom and the United States, not one case of licensing by a Japanese company, and a heavy concentration of sales of the products of these arrangements in the home markets of Asian countries.

The table has some other, less obvious, features that merit comment. A Chinese firm (Peking No. 1 Machine Tool Plant) and one in the Republic of Korea (Tongil) have invested themselves by taking over a firm in the United States and one in the Federal Republic of Germany, respectively. Both investments involved less than full ownership, as the Chinese company shared its purchase

Table 22. Examples of co-operation in the machine-tool industry between Asian countries and foreign partners, 1984-1986

Country	Year	Foreign firm (country)	Local firm	Nature of arrangement	Product	Main market	Remarks
China excluding Taiwan Province	1986	Cross and Trecker (United States)	Kumming Machine Tool	Joint production	Co-ordinate measuring machines	China	
	1986	Cincinnati Milacron (United States)	Wuxi Machine Tools	Licence agreement	Internal grinders	China	Royalty payments were expected to start in 1988
	1985	Trumpf Maschinenfabrik (Federal Republic of Germany)	-	Import of know-how and equipment to start production	CMC metal-plate processing machines	China	
	1985	Flow Systems (United States)	-	Licence agreement	Cutting machines	China: foreign firm has right to sell Chinese-made machines in Asia	Five-year agreement: \$2.5 million
	1984	Auto Numerical (United States)	Peking No. 1 Machine Tool Plant	Takeover of American firm by Chinese firm			50/50 purchase deal with Susanto Group (Hong Kong)

continued

Table 22 (continued)

Country	Year	Foreign firm (country)	Local firm	Nature of arrangement	Product	Main market	Remarks
	1984	Ex-Cell-O (United States)	Ningjiang Machine Tool Company	Licence to build one of American firm's products	-	China, other Pacific countries	Royalties to be paid for 10 years
Republic of Korea	1986	Cincinnati Milacron (United States)	Hyundai Motor	Supply of final product	NC lathes	(United States)	Five-year agreement: supply of 300 units per year, valued at \$10 million per year
	1986	Cincinnati Milacron (United States)	Hyundai Motor	Licence agreement	Small CNC turning centres	Republic of Korea	American firm to buy parts for turning centres from Hyundai as part of world-wide sowing
	1986		Tongil		Local firm's development of CNC to be incor- porated in lathes and machining centres	Export	
	1985	Keyligenstaedt (Federal Republic of Germany)	Tongil	Acquisition of majority ownership of foreign firm	CNC turning machines and profile milling machines		Turnover of foreign firm was DM 100 per annum

continued

Table 22 (continued)

Country	Year	Foreign firm (country)	Local firm	Nature of arrangement	Product	Main market	Remarks
Indonesia	1985	Metalexport (Poland)	-	Joint venture	Machine tools	Indonesia	\$10.5 million venture capital. 75% of the parts to be imported initially; local content should be 100% by 1990
		Leadwell CNC Machines (China (Taiwan Province))	Tools Indonesia	Plant con- struction	Machine tools	Indonesia	
India	1986	Cross and Trecker (United States)	Mysore Kirloskar	Joint venture	Universal turning machine lines	India, later other Asian countries	
	1985	Beaver Machine Tool (Sales) (United Kingdom)	Mysore Kirloskar	Licence agreement	Vertical and horizontal machining centres	India	British firm to supply components and assemblies
China (Taiwan Province)	1986	Cross and Trecker (United States)		Possible establish- ment of 100% affiliate	Low-cost machine- tool components	Asia and United States	

Source: Industry journals, financial press.

with the Susanto Group of Hong Kong and Tongil acquired majority ownership. In each case, the aim seems to have been rapid and full access to NC and CNC technologies and products. This reverse foreign direct investment may well be a coming trend as the heavily committed but less advanced Asian countries seek to widen their technical command and product range. This is sometimes easier to do if a firm makes the investment itself rather than being invested in or paying for the use of a technology that it will never own and that may become obsolete quite fast. Obviously such investment is best done by a takeover rather than a greenfield operation and, given the limitations on financial resources, will usually be directed at no more than medium-sized businesses in the OECD countries.

Hence there is a clear contrast between Japanese and other Asian foreign direct investment in OECD countries: the former aims mostly at using its own technology, it can often be greenfield and large scale, and extends an international network, while the latter aims at gaining access to the technological assets of other firms. It will be of the takeover type and that on a medium scale, and is probably as much concerned with raising quality for home and external markets as with any kind of international network. Tongil, for instance, is known to be keen on expanding its sales of machining centres in Europe (an export target of about \$13 million for 1988) and no doubt sees the acquisition of Heyligenstaedt as a prime route to the achievement of that target.

There appears to be one case of a turnkey operation and, intriguingly enough, the seller is a company based in Taiwan Province, China (although it may be the affiliate of a firm in the United States). In general, machine tools are not a branch where turnkey operations are frequent. Whereas in chemical engineering (to take the turnkey sector par excellence) much of the final product performance depends on plant design, in machine tools the product design has hitherto been overwhelmingly the key factor, with much of the production located in simple workshops or larger, but still quite crude, factories. Admittedly, the relationship between plant design and the sophistication of the product may be altering with quantum leaps in the latter, compelling huge advances in the former. Nowhere is this better evidenced than in the Yamazaki plant in Worcester, United Kingdom, where the production technology used updates that used in the company's home plant at Minimoto and in the facility it established in 1982 at Kentucky, the United States. The plant area covers 16,500 square metres and, to meet the complex requirements of the CNC lath and machining centres produced there, includes features such as: isolation of the floor in the super-finishing section to minimize vibration; a fully automated underfloor pipe system to handle the coolant supply for the production machines; an overhead monorail to transport replacement tools; a buffer store in the central aisle of the plant; and a precision machining area that is entirely computer-controlled.

Layout in such a plant is clearly of the utmost importance, yet even so there is a heavy demand for internal transportation, which includes five automated guided vehicles and 14 computer-controlled

stacker cranes. Such a plant necessitates intense involvement on the part of the machine-tool producer in its design and perhaps even in actual construction and it could be that a line of business will begin to grow in the plant design and erection area. In this sense, the Indonesian operation of the same firm based in Taiwan Province, China, may thus be the forerunner of a series of activities in those Asian countries where there are extensive plans for raising machine-tool output qualitatively as well as quantitatively and for maintaining substantial national ownership of the facilities.

Product marketing is firmly oriented towards the producer countries themselves but there are some instances where sales may be extended to other parts of Asia and in a couple of cases, the United States itself is also targeted. The mix fits well with current conditions and most forecasts for the next few years: the largest Asian countries are aiming at expanding their output of machine tools to meet growing domestic demand, industrialization is expected to continue extending itself, and there will be a constant effort to combine import substitution with export growth. Collaboration arrangements will reflect these objectives, while smaller Asian nations, and particularly those where the absolute size of the industrial sector is tiny by international standards, may try to obtain a marginal linkage with some suppliers of machine tools; the bigger States will go for accords that maintain a degree of independence for themselves and where they can constantly dangle access to their markets as a bait to foreign producers.

Finally, table 22 reveals the germ of one longer term collaboration of an international nature, viz., the link between Hyundai Motor and Cincinnati Milacron. Hyundai Motor (of which Mitsubishi own 15 per cent) is the major automotive producer in the Republic of Korea, with an output of 420,000 cars in 1986, 600,000 in mid-1987 and a scheduled capacity of 750,000 by the end of 1987. The North American axis of its operations is vital, however: in 1986, exactly 40 per cent of its output was sold in the United States and the target for this year was an increase of between one fifth and one half of total sales in the United States. This leap into the United States market has inevitably raised questions of possible VER imposition and therefore foreign direct investment in the United States by Hyundai:

"The company is building a 100,000-a-year car plant in Canada, due to come on stream in 1988 and has said that it will decide within the next year or two whether to set up in the United States." 12/

In that context a close link with one of the world's specialist producers of machine tools, based in the United States, is entirely understandable and mutually beneficial. A cross-fertilization of markets and products can take place with Hyundai strongly dependent on activities in the United States and Cincinnati Milacron undoubtedly interested in securing as a captive customer one of the major industrial firms in one of the most important and fastest-growing Asian countries. Further ventures of this kind might well be a feature of future developments in the machine-tool sector.

### 5. The significance of investment incentives

So far, this section has concentrated entirely on the fundamental forces at work, macro-economically in the OECD countries and in the machine-tool branch itself, that influence foreign investment decisions. A brief comment on the role of investment incentives is provided below and the value, if any, of institutional, legislative and financial actions within prospective recipient countries is discussed.

The current international economic environment is characterized by several features in relation to overall foreign direct investment. First, the annual rate of foreign direct investment is falling in all major OECD countries except Japan where, on the contrary, the recent period represents a boom. Second, the United States accounts for around 30 per cent of the world's foreign direct investment, well below the 46 per cent at the start of the 1970s. Third, the United States is the major recipient of foreign direct investment with a share probably approaching one third of the total; in the period 1 April 1985 to 31 March 1986, about 45 per cent of Japan's foreign direct investment was directed to the United States while in the calendar year 1986 some 30 per cent of the aggregate of the Federal Republic of Germany went to the United States. In 1985, of the 912 cases of major inward investments, as classified by the US Department of Commerce, approximately 24 per cent were Japanese. Fourth, the economic crisis that continues to assail much of the third world has led to a fair degree of disinvestment there, although Asia has been the region least affected by it. Even where disinvestment has not occurred the accent has been on conserving the parent company's finances. In Latin America, for example, about two thirds of the foreign direct investment from companies in the United States stems from the reinvestment of the profits of subsidiaries already established there and risk capital represents only a quarter of the funds obtained by affiliates and this while there has been only a slight drop in profit remittances in the very period when production by subsidiaries has fallen considerably. Fifth, a major thrust, backed not only by the international finance houses but also by the World Bank as part of its policy advice, is on dynamizing credit markets in developing countries of Asia. The idea is to mobilize local risk capital and facilitate access to it by companies setting up in those countries in order to reduce the proportion of foreign sourced capital in transactions over foreign direct investment.

In trying to encourage foreign direct investment, developing countries are clearly confronted with an uphill task. So stress is often placed on setting up a battery of incentives although their effectiveness is limited and that for simple enough reasons. All countries in the business tend to institutionalize more or less similar packages, which put them, as it were, in the same starting blocks but without giving any one a particular advantage.

As an example, table 23 brings together under five sections 26 conditions that investors usually consider favourable and looks at their occurrence in the five main ASEAN countries. In nine

Table 23. Summary of foreign investment incentives available in ASEAN countries, 1986

Incentive	Indonesia	Malaysia	Philippines	Singapore	Thailand
<b><u>Basic rights and guarantees</u></b>					
Against expropriation	X	X	X	X	X
Against losses owing to:					
Nationalization	X	X	X	X	X
War damage	X	X	X	-	-
Convertibility of currency	X	-	X	-	-
Repatriation of:					
Earnings	X	X	X	X	X
Capital	X	X	X	X	X
<b><u>Protection and priorities</u></b>					
Employment of aliens	X	X	X	X	X
Patent protection	X	X	X	X	X
Preference for government loans	-	X	X	X	X
Protection against competition from:					
Imports	X	X	X	-	X
Government	-	-	X	-	X
Local	X	X	X	-	X
Ownership of real estate	-	X	-	X	X
<b><u>Exemptions from taxes and tariffs</u></b>					
Capital gains	-	X	X	-	-
Corporate income	-	X	-	X	X
Imported capital goods	X	X	X	X	X
Imported raw materials	X	X	X	X	X
Royalties	-	X	-	X	X
Interest on foreign loans	X	-	X	X	-
<b><u>Deductions from taxable corporate income</u></b>					
Accelerate depreciation	-	X	X	X	-
Export allowances	-	-	X	X	X
Reinvested profits	-	-	-	-	-
Investment allowances	-	X	X	X	-
<b><u>Special incentives</u></b>					
For transnational corporations	-	-	X	-	-
For exporters	X	X	X	X	X
Low benefiting foreign investors	-	X	X	X	X

Source: Data assembled by the ASEAN Committee on Industry, Minerals and Energy, December 1986.



instances, the situation is the same for all the countries and in four others, only one country differs from the rest. On what are regularly cited by firms in OECD countries (and their Governments) as sensitive issues the table is eloquent: on guarantees against expropriation and nationalization, and on the repatriation of earnings and capital; on patent protection, the employment of foreign staff, and the protection of imports against competition (the Singapore divergence here counts little given its special trading position); on exemptions from tariffs on imported capital goods and raw materials; on corporate tax deductions for the reinvestment of profits; and on special incentives for exporters, on all these issues there is unanimity. The essential ingredients of the incentives code are present throughout the sub-region, only the decorations vary among the cooks. In effect the institutionalization of all these incentives does little more than put a country's name on the list as a possible candidate for receiving foreign direct investment: it does not give the country any special position. The more countries as a group try to compete against each other, the worse off they are each likely to be: they will be playing a negative sum game in which each one comes out a loser. One analysis of the Latin American situation has concluded:

"Questionnaire surveys among transnational firms show that the incentives to foreign investment have, with the exception of protection against competing imports, little or no influence on investment decisions, particularly as regards production for the domestic market. In any case the effects of incentives specific to foreign investment are uncertain and lose their effectiveness the more complex they become and the more often they are modified." 13/

The preceding remarks thus show that incentives certainly do not, of themselves, persuade firms to make investments that they would not make otherwise and they are also most unlikely to have much influence on location since in today's world there is considerable harmonization of legislation (at least in Asia). Decisions are made in response to fundamental macro-economic conditions and evolving patterns in the international industrial structure. What is done legislatively and institutionally by individual countries hoping to attract foreign direct investment is of little sway.

### C. Prospects for developing countries in Asia

#### 1. The Asian context

Given the gravitation of the world's industrial economy towards Asia and the particular weight that primarily Japan and, to a lesser degree, the Republic of Korea and Taiwan Province, China, have rapidly gained in the machine-tool market, the smaller Asian countries outside the Pacific region, of which Sri Lanka, is the principal case, are in serious danger of marginalization. An understanding of the Asian context requires further exploration of the investment situation.

It appears reasonable to begin with Japanese investment since Japan is located in the region, is the world leader in machine tools and now shows the highest marginal propensity for foreign direct investment. Table 24 shows the amount of Japanese investment by country, in Asia, between 1 April 1985 to 31 March 1986. Ten countries are listed specifically and more than 98 per cent of all foreign direct investment in the region was committed to them in the period under review. The general figures, however, do not tell the whole story. Some of the stronger commentaries argue that Asia has been left out of the boom in foreign direct investment from Japan. Thus one recent assessment commented that "except for significant increases in investment in Singapore, South Korea, Taiwan and to a lesser extent India, the Japanese are leaving Asia high and dry". <sup>14/</sup> And "as Japan moves into the information revolution, it has also lessened the need for South-East Asia's raw materials its survival once depended upon". <sup>14/</sup>

Table 24. Japan: Foreign direct investment in developing countries in Asia, 1985 <sup>a/</sup>

Country	Amount (\$ million) <sup>b/</sup>	Change compared with 1984 (%)
Indonesia	408	+9
Singapore	339	+51
Republic of Korea	134	+25
Hong Kong	131	-68
China (Taiwan Province)	114	+75
China excluding Taiwan Province	100	-12
Malaysia	79	-44
Philippines	61	+33
Thailand	48	-60
Brunei Darussalam	21	-80
Others	<u>20</u>	<u>-5</u>
Total	1 435	-12

<sup>a/</sup> Source: The Economist, 25 October 1986, drawing on data from MITI.

<sup>a/</sup> For the fiscal year 1 April 1985-31 March 1986. Figures refer to all sectors.

<sup>b/</sup> Converted at current exchange rates. The aggregate fall from 1984 to 1985 measured in dollars would therefore be greater measured in yen owing to the rising value of the yen against the dollar in the latter half of the fiscal year 1985/86 (i.e. subsequent to the G5 accord of September 1985).

The figures for the past couple of years vary sharply from the pattern of the late 1970s and early 1980s, especially for the ASEAN countries. From 1977 to 1983, the annual average growth rate of Japanese foreign direct investment in manufacturing was 18.7 per cent globally and superior 20.6 per cent in the ASEAN countries. Corresponding world ASEAN country statistics for 1976 to 1983 were for the United States, 6.6 per cent and 13.3 per cent and for the Federal Republic of Germany, 12.2 per cent and 12.8 per cent.

A more detailed picture in relation to foreign direct investment can be gleaned from some other recent research. Japanese foreign direct investment in the ASEAN countries (less Brunei Darussalam and Singapore) is concentrated far more on manufacturing than is investment from the United States. Data from 1983 show that the share of manufacturing in the United States total ranges from about 4.5 per cent for Indonesia and Thailand to about 35 per cent for the Philippines, whereas the corresponding span for Japan runs from 27.5 per cent for Indonesia to 75 per cent for Thailand.

Within manufacturing, Japan put close to one third of its total investment into metals and metal products and the United States just one seventh. A failure to make an impression on Japan would thus mean that investment in the machine-tool and metal-working areas would have to be sought in bits and pieces from firms located in countries that are either not at the core of the branch or losing their position in the core group. Since, moreover, the labour intensity of Japanese investments in machinery industries is high compared with those of other countries,\* the employment effect as well as the foreign exchange effect is significant.

The ASEAN countries may be the most obvious investment targets in the region, in the sense that they are actively seeking foreign collaboration and do not (with the exception of Singapore) yet have sufficiently strong domestic industries of their own. The table below brings together some characteristics of the machine-tool industry in five countries (excluding Brunei Darussalam). No satisfactory estimates of the overall value of output could be obtained but other aspects of branch's structure and the approach of Governments to machine tools could be ascertained. The main findings are summarized below.

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\*Figures for 1983 estimated that for every \$1 million of Japanese assets in the machinery sector in Asia, 59 people were employed; the corresponding figure for the United States was about 15 per cent lower.

Some characteristics of the machine-tool  
Industry in ASEAN countries, 1985\*

Number of producers

Indonesia:	13
Thailand:	1?
Singapore:	10-15
Philippines:	5-10
Malaysia	47 (including metalworking and woodworking)

Nature of product

Metal forming rather than metal cutting (except for Singapore). Intermediate level (except for Singapore), including reconditioning and rebuilding of imported machines (particularly in the Philippines).

Production methods

Use of machines (except in Singapore) that are frequently more than 10 years old.  
Job orders rather than continuous production.  
Reliance on imported raw materials, particularly special steel alloys.

Investment and ownership

Lack of investors (domestic and foreign) despite the high priority given to machine tools in all the countries' investment plans. Risks seen as volatile demand, advanced and changing technology, and weak support industries.

Current ownership is mainly national.

First, the number of producing firms is small, around 10 to 15; the higher number for Malaysia includes several metalworking and woodworking enterprises whose elimination would reduce that country's total to the same range as elsewhere. If this number, unweighted for size of employment or value of output, is compared with the numbers in other countries, then the average for the ASEAN countries is not much more than 10 per cent of the industry size in, for example, Japan or the Republic of Korea.

Second, there is an absence of leading firms, that is, enterprises that have a powerful investment and production base. Thus in an Indonesian commentary of 1986 on the plans to enhance the branch, it was stated: "The government has authorized 11 companies

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\*Derived from material collected by Technonet, Singapore, in The Machine-Tool Industry in the ASEAN Region: Options and Strategies, Main Issues at Regional Level (May 1986).

to expand and develop their machine-tool activities. Until now firms have only been small and have not been able to compete with imports." 15/ There does not, furthermore, appear to be evidence of a State-sector firm of significant size operating in any of the countries.

Third, and closely related to the preceding point, all ASEAN countries recognize a dearth of investment in machine tools notwithstanding the importance assigned to them in national planning. As shown in the last section of the table above, the inherent risks of producing machine tools tend to be accentuated in the developing-country context. Whereas the events of the present decade have been similar to an earthquake in several OECD countries, bringing down many firms and forcing others to be rebuilt on totally different structural bases, in the ASEAN countries they have acted as a brake on getting the industry off the ground.

Reports from sources within specialized industries emphasize both the continued wish of countries to enhance machine-tool production and their recognition that foreign direct investment offers the most promising route for achieving that aim. An analysis in 1985 stated that:

"Although a country that can now produce 1,550 machine tools a year, Indonesia's newest 5-year plan calls for production of 21,000+ metalworking machines per year by 1989 ... present facilities could manage 3,600 units per year by then, and the rest will have to come from new facilities from joint ventures and foreign investment. Indonesian technology officials have announced they would prefer to get the capital and knowhow from the US machine tool industry." 16/

Moreover, in early 1986, the import duty on machine tools was raised by some 15 per cent to encourage domestic output; thus far, however, there is scant evidence that foreign direct investment has actually occurred.

In the case of Thailand, there was an undisguised initiative by the Board of Investment in 1986 to encourage metalworking and machinery firms in the United States to locate plants in Thailand. Thus:

"Thailand has moved into a better position to compete for US manufacturing operations in the wake of rising labour costs elsewhere in Asia, including Hong Kong, Malaysia, Taiwan and South Korea. It has a sizeable pool of engineers and technicians and its assembly line workers make less than \$US 4 per day. Going wage rates for skilled workers range up to \$US 6 per day, while typical salaries for technicians and engineers are \$US 150-250 per month and \$US 300-500 per month respectively. Benefit packages usually come to about 50 per cent of wages and salaries. Standard government incentive packages include

investment guarantees, up to 8 years of corporate income tax and business tax exemption, duty free import of machinery, equipment and basic raw materials and components." 17/

In the Thai case also, the impacts of this drive to encourage foreign direct investment in Thailand have yet to be realized. Obviously there are three kinds of time-lag in this process: viz. the information lag from the Government to the potential investor, the approval lag for acceptance by the Board of Investment of any proposed foreign direct investment, and the gestation lag for turning an accepted proposal into an actual production operation. Together these lags are quite sufficient to account for the absence of actual start-ups until now. The passage of time could well lead to a marked reduction of the information lag and possibly some cut-back of the approval lag. Yet the gestation lag is always likely to be present, especially in an industry as volatile as machine tools. Market conditions can alter between the date a proposal is put together and the time the investment is ready to begin.

Returning to the last table, the fourth point to underline, and one of considerable importance, concerns the types of products and production technology prevailing in ASEAN countries. Singapore stands apart from the other four countries with a profile resembling the advanced OECD countries in its emphasis on up-to-date metal cutting equipment of recent vintage and its export orientation. But the four largest ASEAN countries are in a quite different context. Although they have roughly the same number of firms as Singapore, what these firms actually do is by no means comparable. To begin with, their activities are concentrated on metal forming, using intermediate-level machinery that is often second-hand. The average age of the machinery is therefore high compared with the stock found in more advanced production locations (this statement can be made with some confidence owing to the introduction of new technologies) and the equipment is being used to produce for specific orders rather than large batches. It is true that the demand for machine tools anywhere has a substantial job-order component but a stronger branch where firms have more flexible production equipment can usually manage (except in phases of very limited demand) to keep low rates of machine downtime and reasonably high and stable levels of capacity utilization. These indices are definitely unfavourable for ASEAN countries and must lead eventually to higher product prices and/or lower company profits than would prevail in a situation where the branch was stronger.

The reliance on imported raw materials accentuates the problems not so much in the familiar sense of the risk that foreign exchange will be unavailable (although this might be a difficulty on occasion, especially in Indonesia and the Philippines) but because of the disjuncture between material quality and equipment vintage. There is currently a contradiction between the declared aims of augmenting the quality of machine tools and the tools at the disposal of the industry to achieve that objective. In ASEAN countries, the sector is thus awaiting its own definition - how to combine meeting the simpler, lower-grade requirements for many

branches of local output with the undoubtedly essential introduction of progressively more advanced technologies to support the modern industries. Each of the four countries (leaving aside Singapore) will have a different response on account of the varied industry mixes they possess and as of now there is no sign of any elements of a common approach.

## 2. Foreign direct investment in cheap-labour countries

The major shifts in structures and levels of production costs that are sweeping through the industrial sectors of the OECD countries are particularly pronounced in the machine-tool and engineering branches where the combination of electronic and mechanical processes has totally altered the nature of processes (allowing a felicitous mix of batch and custom-made production) and drastically changed the skill requirements for staff. Production in cheap-labour countries is highly vulnerable to such developments and that creates real tensions around investment decisions. Much time is required to establish marketing channels and long-term customers. Even if the original investment costs can be recouped relatively quickly, medium to long-term profitability is a function both of continuing cost efficiency and quality maintenance (variables that depend, among other things, on whether significant technological changes are occurring) and the ability to retain a marketing grip. The problem in countries with a cheap-labour edge is that this asset is constantly liable to erosion (or even a sudden landslide) owing to technological changes.

Consequently the single advantage of cheap-labour costs is not enough. What is required is at least a second asset, preferably of a system kind that can provide some cushion against technological improvements. The long-term building of that asset has to be the focus not only of policy, seen as a succession of manoeuvres, but also of strategy, which is not the same as economic planning as it has been conventionally understood and widely castigated. Rather, it is a social-cum-economic process of integration that recognizes that domestic entrepreneurship devoted to long-term profit-making through industrial production (as opposed to financial speculation and trading) is essential to improving not only the wealth of the economy, but also its resilience in the face of external shifts. Domestic entrepreneurship will only flourish if public-sector support is available and if the public sector is committed to creating a well-defined type of economic structure. The common feature of the economically successful Asian countries has been precisely the sharpness and insistence of that definition.

Developing countries in Asia that are trying to attract foreign direct investment from the machine-tool sector are thus pursuing a high-risk option. Table 25 brings together, for the latest year for which a sizeable sample of countries on a comparable basis could be obtained, data on hourly wages and labour costs in export production. The numbers tell their own story: Sri Lanka is by far the cheapest location with costs of one half to one third of those prevailing in India, the Philippines and Thailand. The table shows vividly how (even in 1983) Hong Kong, the Republic of Korea and Singapore have become, in the Asian context, locations

with high costs of labour and have therefore been driven to seeking other advantages to sustain their export thrust. On any assessment, and especially when the discipline, skill and literacy levels of the labour force in Sri Lanka are kept in mind, that country is unquestionably the cheap-cost site.

Table 25. Average hourly wages and average hourly costs of labour in export processing zones and world market factories in selected developing countries, 1983 (Dollars)

Country	Average hourly wages	Average hourly costs of labour <u>a/</u>
China (Taiwan Province)	0.40-1.25	0.50-1.50
Hong Kong	0.90-1.65	1.12-2.10
India	0.40-0.75	0.50-0.80
Malaysia	0.50-0.70	0.65-0.90
Philippines	0.25-0.70	0.30-0.90
Republic of Korea	0.60-1.20	0.75-1.50
Singapore	0.60-1.25	0.90-1.80
Sri Lanka	0.11-0.15	0.15-0.25
Thailand	0.35-0.50	0.40-0.60

Source: Folker Fröbel, Jürgen Heinrichs and Otto Kreye, Umbruch in der Weltwirtschaft (Reinbek, 1986), p. 470.

a/ Labour costs differ from wages by including social payments.

Since the latter half of 1985 there has been a major realignment of exchange rates, especially in the parity of the dollar and yen. This has altered investment costs in different countries according to the behaviour of their currencies; the results likely for the two-year period, end-1985 to end-1987, are given in table 26. The only countries, compared with Sri Lanka, that are becoming cheaper for investors both in dollars and yen are Indonesia and the Philippines, with not much difference in the numbers for Malaysia. On one level, this confirms the view expressed earlier that ASEAN countries and Sri Lanka are the main competitors: they have the lowest labour costs (fragmentary information for Indonesia suggests that, could it have been included in table 25, its rates would have been closest to those for Sri Lanka) and their exchange rates are all fairly weak. On a different level, the available evidence also leads to the conclusion that nothing much is to be gained for any country by any further attempts at competitive devaluations, cuts in wage rates or efforts to improve incentives



for foreign investors. Not only would these measures be likely to backfire, in that neighbouring countries would probably modify policies to neutralize the shifts, but they would seriously call into question the net benefits to that country of an export-oriented manufacturing thrust. Owing to the absence of data, it has not been possible to present estimates of net export earnings but they are certainly not that substantial owing to the import content of export-directed manufacturing production. Any further policies allowing part of the benefits to be taken away would leave the country with little to show for its efforts.

Table 26. Projected change in investment costs measured in dollars and yen in selected Asian countries for the period end-1985 to end-1987 (Percentage)

Country	Change in yen	Change in dollars
China (Taiwan Province)	-5.8	+17.5
India	-26.4	-1.7
Indonesia	-43.5	-24.5
Malaysia	-29.6	-5.9
Philippines	-31.6	-8.5
Republic of Korea	-12.1	+17.5
Sri Lanka	-30.2	-6.8
Thailand	-18.7	+8.7

Source: Business Asia, 16 March 1987.

Notes: Percentages calculated comparing actual end-1985 rates with projected end-1987 rates; the basis for the projection is not explained. It is not clear whether full allowance has been made for possible shifts in costs other than exchange rates (e.g. alterations in government policies regarding foreign investment).

To sum up, what then are the overall prospects for the Asian developing countries to attract machine-tool investment from abroad? As a basis for answering this question, the quintessential features of foreign direct investment in the machine-tool branch are reiterated below:

(a) So far, foreign direct investment in machine tools has not taken place on a large scale (compared with both the overall production of machine tools and the foreign direct investment ratios in other branches of manufacturing), but it has been showing a tendency to increase;

(b) Foreign direct investment related to machine tools is clearly among the most demanding types of foreign direct investment, both in terms of supply as well as demand. On the supply side, that

is, the investment preconditions relating to factor availabilities, it presupposes the existence of highly skilled labour resources, a network of suppliers of specialized inputs and a sophisticated supporting service sector (such as local computer software specialists). On the demand side, a large domestic market has shown itself to be of key importance. Foreign direct investment has sought primarily either to maintain access to a protected domestic market (e.g. investment in the United States triggered off by the threat of VER) or at least to combine export production with production for the host-country market within a strategy of risk control. Nowhere has foreign direct investment in machine tools been utilized so far just as an export platform.

These characteristics obviously imply that for those developing countries in Asia outside the core group of NICs, the prospects for attracting investment for their machine tools are not particularly bright. This is not to say, however, that the potential is non-existent. What follows is rather the need to design a clear long-term strategy in this area. The available evidence demonstrates that in no case has the production of machine tools developed in isolation from the overall industrial sector. Being a branch with strong backward and forward linkages, machine tools can only prosper as an integral element of a larger industrial system.

Hence, the chances of attracting investment appear to be best in those countries with a strong industrial-policy commitment to develop and upgrade their metalworking and engineering industries. Moreover, within this overall strategy, countries would have to define for themselves those specific groups of machine-tool products that were of critical importance to their industrial progress and subsequently would have to approach potential investors. Targeted investment promotion activities thus assume critical importance and, as pointed out above, it is not so much a façade of fancy investment incentives as the long-term market prospects that will cause potential investors to respond. Further detailed research would seem to be required, however, to ascertain, at the company level, the various determinants of corporate strategies in general and of investment behaviour in particular.

#### Notes

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Annex

MAIN NATIONAL MACHINE-TOOL ASSOCIATIONS

<u>Country</u>	<u>Name and address of association</u>
<u>Europe (CECIMO members)</u>	
Austria	Fachverband der Maschinenund Stahlbauindustrie Österreichs, Wiedner Hauptstrasse 63, Postfach 430, A-1045 Vienna
Belgium	Syndicat des Constructeurs Belges de Machines-Outils pour le Travail des Métaux, rue des Drapiers 21, B-1050 Brussels*
Denmark	Föreningen af Danske Vaerktøjsmaskinfabrikanter, Nørre Voldgade 34, DK-1358 Copenhagen K
France	Syndicat de la machine-outil, de l'assemblage et de la productique associée, 150 boulevard Bineaux, B.P. 117, F-92203, Neuilly-sur-Seine Cedex
Germany, Federal Republic of	Verein Deutscher Werkzeugmaschinenfabriken e.V., Corneliusstrasse 4, D-6000 Frankfurt am Main 1
Italy	Unione Costruttori Italiani Macchine Utensili, Viale Fulvio Testi, 128, I-20092 Cinisello Balsamo (MI)
Netherlands	Vereniging voor de Metaalen de Elektrotechnische Industrie, Bredewater 20, Postbus 190, NL-2700 AD, Zoetermeer
Portugal	Centro de Cooperação dos Industriais de Máquinas e Ferramentas, Rua Manuel Pinto de Azevedo 439, P-4100 Porto
Spain	Asociación Española de Fabricantes de Máquinas-Herramienta, Edificio Oficinas Lorea, Apartado 907, Avenida de Zarauz 82, E-20009 San Sebastián
Sweden	Föreningen Svenska Verktygsmaskintillverkare, Box 5506, S-11485 Stockholm
Switzerland	Verein Schweizerischer Maschinen-Industrieller, Kirchenweg 4, CH-8032 Zurich
United Kingdom	Machine Tool Trades Association, 62 Bayswater Road, London W2 3PH

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\*Headquarters of CECIMO.

Asia

India            Indian Machine Tool Manufacturers Association,  
82 Jolly Maker Chambers 2, 225 Nariman Point,  
Bombay 400 021

Japan            Japan Machine Tool Builders' Association, Kikai Shinko  
Kaikan, 3-5-8 Shibakoen, Minato-ku, Tokyo 105

Republic of    (Contact person) Mr. Kim Kee Hyo, Assistant Director,  
Korea           Precision Machinery Division, Ministry of Commerce and  
Industry, Seoul

North America

United           National Machine Tool Builders' Association, 7901 West  
States           Port Drive, McLean, Virginia 22102

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TEXTILE POLICY ISSUES FOR DEVELOPING COUNTRIES

Secretariat of UNIDO\*

A. Changes in the international textile industry:  
new parameters for developing countries

Because in many countries the textile and clothing industry is one of the largest industrial employers and the key industrial earner of foreign exchange, it has usually been considered - depending on the point of view - as either a promoter of industrial development (the view in developing countries) or a threat to industrial employment (the view in industrialized countries). "Export-led growth", the magic formula used to describe the exceptionally high growth rates of several Asian developing countries over the last two decades, was more or less synonymous with "textile-led growth". Yet, recent trends in the international textile and clothing system indicate that these industries may in future play a different role in economic development than they once did in certain Asian countries. This article is based not only on the persistence of tight international controls on trade in textile and clothing goods. New technologies, changes in industry structure both within and between countries, and widespread government interventions through specific industrial policies are leading to new international constellations of competition and "man-made" comparative advantages. This article will outline and analyse some of the trends in the international textile/clothing system that constitute new parameters for developing countries in their efforts to promote their textile and clothing industries. These trends are revealed by the data contained in the tables in the appendix.

1. Changes in international textile/clothing trade:  
new customers and new suppliers

During the last two decades, significant changes occurred in the international trade flows of textile and clothing products, reflecting changes in the competitive positions of countries and country groupings. The entry of a growing number of developing countries into world markets - and particularly into the markets of industrialized countries - resulted in today's highly regulated system of textile and clothing trade, which in 1984 comprised 48 per cent of world exports of textiles and clothing. Protectionist barriers and the international recession sharply reduced the growth of global textile and clothing exports in the first half of the 1980s, compared to the preceding two decades.

Table 1 provides an overview of the changing product composition of the world trade in textiles and clothing between 1965 and 1985. The steady decline in the shares of yarns and fabrics (for

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\*This article is a slightly revised version of UNIDO/PPD/R.5(SPEC), 20 August 1987.



Table 1. World exports of selected textile and clothing goods, 1965-1985  
(Thousands of dollars)

Category of export	1965		1970		1975		1980		1985		Growth rate (%)				
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	1965-1970	1970-1975	1975-1980	1980-1985	
<b>Yarn</b>															
Grey cotton	206 501	4.0	306 602	3.0	683 722	2.8	2 446 821	4.4	2 390 316	3.9	7.9	17.4	29.0	-0.5	
Processed cotton	168 259	3.2	225 376	2.2	471 126	1.9	183 122	0.3	182 429	0.3	6.0	15.9	-17.2	-0.1	
Synthetic	709 590	13.3	1 766 770	17.3	3 540 809	14.3	6 301 710	11.3	5 752 724	9.3	20.0	14.9	12.2	-1.8	
		20.7		22.7		19.0		16.0		13.6					
<b>Fabrics, woven</b>															
Cotton	1 407 393	26.8	1 452 339	14.4	3 172 269	12.8	7 094 861	12.7	6 991 924	11.5	0.6	16.9	17.5	-0.3	
Synthetic	505 742	9.6	1 497 287	14.9	3 847 916	15.6	7 894 267	13.2	7 646 004	12.3	24.2	20.8	15.5	-0.6	
		36.4		29.4		28.4		26.9		24.0					
<b>Clothing/ accessories/ knitwear</b>															
Clothing	1 040 864	20.2	2 264 845	22.5	6 967 791	28.2	18 115 022	32.5	21 809 535	35.8	16.4	25.2	21.1	5.8	
Accessories	232 259	4.4	397 624	3.9	813 297	3.3	1 615 005	2.9	3 669 997	2.7	11.4	15.4	14.7	0.7	
Knitwear	942 668	18.3	2 165 706	21.3	5 243 905	21.2	12 011 364	21.6	14 536 180	23.8	17.6	19.3	18.0	3.9	
		42.9		47.9		52.6		57.1		62.4					
<b>Total/ average</b>	5 256 276	100	10 076 609	100	24 740 835	100	55 682 172	100	60 979 110	100	13.9	19.7	17.6	1.8	

SOURCE: UNIDO data base.

the former since the 1970s, for the latter since the 1960s) and the rapid growth in the share of garments emerge as the key trends. In fact, yarns and fabrics experienced absolute declines, in value terms, in the early 1980s (in the case of processed cotton yarns since the mid-1970s), reflecting both the build-up of sizeable production capacities in developing countries and the growing vertical integration of their textile/clothing complexes. In the case of fabrics, rapidly growing exports of synthetic fabrics reached and surpassed exports of natural fabrics in the 1970s and early 1980s, although by the mid-1970s the latter also began to gain, coming close to the level of synthetic fabric exports by 1985.

The changing product composition of world trade in textiles and clothing reflects substantial changes in the industry's international division of labour, resulting from the changing comparative advantages of individual countries and country groups. Table 2 and figures I and II provide an overview of the changing world-export shares of the developed market economies (DMEs), the centrally planned economies (CPEs) and the developing countries. Two subgroups of developing countries are distinguished to take into account the pace and timing of the countries' entries into the world market of textiles and clothing. The first subgroup comprises those developing countries that (a) have reached a more advanced level of income per capita\* and (b) during the 1970s and early 1980s gained major shares in the textile/clothing import markets of the United States and/or the EEC. These countries and areas, which will be referred to as advanced textile exporters (ATEs), are Hong Kong, the Republic of Korea, Brazil, Mexico and Yugoslavia, all of which satisfy criterion (a). Criterion (b) is satisfied by Hong Kong and the Republic of Korea with respect to both the EEC and the United States, by Brazil and Mexico with respect to the United States only and by Yugoslavia with respect to the EEC only.\*\* All other developing countries constitute the second subgroup and will be referred to as other developing economies (ODEs) in the following discussion.

As a group, the ATEs expanded their share of world export markets at an increasing pace from the mid-1960s to the mid-1970s. Between 1965 and 1970 they gained market shares at the expense of both the developed market economies and the ODEs, but after 1970, their gain was fully at the expense of DME exports. In the second half of the 1970s, the ATE share of world exports basically stagnated in the face of rapidly expanding exports of ODEs.

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\*These countries are classified by the World Bank as upper-middle-income countries. The rationale of this criterion is the focus in this chapter on global changes at various processing stages of the textile/clothing production chain. These changes are closely correlated with development stages, a proxy of which is taken here to be income per capita.

\*\*China (Taiwan Province) would have fulfilled both criteria but could not be included because its trade is not explicitly included in United Nations trade statistics.

**Table 2. Share of selected country groups in the world trade of textiles and clothing (Percentage)**

Trade	1965	1970	1975	1980	1985
<b>Exports</b>					
Developed market economies	82.0	80.3	72.0	66.0	55.8
Advanced textile exporters	9.6	12.0	17.3	18.0	21.2
Other developing economies	6.8	5.7	7.8	13.4	20.9
Centrally planned economies	1.6	2.0	2.9	2.6	2.1
<b>Imports</b>					
Developed market economies	70.3	75.6	78.0	77.5	80.1
Advanced textile exporters	5.0	7.5	5.3	6.0	8.2
Other developing economies	21.5	12.5	11.9	13.1	9.1
Centrally planned economies	3.2	4.3	4.7	3.4	2.6

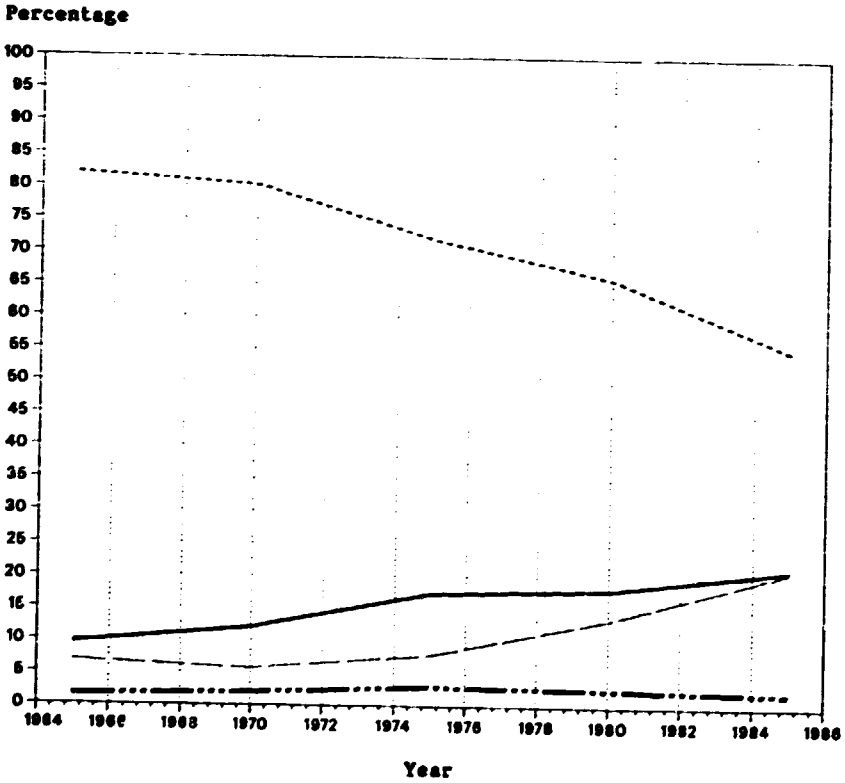
Source: UNIDO data base.

The share of DMEs in world export markets was thus reduced, in the first half of the 1970s because of the rapidly expanding exports of the ATEs, and in the second half of the 1970s mainly because of the rapidly expanding exports of the ODEs. Thus, although their exports had increased, on average, by more than 16 per cent per year between 1970 and 1980, the DMEs saw their share of world exports drop from 80 to 60 per cent. In the 1980s, the DMEs suffered a further sharp reduction of their share in the world market, this time, however, because of the rapidly expanding exports of both ATEs and ODEs, as well as an absolute contraction of their own exports.

This contraction also affected intra-DME exports, which since 1970 had accounted for more than three quarters of all DME exports of textiles and clothing. This share remained almost constant throughout the 1970s and the first half of the 1980s, despite declining overall shares of DMEs in the world export markets of textiles and clothing. From this observation it can be concluded that exports from developing countries increasingly displaced trade between the developed market economies.\*

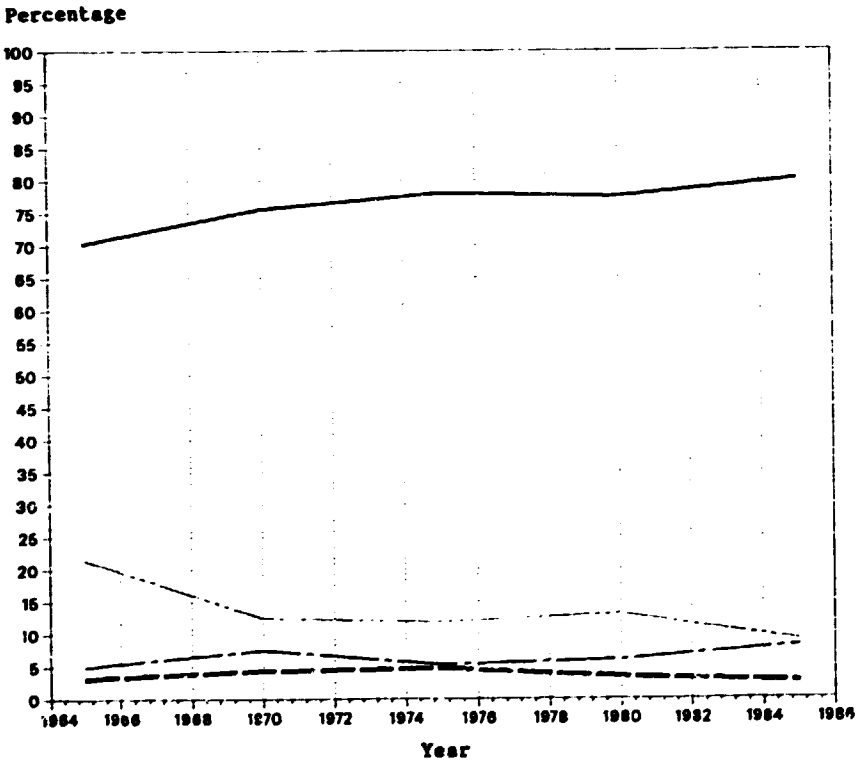
\*Otherwise the share of intra-DME exports would have increased in view of the shrinking DME share of world export markets.

Figure I. Share of selected country groups in world exports of textiles and clothing, 1965-1985



**Key:** ----- Developed market economies  
————— Advanced textile exporters  
- - - - - Other developing countries  
- . . . . Centrally planned economies

Figure II. Share of selected country groups in world imports of textiles and clothing, 1965-1985



**Key:** ————— Developed market economies  
- - - - - Advanced textile exporters  
..... Other developing countries  
- . - . - Centrally planned economies

As the share of DMEs in world exports declined, their share of world imports increased until, in the mid-1970s, the trade balance of their textile/clothing complex became negative.\* The increase of the DMEs' share in world imports is largely based on "trade creation", i.e. on "additional" imports of goods that they had previously produced themselves, and not on "trade diversion" through growing economic integration between the DMEs. The share of intra-DME trade in total DME imports fell from 80 per cent in 1965 to 50 per cent in 1985.

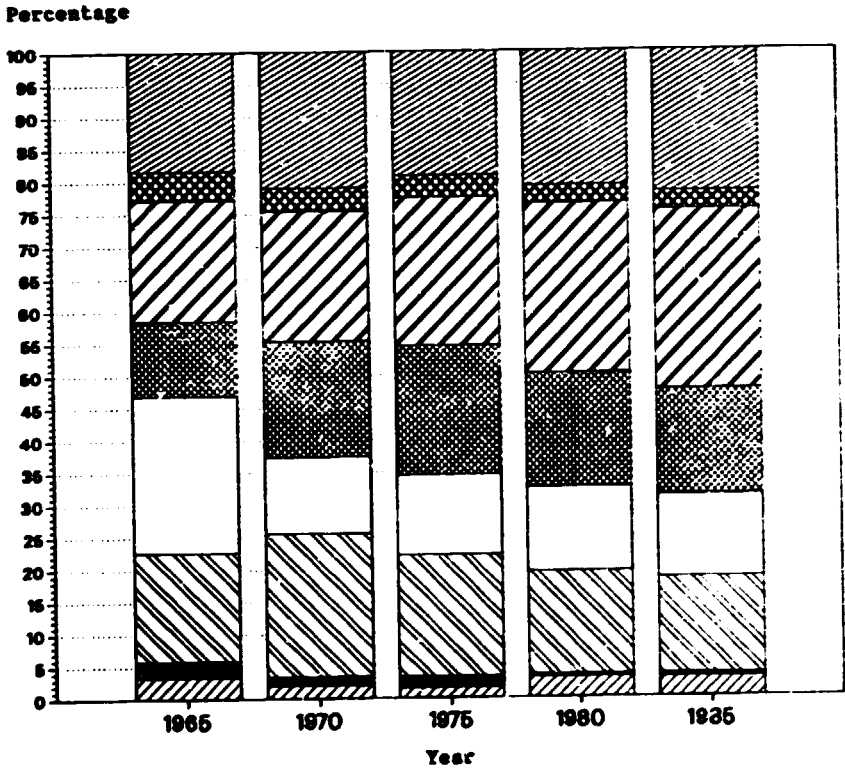
These changes in the overall position of DMEs in the international textile and clothing markets went hand in hand with changes in their trade structure (figures III and IV). Exports of natural yarns played only a negligible role throughout the period, whereas exports of synthetic yarns peaked in 1970, when they had a share of 22.2 per cent, in response to the growing demand for imports on the part of both the ATEs and ODEs. However, as the developing countries (particularly the ATEs) built up their own synthetic yarn production capacities, the weight of synthetic yarns in the DME export basket was reduced again. The share of fabrics dropped, from almost 36.0 per cent in 1965 to around 30 per cent in 1970, and fluctuated around this value for the remainder of the period. The fabric mix changed significantly, however: synthetic fabrics increased their share from about one third of fabric exports in 1965 to almost two thirds in 1975, and still accounted for 56 per cent of fabric exports in 1985. Perhaps the most surprising observation, given the labour intensity of the production process, is the strong and continuous increase of DME clothing exports. Their share increased from 18.7 per cent in 1965 to 27.7 per cent in 1985, representing largely intra-industry trade: between 1970 and 1985 the share of clothing exports directed to other DMEs fluctuated at between 87 and 88 per cent of total DME clothing exports, and the growth of this trade flow accounted for almost 25 per cent of the total increase of DME textile and clothing exports between 1965 and 1985. Together, exports of clothing and knitwear (90.6 per cent of the latter were destined to other DMEs in 1985) accounted for 51 per cent of the DME increase in exports over this period. Thus, intra-industrial trade between DMEs in knitwear and, particularly, clothing (where it may be assumed that cost is not the major determinant) has been stabilizing their textile and clothing exports as new competitors emerge in international markets.

These trends are reflected on the import side, where clothing and knitwear continuously increased their combined share in the DME import basket, from 46.8 per cent in 1965 to 67.8 per cent in 1985. Of these imports, 41 per cent were purchased from other DMEs in 1985 (37.9 per cent of clothing imports, 45.6 per cent of knitwear imports). This, however, is significantly less than the 75.9 per cent share accounted for by intra-DME trade in 1965.

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\*The balance is positive, however, if exports of textile machinery and intermediate products are taken into account.

Figure III. Export composition of developed market economies, 1965-1985

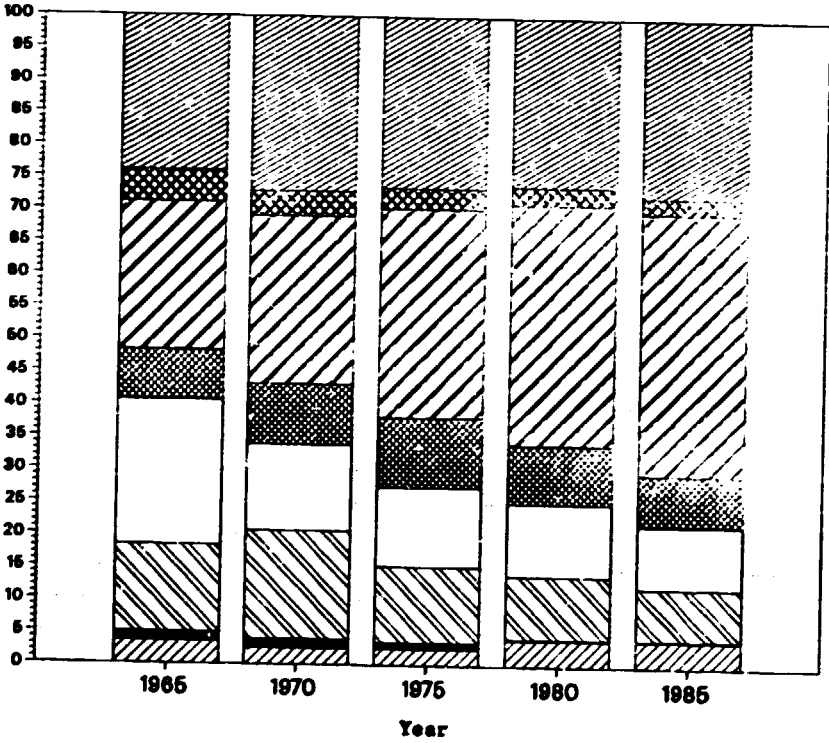


- Key:**
- Knitwear
  - Accessories
  - Clothing
  - Synthetic fabrics
  - Woven fabrics
  - Synthetic yarn
  - Processed yarn
  - Grey yarn

**Source:** Table 9.

Figure IV. Import composition of developed market economies, 1965-1985

Percentage



- Key:
- Knitwear
  - Accessories
  - Clothing
  - Synthetic fabrics
  - Woven fabrics
  - Synthetic yarn
  - Processed yarn
  - Grey yarn

Source: Table 9.



The textile and clothing industries of the ATEs had achieved positive trade balances as far back as 1965, when their share of world exports was almost three times as large as their share of world imports. The ATEs rapidly gained shares in international markets until the mid-1970s. Between 1975 and 1980, they were able to improve their international market positions only slightly, because their exports faced both increasing protectionist barriers in industrialized countries and growing competition from other developing countries. Then, in the 1980s, they were once again able to increase their shares in international markets, at the expense of exports from the DMEs. This growth in ATE exports was accompanied by growth in their share of world imports of textiles and clothing, from 3.4 per cent in 1965 to 8.2 per cent in 1985.

In 1965, clothing and knitwear already accounted for 63 per cent of the textile and clothing exports of ATEs (figure V). By 1985, this share had increased to 76.5 per cent. Natural fabrics exports equalled knitwear exports in 1965, at which time each accounted for 26.4 per cent of the total. Between 1965 and 1975, natural fabrics rapidly lost ground, and they continued to decline until 1985, by which time their share had fallen to 6.2 per cent. Exports of synthetic fabrics, on the other hand, continuously increased their share and had become the third largest product category in the ATE export basket by 1985, accounting for 10.6 per cent.\* Of these exports of synthetics, 45.3 per cent were directed to ODEs, 20.6 per cent was trade between ATEs and 25.8 per cent went to DMEs. Trade between developing countries thus accounts for two thirds of the synthetic fabric exports from ATEs and constitutes the most important trade flow of textile and clothing goods between developing countries.

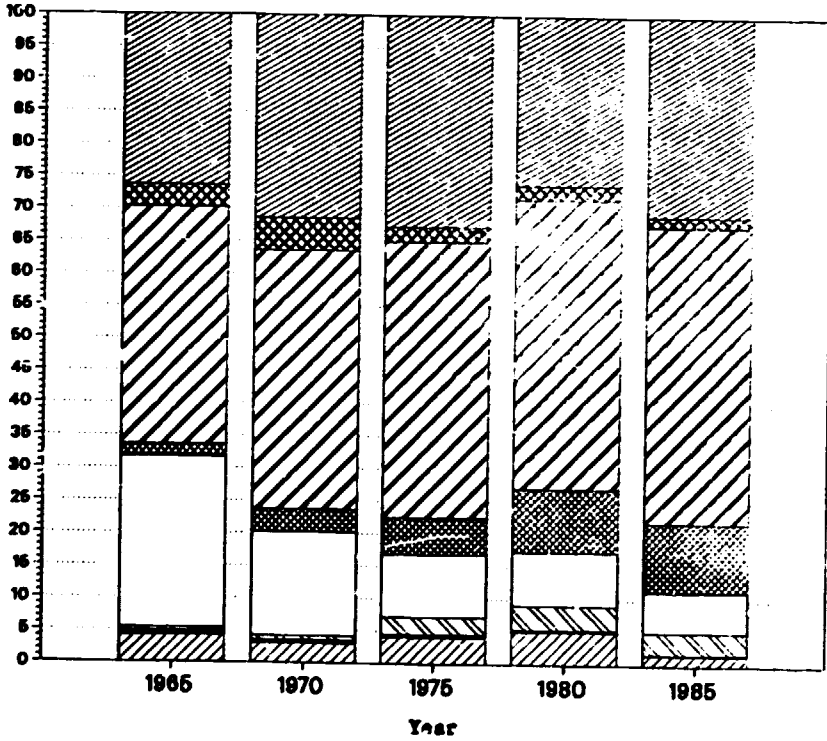
Fabrics constituted the largest product group in the ATE array of imports throughout the period, although their share declined from 59.8 per cent in 1965 to 48.7 per cent in 1985 (figure VI). However, the fabric mix changed. Cotton fabrics lost ground and synthetic fabrics gained rapidly between 1965 and 1970, as the ATEs' import-dependent clothing export industries adjusted to new demand requirements. Since then, the share of natural fabrics has remained relatively stable, at around 20 per cent, but the share of synthetic fabrics has fallen continuously, reflecting the establishment of production capacities in ATEs, the stabilization of international demand for natural fabrics and the drop in petroleum prices. The profile of suppliers of these imports remained relatively constant in the case of natural fabrics: DMEs supplied between 35 and 40 per cent, and ODEs between 45 and 47 per cent. In the case of synthetic fabrics, however, the supplier profile changed dramatically: the share of DMEs in ATE imports dropped from 88.9 per cent in 1965 to 46.4 per cent in 1985. The winners were the ODEs and intra-ATE trade, which, although they had been

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\*If the large synthetic fibre capacity of China (Taiwan Province) had been included, this share would have been significantly higher.

Figure V. Export composition of advanced textile-exporting countries, 1965-1985

Percentage

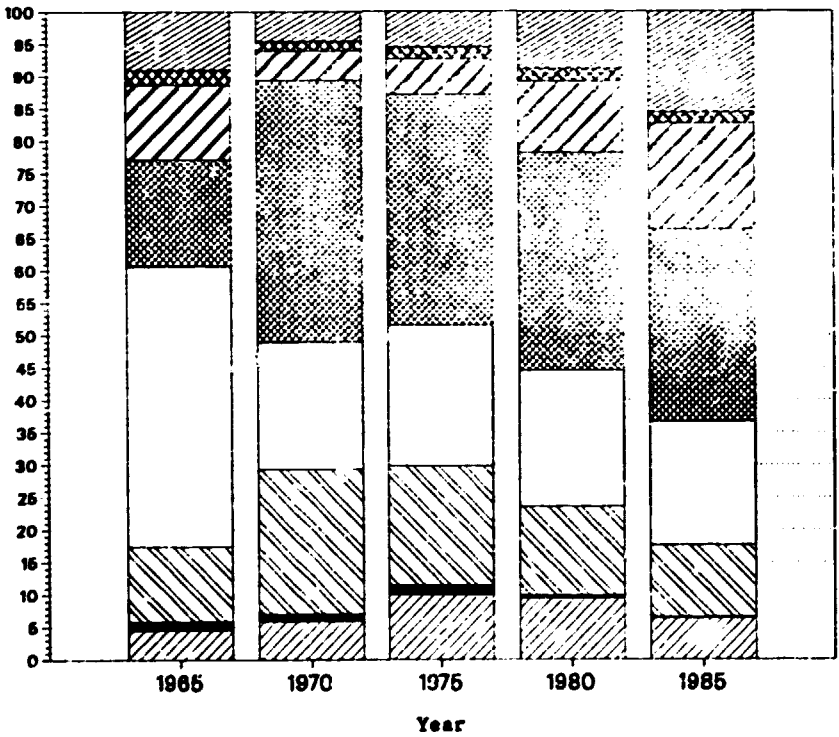


- Key:
- Knitwear
  - Accessories
  - Clothing
  - Synthetic fabrics
  - Woven fabrics
  - Synthetic yarn
  - Processed yarn
  - Grey yarn

Source: Table 10.

Figure VI. Import composition of advanced textile-exporting countries

Percentage



Key: Knitwear  
 Accessories  
 Clothing  
 Synthetic fabrics  
 Woven fabrics  
 Synthetic yarn  
 Processed yarn  
 Grey yarn

Source: Table 10.

almost non-existent in 1965, supplied 24.8 per cent and 26.4 per cent, respectively, of ATEs imports of synthetic fabrics in 1985.

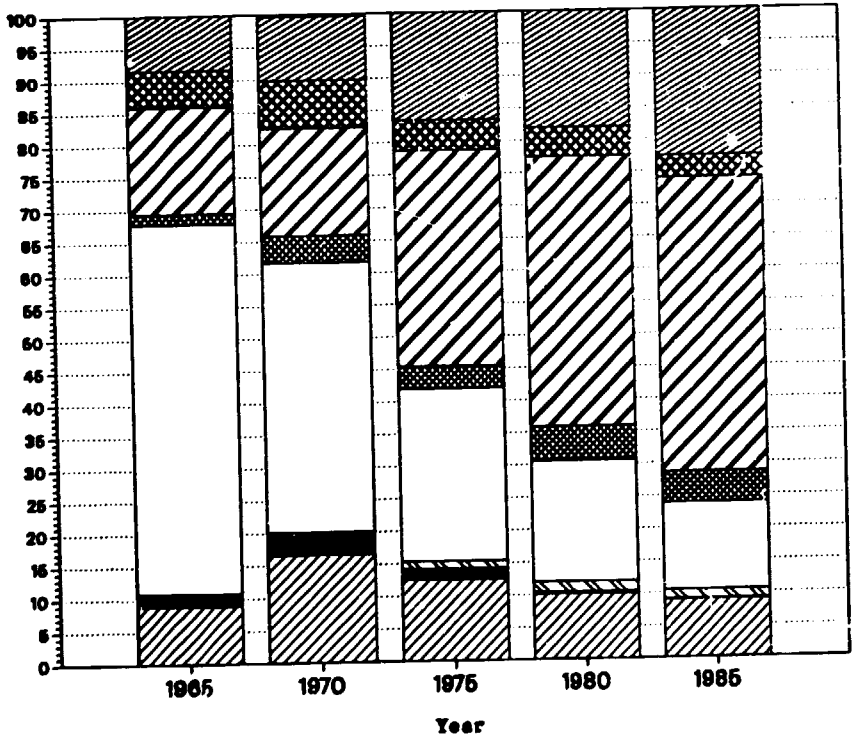
The ODEs played a relatively modest role in world trade of textile and clothing goods up to the mid-1970s. In fact, ODEs were highly dependent on imports of textile and clothing products throughout the 1960s and 1970s. In 1965 they accounted for 21.8 per cent of world imports of these products, but for only 6.8 per cent of world exports. In the second half of the 1960s, the establishment of sizeable production capacities in these countries caused a steep reduction in their share of world imports. It had fallen to 12.7 per cent by 1970 and has fluctuated around this level ever since. Yet it was not until 1980 that expanding exports were able to eliminate the ODEs' overall trade deficit in textiles and clothing. Subsequently they became significant net exporters, and by 1985 their 20.9 per cent share of world exports stood in contrast to their 9.1 per cent share of world imports.

Between 1975 and 1985, the ODEs almost tripled their share in world export markets, from 7.8 per cent in 1975 to 20.9 per cent in 1985. With exports growing at an average annual rate of 31.1 per cent, the rapid penetration of world export markets by ODEs between 1975 and 1980 was matched by a corresponding reduction in the export shares of the DMEs. The relative position of the ATEs remained largely unchanged, although their textile and clothing exports grew at an average annual rate of 18.6 per cent. The stagnant position of the ATEs between 1975 and 1980 was due to the combined impact of DME trade barriers against ATE exports, which facilitated the penetration of international markets by ODEs, and of the relatively greater competitiveness of ODEs against ATEs. Between 1980 and 1985, the further steep rise in the market share of the ODEs again paralleled the new market share gains of the ATEs, but the average annual export growth rates of ODEs (11.7 per cent) continued to be significantly higher than the growth rate of the ATEs (4.3 per cent). Still, the export growth rates of both groups of developing countries fell significantly short of the rates recorded between 1975 and 1980, reflecting not only increasing trade barriers, but also the drop in demand by OECD countries for textiles and clothing. However, a decrease in the value of DME exports between 1980 and 1985 by a total of 6 per cent allowed developing countries to gain market share comparable to the gains achieved with much higher growth rates between 1975 and 1980.

Unlike in the other groups of countries, exports of grey and processed yarns constituted an important element of the export basket in the ODEs until the mid-1970s, with a peak share of around one-fifth in 1970 (figure VII). The destination of these exports varied significantly with the level of processing: whereas 57.1 per cent of exports of grey yarns were delivered to developing countries, 52.6 per cent of exports of processed yarns went to the CPEs. By 1975, this share had increased to 73.7 per cent. By 1985, however, the share of processed yarns in the export basket of ODEs had dwindled to 0.1 per cent, reflecting both a sharp reduction in such imports by the CPEs and increasing forward integration of their own textile complexes, whose exports of clothing developed

Figure VII. Export composition of other developing economies, 1965-1985

Percentage



- Key:
- Knitwear
  - Accessories
  - Clothing
  - Synthetic fabrics
  - Woven fabrics
  - Synthetic yarn
  - Processed yarn
  - Grey yarn

Source: Table 11.

dynamically.\* As a result of this, the share of clothing in ODE exports rose from 30 per cent in 1975 to 40 per cent in 1980, and the share of ODEs in world exports of textile and clothing products rose from 7.8 per cent to 13.4 per cent. In the first half of the 1980s, the continuing penetration of ODEs exporters into international textile and clothing markets was supported by a steep rise in knitwear exports, which grew in value terms at an average annual rate of 16.9 per cent between 1980 and 1985 and increased its share of ODE textile and clothing exports from 18.3 per cent to 22.7 per cent.

Imports of ODEs are dominated by synthetic fabrics, which accounted for almost one third of their textile/clothing imports in 1985, followed by clothing and synthetic yarns (figure VIII). Together, synthetic yarns and fabrics accounted for 50.3 per cent of ODE imports in 1985.

## 2. Textile and clothing industries and economic development: a fresh look

An examination of the overall balance and changing composition of the textile/clothing trade of ATEs and ODEs since the 1960s yields some insight into the common patterns of the textile and clothing industries in developing countries. The pattern for small and medium-sized developing countries is summarized in figure IX. The key variable is the changing net trade balance as a country's textile and clothing industry develops. These trade balances have also been determined separately for textiles and clothing. To eliminate the scale problem resulting from differences in the size of individual developing countries and from corresponding differences in their absolute trade figures, the changes in trade balances were calculated as ratios: the ratio of exports over imports of textiles and clothing combined; (curve 1); the ratio of exports over imports of clothing only (curve 2); and the ratio of imports over exports of textiles (curve 3). In the first two cases, ratios with a value greater than 1 indicate a net export status; in the latter case, ratios of greater than 1 indicate a net import status.

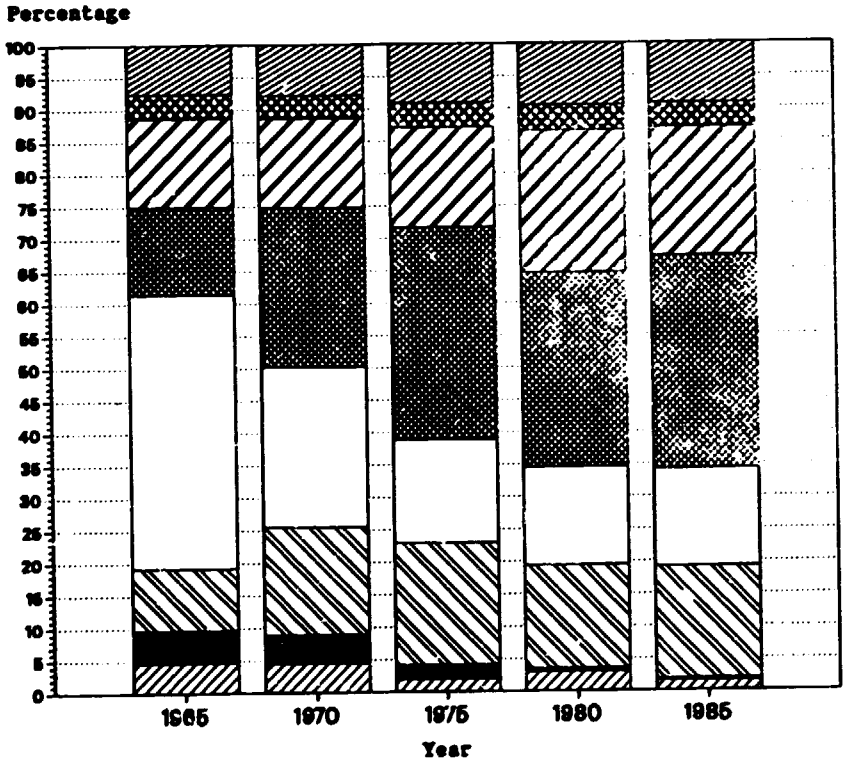
The figure shows that developing countries were usually net importers of textile and clothing products before they became net exporters (phase IV). During the period of net imports, three separate phases can be typically discussed. The phases may be characterized as follows:

(a) Phase I, the "infant industry" phase, which is characterized by net imports of both clothing (ratio of exports

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\*Because of forward integration, the share of woven natural fabrics in the export basket of ODEs also fell continuously, to 13.4 per cent in 1985, from 51.7 per cent in 1965. These trends were reinforced by the growing protectionism of DMKs against clothing exports of ATEs, which reserved niches for ODE exporters in these markets. It was basically these exports which had by 1980 eliminated the overall textile/clothing trade deficit of ODEs.

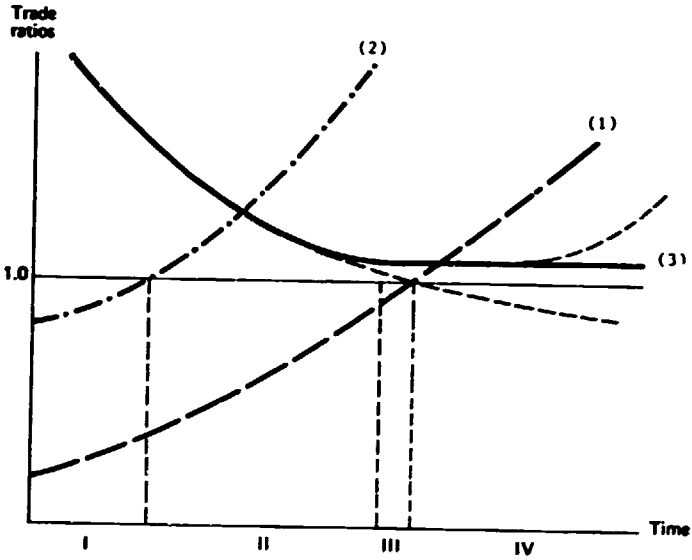
Figure VIII. Import composition of other developing economies, 1965-1985



Key: Knitwear  
 Accessories  
 Clothing  
 Synthetic fabrics  
 Woven fabrics  
 Synthetic yarn  
 Processed yarn  
 Grey yarn

Source: Table 11.

Figure IX. Development patterns of textile and clothing industries in small and medium developing countries



Key: ——— Net exports/imports of textiles and clothing (curve 1)  
- · - · - Net exports/imports of clothing (curve 2)  
——— Net imports/exports of textiles (curve 3)



over imports <1) and textiles (ratio of imports over exports >1), but with declining trend;

(b) Phase II, the "export promotion and import substitution" phase, during which the overall trade deficit of the textile and clothing complex is increasingly reduced by growing net exports of clothing and growing substitution of textile imports;

(c) Phase III, the "clothing-led growth" phase, in which textile import substitution ends, though typically at a modest net trade deficit of textile goods. Exports of clothing continue to expand, but the surplus of net clothing exports is insufficient to compensate the persisting deficit of textile trade;

(d) Phase IV, the "surplus phase", in which exports of clothing are greater than imports of textiles (IVa) and/or textile exports are greater than textile imports (IVb).

Using this four-phase approach, table 3 illustrates some of the changes that occurred, country by country, in the global textile/clothing system between 1962 and 1985. During the 1960s, the textile and clothing industries of most developing countries were still in the earlier phases of their development. Exceptions were developing countries with large internal markets and/or sizeable domestic resource bases (cotton), such as India, Mexico, Pakistan and Brazil. In large developing countries, trade tends to account for a smaller share of domestic production and consumption. The potential offered by the internal market, supported by protective Government policies, favours the development of textile production for the domestic market and allows modest trade surpluses in textile goods at relatively early stages. Export-oriented clothing production, the driving force in phases III and IVa of the small and medium-size country pattern, is less relevant to the development of textile/clothing complexes in large developing countries. A second group of exceptions is made up of outward-looking countries and areas such as Hong Kong and the Republic of Korea (the latter has "looked outward" since the mid-1960s).

By 1970, some Mediterranean countries had made particularly significant advances (Greece and Morocco from I to II, Spain and Turkey from I to IVb). These gains continued in the early 1970s, and by 1975 only Indonesia remained in phase I. Greece and Morocco had entered surplus phase IVa, and several of the countries often referred to as the second generation of newly industrializing countries (Tunisia plus some countries in Asia) clustered in phases II and III. In the first half of the 1980s, all the countries included in the table, except Singapore, had reached surplus phase IV. However, since the mid-1970s, there appears to have been a halt (or at least a slow down) in the graduation process that was observable throughout the 1960s and 1970s. None of the countries that found themselves in phase IVa in 1975 managed to proceed to phase IVb (net exports of both textiles and clothing), with the result that the majority of developing countries included in the table remain clustered in phase IVa.

Table 3. Changes in the global textile/clothing system

Phase	1962	1970	1975	1980-1985
I	Colombia, Greece, Indonesia, Malaysia, Morocco, Philippines, Singapore, Sri Lanka, Thailand, Tunisia, Turkey	Colombia, Greece, Indonesia, Malaysia, Thailand, Philippines, Tunisia	Indonesia	
II	Rep. of Korea	Greece, Morocco, Singapore, Sri Lanka	Malaysia, Philippines, Singapore	Singapore
III	Spain, Yugoslavia	Spain, Yugoslavia	Mexico, a/ Yugoslavia	Sri Lanka, Thailand, Tunisia
IVa	Hong Kong	Hong Kong, India, Rep. of Korea, Mexico	Hong Kong, Rep. of Korea	Tunisia, Brazil, Hong Kong, Indonesia, Malaysia, Mexico, Morocco, Philippines, Thailand, Sri Lanka
IVb	Brazil, Mexico, b/ Portugal, India, Pakistan b/	Brazil, Mexico, b/ Portugal, India, Pakistan b/	Portugal, India, Colombia, Pakistan, Spain, Turkey	Colombia, Greece, India, Rep. of Korea, Portugal, Spain, Turkey

a/ Textile surplus.

b/ Clothing deficit.

To sum up, a characteristic feature of the development of textile and clothing industries in small and medium-size developing countries has been a significant trade deficit in textile goods, resulting from capacities that were too small to fully satisfy domestic demand and, at later stages, to support rapidly expanding exports of garments. In many developing countries, garment exports originate with manufacturers based in export-processing zones, who take duty-free imports of intermediate textile goods and process them further. In the course of their industrial development, many developing countries succeeded in establishing increasingly vertically integrated textile/clothing complexes, which in advanced stages became net exporters. However, this general, historical pattern does not fully reflect the experience of every individual developing country, nor can it be expected to automatically persist in the future.

Some qualifications need to be expressed at this point. Only a few countries have achieved 100 per cent import-substitution of textile products and fewer still have managed to achieve a trade surplus for such products (the downward-sloping dashed extension of curve (3) in figure IX). The fact that the majority of developing countries continue to be net importers of textile goods reflects, first, the difficulties of progressing from a growth stage led by garment exports (with parallel imports of textiles) to one characterized by the integrated development of textile/clothing complexes. In fact, in recent years some developing countries, such as the Philippines, Sri Lanka and Thailand, have experienced a reversal of this trend as their dependence on textile imports again begins to grow (the upward-sloping dashed extension of curve (3) in phase IV). It also reflects the success of industrialized countries, during the last decade, in modernizing their textile industries. In many industrialized countries (and in some advanced developing countries), this success was the result of specific industrial policy programmes, as will be elaborated in section B. These policies aimed at modernizing the textile industries of the respective countries and adjusting their product mix to new market requirements in order to regain or secure new and sound long-term comparative advantages.

### 3. Changes in industry structure: concentration and internationalization

There have been significant structural changes in the textile and clothing industries not only at the international level but also at the level of individual countries. Until recently, the textile and clothing industries in most countries were characterized by a large number of small and medium-sized firms, often family-owned. As a consequence of small plants and low barriers to the entry of new producers, the levels of industrial concentration have generally been below the average concentration in other kinds of manufacturing. In the United Kingdom, for instance, the 100 largest clothing firms accounted for about 9 per cent of output in 1973, compared to 40 per cent for all manufacturing firms. In the Federal Republic of Germany, the three largest clothing firms accounted for less than 5 per cent of output, compared to 25 per cent for all industrial firms. In Japan, the same fragmentation prevailed, with the five largest clothing firms accounting for less

than 20 per cent of output, compared to 50 per cent for all manufacturing firms.\*

Over the last few decades, however, a trend towards oligopolistic market structures has become evident, particularly in regard to the production of man-made fibres (MMF). MMF producers are typically divisions within large multinational, multi-product firms, and they have sizeable financial, technical and managerial resources. Of all the segments of the textile complex, MMF production involves the smallest number of firms and enjoys the most favourable economies of scale. It is also the most capital-intensive and usually the most efficient one of the segments. These advantages dissipate rapidly in the downstream segments, which are characterized by greater numbers of firms, less favourable economies of scale, less efficient production, greater labour intensity, and more formidable international competition. As a result of these structural differences, MMF producers have considerable market power vis-à-vis individual textile companies in terms of product types, product quality and price. This is particularly true of foreign subsidiaries in developing countries, which shelter them from external competition through import barriers.

Only about 50 countries produce MMF. Table 4 shows the share of world production of non-cellulosic MMF claimed by each of six world regions. The two world leaders in production, the United States and Japan, are shown as separate entries. Of the 14 MMF-producing countries in Western Europe, the largest are the Federal Republic of Germany and Italy. Eastern Europe's eight MMF-producing nations include the Union of Soviet Socialist Republics, which is the largest producer in this group. Mexico and Brazil are the largest producers of man-made fibres in the 12-nation category "other Americas". The region designated as "all other" includes Asia, Africa and Oceania. There are approximately a dozen Asian MMF producers, while Africa and Oceania have about four each. The Republic of Korea and China (Taiwan Province) are the largest producers in this region.

The geographical concentration of the MMF industry has an impact on the relative bargaining strength of the more widely dispersed textile and clothing industries that is compounded by the high degree of concentration and specialization of the MMF companies themselves. Table 5 lists the largest European, Japanese and United States MMF-producing companies and their most important fibres. The high degree of internationalization of the industry and the resulting relative dependency of other regions of the world on many of these companies is presented in table 6, which provides data on the location of the man-made fibre production capacity of 20 of the world's largest MMF producer firms. The European firms have the largest percentage of their production outside their own region (32 per cent), followed by United States firms (12 per cent). Japanese production capacity, by contrast, is almost exclusively (95 per cent) in the Far East.

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\*José de la Torre, Clothing-Industry Adjustment in Developed Countries, Thames Essay No. 38 (London, Trade Policy Research Centre, 1985), pp. 85-86.

Table 4. Production shares of the leading non-cellulosic man-made fibres  
by geographic region, 1973-1987  
(Percentage)

Region	Acrylic and modacrylic				Nylon and aramid				Polyester				Total			
	1973	1981	1985	1987 g/	1973	1981	1985	1987 g/	1973	1981	1985	1987 g/	1973	1981	1985	1987 g/
Western Europe	41	41	38	35	31	24	20	24	27	18	14	13	31	24	20	18
Eastern Europe	9	9	11	13	9	15	18	22	6	9	10	11	8	11	12	13
United States	22	15	12	10	36	32	31	39	41	32	23	21	35	26	23	21
Other Americas	3	5	6	7	7	8	7	12	7	8	7	7	6	7	7	8
Japan	21	16	16	15	12	9	9	10	13	11	10	9	15	12	11	10
All other	<u>4</u>	<u>14</u>	<u>18</u>	<u>20</u>	<u>1</u>	<u>12</u>	<u>14</u>	<u>22</u>	<u>6</u>	<u>22</u>	<u>36</u>	<u>40</u>	<u>1</u>	<u>18</u>	<u>27</u>	<u>30</u>
Total h/	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Compiled from Textile Organon, various issues.

g/ Estimated capacity.

h/ Totals may not add due to rounding.

Table 5. Main fibres of leading MMF producers

Company	Main fibre(s)	Backward integration	Forward integration
<b>Western Europe</b>			
Hoechst	Polyester	Yes	No
Courtaulds	Acrylic	No	Yes
Bayer	Acrylic	Yes	No
ICI	Polyester	Yes	No
	Nylon	Yes	No
Euka	Polyester	No	No
	Nylon	No	No
Rhône-Poulenc	Polyester	Yes	No
	Nylon	Yes	No
Montefibre	Polyester	Yes	No
ANIC	Acrylic	Yes	No
SWIA	Nylon	Yes	No
<b>United States</b>			
DuPont	Polyester	Yes	No
	Nylon	Yes	No
	Acrylic	Yes	No
Celanese	Polyester	No	No
Eastman	Polyester	Yes	No
Hoechst	Polyester	No	No
Allied	Nylon	Yes	No
Monsanto	Nylon	Yes	No
	Acrylic	Yes	No
Badische	Nylon	Yes	Yes
	Acrylic	No	Yes
Akzona	Nylon	No	No
American Cyanamid	Acrylic	Yes	No
<b>Japan</b>			
Toray	Polyester	Yes	Yes
	Nylon	Yes	Yes
Teijin	Polyester	Yes	Yes
Asahi	Acrylic	Yes	No
	Nylon	Yes	No
Toyobo	Polyester	No	Yes
	Acrylic	No	Yes
Kuraray	Polyester	No	Yes
Unitika	Nylon	No	Yes
Kanebo	Polyester	No	Yes

Source: "Global strategies for man-made fibres in the eighties", in Decision Resources (Cambridge, Arthur D. Little, May 1982).

Table 6. Location of the world's man-made fibres capacity by individual company, 1983  
(Thousands of tonnes)

	North America	Latin America	Western Europe	Far East	Eastern Europe	Others	Total
DuPont	1 534	68	112	-	-	-	1 714
Celanese	640	226	-	-	-	-	866
AKZO	156	130	276	4	-	10	576
Toray	-	-	-	575	-	-	575
Hoechst	234	11	260	-	-	18	523
Teijin	-	5	17	449	-	-	471
Rhône-Poulenc	-	113	310	25	-	-	448
Monsanto	399	-	-	-	-	-	399
ICI	-	-	290	30	-	53	373
Allied	278	-	-	-	-	-	278
Montefibre	-	-	268	-	-	-	268
Eastman	258	-	-	-	-	-	258
Asahi	-	-	18	226	-	-	244
Bayer	-	27	185	-	-	12	224
SNIA	-	37	174	-	-	-	211
ANIC	-	-	204	-	-	-	204
Courtaulds	5	-	168	-	-	-	173
Badische	131	-	-	-	-	-	131
Mitsubishi	-	12	23	87	-	-	122
Toyobo	-	-	-	108	-	-	108
All others	<u>170</u>	<u>322</u>	<u>256</u>	<u>2 623</u>	<u>1 699</u>	<u>372</u>	<u>5 442</u>
Total	3 805	951	2 561	4 127	1 699	465	13 608

Source: Previously unpublished estimates by Monsanto, July 1983, reported in David A. Ricks *et al.*, The United States Man-made Fibres Industry: Global Challenges and Strategies for the Future (Columbia, South Carolina, University of South Carolina Press, 1984).

A key factor influencing the competitiveness of national textile complexes is the degree of vertical integration. In the case of M&F production, backward integration consists in the processing of a company's own chemical raw materials, whereas forward integration consists in an M&F company's uses of its own fibres to produce textiles. Forward integration can also include other downstream activities, such as the manufacture and distribution of clothing. The integration strategies of M&F producers were indicated in table 5. In Western Europe, all but one of the M&F firms employ mostly backward integration strategies. The same pattern generally holds for United States firms. Japanese companies, by contrast, are more prone to use international forward and/or backward integration strategies. For example, one of Japan's largest fibre companies, Toray Industries, wholly or partially owns numerous textile and clothing companies throughout South-East Asia.

Forward integration gives M&F producers considerable competitive advantages over more fragmented and independent arrangements: the producer is directly linked to the market, and its R and D activities benefit from a first-hand knowledge of fashion trends and changing fibre preferences of the market.\* Demand is more stable since it is spread over many markets, leading to economies of scale in the production not only of fibres but also of textiles and clothing. Quotas imposed by importing countries can be more easily circumvented by shifting production from one country to another when the quota for the first country is filled.

Internationalization and concentration trends are also evident, although to a lesser degree in the textile industry. Unlike in the case of M&F production, however, this does not involve substantial foreign direct investments, except in the cases of the Republic of Korea and Japan. Instead, internationalization is evidenced by the substantial shifts that have occurred in the international division of production, the development of international linkages by European, Japanese, and United States trading companies, and the industrial adjustments being undertaken by national industries and promoted by their Governments. Technological progress has led to the integration of spinning and weaving activities into large-scale plants; substantial increases in capital intensity, labour productivity and productive flexibility; and substantial improvements in product quality (defect-free output, texturing, fibre blends and so on). The rapidly mounting costs of modernizing textile plants and the textile production process will place severe burdens on small and medium-sized firms with limited financial resources unless public funds are made available to support such investments. Government-led programmes to rationalize the production of fibres, textiles and clothing in a number of countries have also had the net effect of concentrating production, especially in textiles.

Concentration pressures have not been as strong in clothing. While technological change has been relatively rapid in cutting and

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\*This integration strategy contributes to the continued strength of the Japanese producers of fibres and fabrics.



pressing, it has been considerably slower in sewing, the labour-intensive nucleus of this particular segment of the textile complex. However, recent technological advances may be a sign of sweeping technological and structural changes in the production of clothing, similar to past changes in textiles production. The already high specialization ratios of the industry in many countries may force further rationalization and concentration. Clothing firms specialized almost exclusively in a particular kind of clothing are highly vulnerable to changes in the operations. Some successful, growth-oriented United States clothing companies responded to this pressure by adopting a spoke-and-wheel concept to balance economies of scale in production, distribution and inventory costs.\* Several optimal-sized manufacturing plants were linked by a large, geographically centralized distribution warehouse and administrative offices. The warehouse and offices were typically located in a large urban area, and the plants were located in rural areas, where labour was relatively inexpensive. These companies benefited from lower wages, economical plant sizes and economies of centralization in those activities that were common to all plant operations. The same concept is also being used by firms in Japan and the Republic of Korea, with the main difference being that the plants are located in other countries with lower wages.

#### 4. Challenges facing developing countries

Textile and clothing industries around the globe have encountered considerable change in the last three decades. These changes are expected to continue and so will constitute binding parameters for Governments as they seek to develop, revitalize and/or restructure their industries. They can be summarized as follows:

1. In the industrialized countries, demand for textiles and clothing is growing more slowly than the aggregate demand increase associated with rising per capita income. Consequently, the share of clothing expenditure in total consumption is higher at low income levels and has been falling significantly in almost all developed countries. Adding to this the persisting high differentials in population growth rates between developed and developing countries, it can be concluded that the main growth markets for clothing will be in the developing countries and, to a lesser extent, in the centrally planned economies. Because the markets in both groups of countries can be expected to remain highly protected, the opportunity to earn foreign exchange through textiles and clothing exports will be limited, for the most part, to the slowly growing markets of the industrialized countries. Therefore, the potential of internal markets in developing countries constitutes a source of growth which developing countries' textile industries will have to increasingly rely on in the future.

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\*See José de la Torre and others, Corporate Response to Import Competition in the U.S. Apparel Industry, Research Monograph No. 74 (Atlanta, Ga., Georgia State University, 1978).

2. This conclusion, which is based on demand considerations, is supported by trends on the supply side. As national complexes and individual competitors redouble their efforts to gain market shares on a global scale or to protect their domestic markets, the nature, degree, and complexity of competition within the global textile complex can be expected to intensify. More and more textile/clothing complexes in developing countries have completed the transition from overall trade deficit phases to trade surplus phases. However, as outlined in section A.3, the process of "graduation" seems to have reached a critical stage, as more and more developing countries settle into the surplus phase. This has been supported by the selective protection provided to the clothing industries of the developed countries. The establishment of country-specific quotas favouring the less-advanced developing countries has accelerated the development of even lower-cost clothing industries in those countries. Countries and areas such as Japan, Hong Kong and the Republic of Korea have sought to circumvent these quotas by establishing clothing facilities in these countries, and the industries of several developed countries, notably the Federal Republic of Germany and the Netherlands, have sought sub-contracting arrangements with clothing manufacturers in low-cost countries in Eastern Europe, in order to remain competitive in their domestic markets.

3. Many developing countries languish in surplus phase IVa, in which net clothing exports overcompensate a deficit of trade in textiles. Persisting deficits in the trade of textiles are a sign of the difficulties that developing countries face when they try to establish fully integrated textile/clothing complexes. These difficulties include the successful efforts to restructure the textile industries of industrialized countries and the lack of analogous efforts in most developing countries as well as the problems posed when "newcomers" try to proceed from garment exports utilizing imported intermediates (often in export processing zones) to garment exports based on integrated textile/clothing complexes. The latter set of problems includes the existence of well-established distribution and trade channels between industrialized countries and the main exporters of textiles and clothing in developing countries; the fact that the production of developing countries is often oriented to the consumption patterns and fashions of industrialized countries; and the high cost of intermediate inputs, given the market power of foreign suppliers and existing trade régimes in developing countries.

4. National industries specialize in those segments in which they enjoy comparative advantages (e.g. man-made fibres, textiles or clothing and, within these major sectors, in particular types of fibres, fabrics and clothing). The international markets for textiles are increasingly divided into two distinct markets: undifferentiated (commodity-type fabrics and yarns) and differentiated (specialty-type fabrics and yarns). The first market is for basic yarns and fabrics, which can best be made in long production runs. Of the industrialized countries, the United States is currently the most efficient producer of these types of fabrics. However, the market is dependent on a high-cost clothing industry that is unable to compete internationally in the low-price, high-volume end of the

market. The comparative advantage for this type of textile market will be held by the emerging textile industries in developing countries, provided they are linked to strong, export-oriented clothing industries that have large pools of low-cost labour, that make use of modern production techniques and technology and that produce the quality of clothing demanded by the markets of the developed countries. It is thus the textile producers in advanced developing countries who are directly competing with United States manufacturers. The second market is for specialized yarns and fabrics. This market, which has grown substantially in the last 20 years, is the result of textile firms having sought to become dominant in specific market segments and the growing sophistication of clothing markets in developed countries. Textile industries in Western Europe particularly have targeted their modernization and restructuring efforts at this market. The introduction of new, flexible machinery allows these companies to react quickly to changing demand in high-fashion markets and to produce even small lots cost efficiently. Access to the more affluent markets, close links to man-made fibre firms, the domination of advanced fabric-forming and -finishing technologies, experience in marketing on a global scale and, last but not least, close links to the manufacturers of textile machinery support these newly established comparative advantages of West European textile manufacturers. Developing countries do not appear to be competing with European producers in these new product lines and market segments; indeed, Governments of the EEC reportedly took a much more liberal stand than the United States Government during the fourth round of Multi-Fibre Arrangement (MFA) negotiations.

5. Traditional models, such as the Heckscher-Ohlin model, that explain changing comparative advantages in terms of evolving relative factor endowments in the course of development\* have only limited analytical value in explaining observable trends. Instead, the international textile-clothing system is advancing from "man-made fibres" to "man-made comparative advantages". This relates both to changes in the structure of the industry producing man-made fibres and chemical inputs which tend to increase the market power of this industry, and to the growing impact of government intervention on comparative advantages. In fact, the key elements that will determine future comparative advantages in textiles and clothing production - such as access to new technologies and support for their dissemination in order to increase the flexibility of production; access to necessary inputs (e.g. oil and gas in the case of man-made fibres; man-made fibres and chemical inputs in the case of textiles; and fabrics in the case of clothing); and access to sufficiently large markets to gain economies of scale and rules affecting labour costs and labour productivity - are highly susceptible to policy action. Although technological innovation - primarily in the textile sector, but also in the design and cutting

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\*According to this view, developing countries would "accumulate" relatively more capital than labour, which would confer upon them new comparative advantages in more capital-intensive production lines.

segment of the clothing sector - is in principle available to all countries, it is placing increasing financial and training burdens on individual firms. As competition for market shares intensifies and new skills in marketing and management become necessary, firms are burdened by the need to finance increasingly expensive plants and equipment and to train their workers in the use of this equipment.

6. In most countries, the textile/clothing complex grew sequentially but in a backward manner (i.e. first a clothing industry based on imported intermediate products developed, then a textile industry, and finally a man-made fibre industry), and it was usually part of a deliberate industrialization programme. However, as was shown utilizing trade ratios, this pattern is not inevitable. Many developing countries never manage to achieve complete textile import substitution or even to become net textile exporters. Indeed, some countries now exhibit a renewed dependence on textile imports to support their exports of garments. The experiences of the Republic of Korea and China (Taiwan Province) suggest that the relatively advanced third world countries will eventually lose most of their advantage in the production of undifferentiated textiles and clothing to the up-and-coming, less-advanced developing countries. Whether they also lose their advantage in textiles and clothing overall will depend on their ability to finance and support advanced and more flexible textile industries and on their ability to learn the manufacturing and marketing techniques of these industries.

#### B. Textile policies of developing countries: industrial expansion and modernization

During the last two decades the developing countries have taken an active part in promoting their textile and clothing industries. The main objective of their textile policies was to expand the relatively young industries and to strengthen their comparative advantages, although the world-wide recession in the early 1980s forced many Governments to shift their emphasis to the consolidation and short-term survival of the industry. The Governments of some developing countries have even gone so far as to initiate structural adjustment programmes that would set a sounder basis for growth given the changed set of international parameters. The following sub-sections contain an overview of the various policy incentives used by developing countries to promote their textile and clothing industries.

##### 1. Protection of domestic markets

Compared to the tariffs levied by industrialized countries, which exempt each other from quota restrictions,\* the tariffs

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\*Textile and clothing trade between industrialized countries is, however, subject to tariff restrictions. The weighted average tariff for textiles and clothing in OECD countries is generally high (19.0 per cent in the United States, 11.5 per cent in Europe, 11.5 per cent in Japan and 21.5 per cent in Canada and Australia) compared to the tariffs levied for other manufactured products.

levied by most developing countries on imports of textiles (yarns and fabrics) and clothing are much higher (usually between 20 and 100 per cent).<sup>\*</sup> The lower tariffs are for fibres and yarns, the higher tariffs are for fabrics and clothing. For example, the tariffs levied by Pakistan are 65 per cent on yarns, 130 per cent on fabrics and 160 per cent on clothing. The tariffs levied by the Republic of Korea are 20, 35 and 40 per cent, respectively.

In addition, most developing countries have other import restrictions, such as import license requirements, import prohibitions, and other non-tariff and non-quantitative trade restrictions, such as cash deposits on imports, price controls and origin marking requirements. For example, the Republic of Korea requires a 20 per cent cash deposit against all textile and clothing imports and has established a system of quotas. Imports of textiles must also have the approval of a textile-import supervisory board. Other countries, such as Brazil, Peru, India and Thailand, prohibit the importation of certain textiles and clothing items.

These tariffs and trade restrictions virtually close the textile and garment markets of many developing countries to foreign competition, giving local producers the opportunity to subsidize foreign sales with high domestic contributions. The greater role of protection in the policy framework of developing countries, compared to developed countries, corresponds to the different policy objectives of the former, i.e. to establish and expand their young industries. In addition, the high profits generated on domestic sales are used to offset the lower profit margins obtained from export sales. There are, however, serious drawbacks to this approach, unless offsetting policies are introduced. In particular, exports are being discriminated against, because non-exporting textile and clothing companies have a profit advantage over companies that use their "closed market" profits to subsidize exports. In addition, unless protection is complemented by an active policy of modernizing and restructuring the industry, it may result in an inefficient industry comprising a large number of marginal companies. Closure of the market also encourages contraband, especially if the local products are not comparable to foreign-made products in terms of fashion, design, quality or fabric assortment.

## 2. Sectoral aid measures

Three types of sectoral aid measures were used by one or more of the countries covered in table 7: (1) subsidies to assist in the modernization of the targeted industries; (2) subsidies to reduce the costs of needed inputs; and (3) creation of state-owned holding companies to preserve jobs.

### (a) Modernization assistance

Textile- and clothing-specific subsidies to modernize those particular segments are common, also in developing countries. Of

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<sup>\*</sup>The only exception is the free port of Hong Kong.

Table 7. Sectoral aids favouring the textile and clothing industries of nine developing countries and areas, 1952/54

Type of aid	Brazil	Hong Kong	India	Pakistan	Philippines
Modernization and diversification subsidies			<p>Cotton textile industry - 10-year fund established. Select number of state-owned firms to receive increased financial support. United Nations development support for specific regional clothing firms.</p>	<p>No information.</p>	<p>Modernization of textile industry financed partly by World Bank. Firms must contribute 25% of needed capital. Funds were also available for clothing industry and expansion of exports.</p>
Export promotion			<p>Promotion measures favouring 100% export textile firms.</p>	<p>Export-oriented firms granted a complete exemption from customs on imports of raw materials. Duty-free imports of plant and equipment for textile and clothing firms.</p>	<p>Export credits and export capital made available. Also receive an interest rebate of two percentage points below normal market rates.</p>
Other export promotion measures			<p>State holding company for the absorption of non-viable firms - 130 cotton weaving firms currently kept from bankruptcy.</p>	<p>State holding company for the absorption of non-viable firms - non-competitive firms are kept from bankruptcy. Price-reductions for the purchase of cotton.</p>	<p>Preferential access to foreign exchange gains from exports normally turned over to Central Bank can be used to repay credits for imports of machines, raw materials etc. Textile firms also get preferential treatment in foreign exchange sector.</p>

**Table 7 (continued)**

Type of aid	Brazil	Hong Kong	India	Pakistan	Philippines
Tax-based promotion of investments	Income tax and sales tax exemptions. Tariff exemptions on purchases for production. Trebling of depreciation rates. Multiple-shift bonuses.	No special measures but favourable tax frame framework - no capital gains tax, unlimited carry-forward of losses, no dividend tax, favourable depreciation regulations.	10% depreciation allowance in year of purchase of select capital goods. 50% immediate write-off possible for textile and clothing machines. 8-year carry-forward of losses. Tax-free allowance in earning tax for up to 25% of capital goods. Companies can deduct a percentage of capital stock from taxable income for 3 years. Firms established 1981-1986 can deduct 20% of corporate tax for 8-year period.	Reduction of import duties for machines and tangible assets. Exemption from income tax till 1988 for newly established clothing firms. 5-year tax exemption in development areas. Other regional development incentives.	Tax holidays, loss carry-forward privileges and tax-free allowances for certain firms and machines and parts. Also 50% duty exemption on imported equipment and parts. Export intensity is a major criterion for eligibility.
Tax-based promotions of exports	Tax reductions on the basis of the proportion of total turnover/export turnover. Export trading companies can deduct difference between domestic prices and f.o.b. values from taxable profits. Allocation of a tax credit to exporter in an amount of the turnover tax rate. Preferential treatment for the import of export-oriented goods.	No information.	Tax reductions on export earnings. Tax exemption in export-oriented free zones (5 years on earnings, no import charges, domestic supplies count as exports, no sales tax). Reimbursement of paid domestic indirect taxes. Refund of import charges for export-oriented primary products.	Exemption from import charges for goods required for export. Deduction of 5% of export proceeds from taxable income. Export-processing zone exempt from income taxes for at least 3 years. Reimbursement of duties and indirect taxes in accordance with standard rates.	5-10% tax-free allowance on earnings from total profits or export proceeds for 3-10 years. Tax-free allowances in earnings tax for paid customs duties and imports charges. Doubling of normal depreciation rates. Complete exemption from taxes in export-oriented free trade zones. Doubling of freight costs and additional deductions associated with wages and material expenses up to 25% of export

Table 7 (continued)

Type of aid	Republic of Korea	Taiwan	Thailand	Tunisia
Modernization and diversification subsidies	Modernization fund - replacement loans (8 years, 3 years free from redemption, 5%). Diversification fund - emphasis on product quality, printing process and expansion of exports.	Renovation programme - offers better conditions for amalgamation of firms, makes available long-term financing for replacement of obsolete equipment, introduces new technologies for textile production unit for dyeing and printing.	Promotion programme for small- and medium-sized firms. Financial assistance given to small and medium-sized firms, particularly in weaving and knitting industries.	State aid for the creation of permanent places of employment. Regional employment incentives. World Bank loans - in 1981, loans amounting to \$18.8 million made available to select textile firms for modernization.
Export promotion	No information.	No information.	Export credits - favourable loans at 6% available for up to 3 years. Alternatively, banks discount payable exports at 7%. Financing of export-oriented imports - banks obliged to offer loans 1.5% below market rate.	No information.
Other export promotion measures	No information.	No information.	Financing of raw materials - domestic textile firms offered a rediscout of commercial bank loans at interest rate of 6% for 14-90% of amount for raw materials. Interest subsidies - at standard interest rate of 14.5%.	Exemption from social charges - 100% exemption given firms meeting requirements. Reduced to zero over a 4-6 year period.

continued



Table 7 (continued)

Type of aid	Republic of Korea	Taiwan	Thailand	Tunisia
Tax-based promotion of investments	Special incentives for small- and medium-sized firms - tax-free investment allowances and quicker depreciation rates. Also other tax provisions, such as tax holidays etc. Provisions depend on whether firms are free of foreign share or not. Also, export intensity a major criterion.	Tax exemptions and depreciation allowances given firms meeting special requirements. Includes expansion plans, replacement plans. Also custom-free import of machines.	Exempt from profit tax 3-8 years. 3-year carry-forward of losses. Quicker depreciation rates. 3-year tax exemption on licenses, concessions etc. Doubling of deductible expenses for transport and energy supplies. Exemption or halving of import charges for machines etc. required for production. Depends on zone and type of company.	No information.
Tax-based promotion of exports	Tax-free reserves to the extent of 1% of export turnover in convertible currency for export losses. Tax-free reserves for the development of foreign markets to the amount of 1% export turnover in convertible currency. Tax-free allowance for a rate of 30% of the depreciation value insofar as export proceeds 30% of taxable income.	No trade tax for the export share of total turnover. Tax-free reserves to the amount of 1% of the previous year's export turnover. Tax-free reserves for a rate of 7% of the purchase costs of foreign machines in case of foreign exchange losses. Reimbursement of import duties paid for goods required for re-export.	Tax-free allowance in earnings tax for 5% of the annual increase of export earnings. Exemptions from import charges for goods required in connection with exports. Exemption from export duties and turnover tax.	Exemption from trade income tax. Reduced taxes for 10-year period. Exemption from rental tax for 20 years (10%). Exemption from import charges for 20 years for goods required for production for export. No turnover tax for a period of 20 years for the procurement of domestic goods required for production. Above tax privileges are maximums and are lower for less export-intensive firms.

the nine countries listed in table 7, six (India, Pakistan, Philippines, the Republic of Korea, China (Taiwan Province) and Tunisia) provided subsidies for modernization. In most cases, the subsidies involved credits for the purchase of new machinery.

For example, as part of its 1982-1986 economic development plan, the Republic of Korea provided the textile industry with a modernization fund totalling \$36.4 million (30 billion won). These funds were to be used to replace obsolete machinery, particularly spinning machines, with new equipment. They took the form of eight-year loans at an interest rate of 8 per cent.

The Philippines is taking several measures to encourage the modernization of its textile and clothing industries. These include subsidized capitalization arrangements, special regulations for the procurement of foreign exchange, and loans from the State Development Bank. World Bank loans totalling \$150 million are being used to finance modernization projects at very favourable terms. Companies participating in approved projects need contribute only 25 per cent of the investment. Export-oriented firms are allowed to retain a part of their export earnings for the purchase of imported equipment and raw materials. Finally, the State Development Bank provides loans to labour-intensive small and medium-sized firms; 14 per cent of these have been granted to textile and clothing companies.

The modernization measures being taken by the other countries - India, Pakistan, China (Taiwan Province) and Tunisia - are similar to those described above. In general, they involve the direct participation of the Government in the financing of modernization projects, provided viable long-term jobs are created, new equipment is purchased and/or the project is export-oriented. In some countries (India, for example), capacity expansion projects are also subsidized by the Government.

(b) Subsidies for the purchase of inputs

The Governments of Pakistan and Thailand subsidize the purchase of raw materials. In the case of Pakistan, the Government is directly involved. It provides credits that effectively reduce the cost of imported raw materials, specifically cotton. In the case of Thailand, the assistance is indirect. The Government rediscounts commercial bank loans with an interest rate of 6 per cent and covers 14-90 per cent of the amount required for the purchase of raw materials.

(c) Job-preservation assistance

India and Pakistan have created state-supported holding companies to absorb uncompetitive companies in order to preserve jobs. For example, it has been estimated that the Indian Government has had to absorb about 130 uncompetitive cotton-weaving firms (or 21.7 per cent of the country's 600 largest textile firms). Specifically, these holding companies ensure jobs for the affected workers.

By sheltering internationally inefficient companies in order to safeguard employment, India and Pakistan are following the job-preservation strategies of France, Italy and the United Kingdom during the 1970s. In the latter three countries, the strategies led to declining international competitiveness and a dualistic system wherein an effective private sector existed side by side with an ineffective public sector. In general, this approach discriminates against those companies which do attempt to become internationally competitive. They must compete not only with highly competitive companies in foreign markets but also with heavily subsidized public companies in their domestic markets. In most cases, both in the developed and developing countries, a more effective approach to maintaining employment is an approach that is geared to replacing antiquated capacity with modern, internationally competitive capacity, coupled with aggressive marketing to expand exports. These alternative approaches are currently being pursued by countries such as the Republic of Korea, Spain and China (Taiwan Province).

### 3. Tax-based incentives

Two types of tax-based incentives are usually possible. Both have been used by the nine countries listed in table 7. The first provides profit or earnings tax relief, frequently by permitting exclusions in the determination of taxable income. Since this incentive strengthens the capital stock formation of companies that operate at a profit, it may not have an impact on all the companies that are the target of a restructuring programme.\*

The second kind of incentive is the manipulation of cost-related taxes levied on imports or exports. Exported products are relieved of cost-related taxes by appropriate compensation. This may be done by deducting the actual amounts of specific taxes, by deducting one lump-sum percentage from the final product price, or by deducting various lump-sum percentages according to established product priorities.

One or both of these tax-based subsidy measures are used by many developed countries to stimulate investments (e.g. the United States has an investment tax credit), exports (e.g. the European Community has a tax rebate on exports), or both. The nine developing countries included in table 7 are no exception. They provide a wide range of tax-based investment and export promotion incentives that are frequently specific to the textile and/or clothing industry. The investment incentives include partial or complete exemption from profit taxes for a period of time, generally four to ten years, or a reduction in the basis of assessment for profit tax by means of tax-free allowances and the raising of depreciation rates. In addition, tax-free contingency reserves and allowances that reduce profit taxes are used to stimulate exports.

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\*The issue of which enterprises should constitute the target group will be discussed in more detail in section D.1.

Tax measures that reduce costs include tariff exemptions or reductions for imported machinery, material inputs, and auxiliary materials and semi-finished products, as well as the reimbursement of indirect domestic taxes. In some cases, sales and excise taxes are also eliminated. It has been estimated that in India, Thailand and the Philippines the refunding of indirect taxes is greater than the original taxation.\*

Of the countries and areas considered in table 7, Hong Kong, the Republic of Korea, China (Taiwan Province), Brazil and Turkey do not provide textile-industry-specific tax measures, whereas Thailand, India, Pakistan and the Philippines do provide tax measures to specifically encourage these industries. While Hong Kong offers no tax-based investment or export promotion measures, its fundamental tax structure encourages business: it has the lowest business tax in the Far East, no capital gains tax, no taxation of dividends, and favourable depreciation regulations.

The Republic of Korea, China (Taiwan Province), Brazil and Turkey provide tax-based incentives that are sometimes of a general nature, in which case they apply to all industries, and sometimes specific, in which case they apply only to targeted industries, such as those designated as key industries by the Republic of Korea or those designated as strategic industrial branches by China (Taiwan Province). Although the textile and clothing industries of these four countries have not been singled out as being "key" or "strategic", the tax-based measures that apply to all industries can in themselves be quite significant.

The Republic of Korea, for example, gives small and medium-sized firms (700 or fewer employees) investment tax allowances of up to 15 per cent of fixed assets and allows them a 50 per cent increase in the normal depreciation rates. Many textile and clothing firms fall within this size category and so can benefit directly. Textile and clothing firms also benefit from general tax-based export promotion measures that include three tax-free contingency reserves and a special depreciation allowance. The contingency funds are to cover export losses (1 per cent of turnover), development of foreign markets (1 per cent of export turnover in convertible currency), and price fluctuation\* (5 per cent of export turnover). The special depreciation allowance (tax-free allowance of 30 per cent of the normal depreciation rate) is provided when 50 per cent of taxable income is derived from exports.

China (Taiwan Province) also provides general investment and export promotion tax-based measures. For capacity expansion investments, for example, companies receive a four-year tax exemption or a special depreciation allowance. Also, exports are encouraged by providing tax-exempt contingency funds, the reim-

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\*Transnational Corporations in the Man-made Fibres, Textile and Clothing Industries (United Nations publication, Sales No. E.87.II.A.11).

bursement of customs duties and the reduction of taxes on export-generated income (a 2 per cent reduction in the taxable income of exporting companies that must not, however, exceed 25 per cent of export proceeds). Finally, firms operating in export-processing zones receive a five-year tax exemption, do not pay sales or excise taxes and are exempt from customs duties and import charges for machinery and raw materials required for production.

In general, tax incentives have proved to be successful in combination with other types of measures. The Republic of Korea, whose textile policies will be reviewed in more detail in section B.5, was successful in encouraging its textile and clothing companies to become export-oriented. It did this through the careful application of tariffs, general tax allowances and branch-specific modernization assistance.

#### 4. Auxiliary services

Until recently, auxiliary services generally referred to R and D activities associated with the development of new textile and clothing products, such as new fibres, new fibre blends and new manufacturing processes and techniques to improve productivity, product quality etc. Today, however, auxiliary services also embrace the development of market and marketing-related activities and links, such as the development of international contacts with sub-contractors and buyer groups, licensing, fashion and design, domestic and foreign market studies, and training programmes.

In the past, most government and industry attention focused on the production aspects of fabrics, threads and clothing. Today, it is increasingly apparent that fashion, design and fabric combinations are as important as price and product quality. Belgium and Spain, which will be treated as case studies in section 3, are good examples of developed countries that have explicitly incorporated these aspects into their textile plans. Developing countries, too, particularly advanced developing countries, are paying more and more attention to these aspects. One example is the Republic of Korea, whose restructuring programme will be analysed in more detail in the following section. All three countries have included in their textile and clothing restructuring plans programmes designed to stimulate (a) fashion and design activities, (b) market and marketing services and (c) country and brand image promotion activities. They have also created non-profit institutions to administer their restructuring programmes, as well as centres for research and development, commercial activities and production and management training.

#### 5. Case study: the Republic of Korea\*

Changes in the regulations governing international trade in textiles and clothing, the emergence of lower-cost textile and

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\*This section is based on Moon-Shin Hong, "The textile industry in the Republic of Korea: problems and prospects", an unpublished report prepared for UNIDO, February 1986.

clothing industries in other third world countries, and the success of their own industrialization programmes have caused several advanced textile-exporting countries to lose their comparative advantage in certain product lines. The Republic of Korea is no exception. Its textile and clothing exports increased fourfold between 1973 and 1980, while the People's Republic of China increased its textile exports 11-fold and Thailand, Singapore and Malaysia saw their exports rise by 800 per cent in the same period. Wages in the ASEAN area and the People's Republic of China are expected to remain lower than in the Republic of Korea for some time to come, so the modernization of the industry is a high-priority issue.

(a) Rationalization and modernization

In response to the new trading environment that had developed by the late 1970s, the Government of the Republic of Korea sought new policy approaches and instruments to facilitate the required modernization. The key objectives of this effort are the amalgamation of numerous inefficient production units into larger, more efficient units to achieve economies of scale, redirection of investment towards the dyeing and finishing subsectors, increased replacement investment, and the introduction of production methods that are more technology- and capital-intensive. In the past, the Republic of Korea's large-scale mass production was tailored to the needs of the larger foreign wholesalers who bought in huge quantities. Under the new system, large firms will concentrate on developing sophisticated yarns and fabrics requiring large investments; general trading companies will devote themselves to marketing; and small companies will assume the task of garment production. Even garment-makers, however, are investing heavily in labour-saving machines and equipment, such as automatic cutting machines, special-purpose sewing machines, automatic ironing devices and automatic fusing machines.

The policy framework under which the Government supports the restructuring of the textile industry is known as the Basic Modernization Plan for Textile Industries. Introduced in 1980, it is based on the Law for the Modernization of the Textile Industries, enacted in 1979. This law gives the Ministry of Trade and Industry a key role in promoting the industry. An important source of financial support to the industry has been the Textile Industry Modernization Fund, which was endowed with a total of \$36.4 million (30 billion won). Between 1981 and 1984, the Fund provided \$19.4 million (16 billion won) in loans to help companies modernize their textile plants. The fund draws its financial resources equally from private and government sectors. Textile companies can borrow from the Fund at interest rates of 6-8 per cent, with maturities ranging from five to eight years.

In addition to this branch-specific fund, textile and clothing companies benefit from the Government's efforts to assist smaller companies through subsidized priority loans for modernization and through gradual changes in the export régime, from export quotas to strategies favouring smaller enterprises. Small and medium-size enterprises of all industrial branches can borrow up to W 300 mil-

lion at 9 per cent interest from the Small and Medium Business Promotion Fund, with repayment periods of up to eight years (capital funds) and three years (operating funds). So far, a total of W 16 billion has been loaned to textile mills, accounting for 19 per cent of all the loans outstanding from the Fund. Textile companies also gain from general tax benefits provided to industry through various tax incentive schemes, including tax exemptions or reductions (e.g. tax reductions on paid dividends and exemption of duties on imported raw materials); income tax deductions (e.g. on energy-saving and R and D investment); depreciation allowances (e.g. 20 per cent enhanced depreciation on machinery and 100 per cent write-off on energy-saving investment); and loss treatment of contingency funds (e.g. R and D failures and export losses).

**(b) Promotion of research and development**

In the past, the Republic of Korea was an exporter of low-quality textile products, but a concerted effort is being made to develop new and higher-value-added products and to find new niches in the international textile market. The country is promoting R and D to support the move from high-volume production to high-value-added products. It gave \$20.6 million (W 17 billion) in loans to R and D projects of textile companies between 1976 and 1983. The most active participants in R and D are the manufacturers of man-made fibres, who focus on fibres with properties similar to those of natural products like cotton, silk and wool. The large synthetic fibre producers have developed yarns such as thick-and-thin yarn (TTY), high-elastic yarn, modified-cross-section yarn, super-multi-yarn, moisture-absorbent filament and fine-denier yarn.

**(c) Development of new designs and fashion**

The Government and industry have started to co-operate in addressing the two weakest links in the industry's drive for higher-value-added products, i.e. the dyeing and design segments. To upgrade the dyeing segment, the Ministry of Trade and Industry has induced dyers to move into industrial complexes established with Government funding. Presently, there are two industrial complexes for dyeing, housing 120 firms. Another complex is under construction in Pusan. Under the promotion plan, the Republic of Korea's dyeing technology was expected to have matched that of advanced countries by 1987.

Many activities have been initiated to develop the skills required to create better fashions. Currently, designers who have studied overseas are leading the industry. To facilitate the introduction of foreign fashions and thereby stimulate domestic design activities, the Government has revised several regulations. Other activities include the opening of new fashion design schools; establishment of sister relationships with foreign fashion schools; sponsorship of international fashion fairs; and increased participation in international fashion shows.

(d) Management of the external sector

Given the high degree to which the economy of the Republic of Korea is oriented outwards, management of the external sector is a priority. Key tasks are to secure the supply of raw materials and to diversify export markets. The country's textile industry depends heavily on imported materials such as raw cotton and wool, and it imports 60 per cent of its chemical fibres, making the Republic of Korea's textile prices highly sensitive to fluctuations in world prices. The Government is currently taking several measures to secure a reliable and timely supply of textile raw materials. These include financial assistance for the import of raw materials (e.g. raw cotton); the reduction of import duties (e.g. wool); guaranteed supply at the current world market price (e.g. synthetic fibres); policies to stabilize the prices of intermediate materials (e.g. purchase pool and inventory build-up); tax incentives (e.g. a reduced consumption tax on hand-made products and carpets).

Exports of the country's textile industry are concentrated in a very few markets. For instance, the United States and Japan account for more than 40 per cent of total textile exports, making the industry particularly vulnerable to trade restrictions imposed by those countries. Thus, both Government and industry are emphasizing the development of new markets. Industry is switching its marketing efforts to non-quota areas, such as the Middle East, South America, Africa and South-East Asia. This diversification effort is complemented by the development and production of products not subject to import quotas (e.g. silk products), the initiation of joint-venture projects with non-quota countries, and the direct participation of textile companies in the distribution system of importing countries, through the opening-up of self-operated retail and wholesale stores. The Government provides a variety of supports for such overseas marketing activities by the country's textile companies. Finally, the system of export-quota allocation, which gives priority to the filling of quotas for high-value-added items, is helping to diversify the export basket.

(e) Institutional framework

Under the Law for the Modernization of the Textile Industries, the Korea Federation of Textile Industries (KOFOTI), a non-profit organization representing the country's textile industries at home and abroad, is the principal statutory entity for carrying out the modernization and development of these industries. KOFOTI operates the Fund for the Modernization of Textile Industries, to which both the Government and the industries contribute. It carries out many activities in connection with this Fund, among them the following:

(a) It formulates long-term plans for the structural improvement of the textile industry and promotes the replacement of outdated textile facilities;

(b) It promotes the development of new and better textile materials and clothing designs and it fosters the dyeing industry;



(c) It reinforces R and D in textile technology and promotes the introduction of new technology and the training of technicians;

(d) It co-operates with KOFOTI's overseas counterparts by seeking to develop textile trade, dispatching textile missions abroad, receiving foreign textile missions in the Republic of Korea, holding and participating in international meetings, fairs, exhibitions etc.;

(e) It provides services and information concerning domestic and international development of textile industries through various research activities, convening of seminars and lectures and other means;

(f) It communicates the view of the industry on various issues to the Government, and recommends policy in the interests of the industry.

**C. Textile policies of industrialized countries:  
restructuring to meet low-cost competition**

In response to emerging low-cost competition from developing countries, Governments in developed countries have used a wide range of policy instruments to support a restructuring of the industry. In providing an overview of these policies, this section focuses on industrial policies and for the most part passes over the complex framework of regulations governing international trade. (Trade policies are, however, occasionally referred to because in most countries they are a supporting or limiting framework of industrial policy, and in some countries they even replace it.)

**1. Policy orientations and instruments\***

From the early 1950s until about 1970, public intervention in most European countries was confined to government support for industrial development programmes of a general nature, and to the conclusion of orderly marketing arrangements to control the level of imports, first from Japan and later from the developing countries. Except in the case of Japan, which was forced to reduce capacity in some of its most sensitive sectors, the period was one of general expansion. Moreover, there were significant opportunities in other industries to absorb employment losses in declining sectors of the clothing industry.

Between 1970 and 1975, however, conditions changed drastically. Growth in demand for textiles and clothing stabilized or

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\*Information presented in this section on textile industry programmes pursued by OECD member States is based on Benoit Boussemart, "L'ajustement structurel dans la dilière textile", a report prepared for the OECD (Paris, 1986), and on Jürgen Wiemann, "Selective protectionism and structural adjustment" (Berlin, German Development Institute, 1983).

even declined, and at the same time the scope and intensity of import competition increased. To cope with this, the governments of industrialized countries resorted to a wide range of industrial policies, according to their underlying political philosophies. Broadly, the textile and clothing industries in industrialized countries benefited from the following:

(a) General industrial incentives, which were being provided to all industrial branches;

(b) Special incentives to promote development in structurally less developed regions;

(c) Branch-specific incentives, aiming at restructuring and revitalizing the textile and clothing industries.

A general overview of policy instruments in these three categories is provided in table 8. It should be noted that the line between general, regional and branch-specific incentives is not always clear-cut. Regional incentives have many of the same effects as branch-specific incentives in cases where the branches are concentrated in - or, through these incentives, attracted to - specific regions. Also, several of the general incentives listed in table 8 (or special terms of such incentives) have been granted on a branch-specific basis only. Branch-specific incentives have been offered either ad hoc or in the framework of comprehensive "textile plans".

The main differences between these policies and the policies applied by developing countries, which were summarized in table 7, are the formers' emphasis on research and development, the collection and dissemination of market information and the training of workers. While developing countries have not completely neglected these activities, they have, with few exceptions, paid less attention to them.

In the EEC, common textile and clothing policies have generally been confined to the area of trade policy (in the framework of the various extensions of the MFA); an exception was the branch-specific allocation of 3.9 million ECU (approximately \$4.5 million) in connection with the EEC programme to promote research and development. However, the textile industry's share in funds provided by the EEC remained small, and the Commission of the European Communities even intervened in various cases against specific incentives contained in the support schemes of member States. The Governments of some EEC member States, such as Belgium, the Federal Republic of Germany, France, Italy and the Netherlands give significant support to the R and D activities of their textile industries (both individual and joint enterprises).

Among EEC countries, the least interventionist response to the problems of the textile and clothing industries was that given by the Federal Republic of Germany, which opted not to apply branch-specific policies. Even here, however, the restructuring of the two industrial branches was not completely left to the free play of market forces: textile and clothing enterprises were protected

Table 8. Classification of policy instruments and programmes provided to the textile and clothing industries of developing countries

Objective	Policy and programme orientation		
	General industrial development	Regional development	Branch-specific measures
Improve the functioning of markets	Competition and anti-trust policies Regulatory environment National investments in infrastructure	Improvement of the infrastructure and other basic services Removal or reduction of cost disadvantages	Sponsorship for the collection and dissemination of information Promotion of joint industry research and productivity centres
Influence resource allocation	Incentives for industrial research and development Accelerated depreciation allowances Labour training schemes	Investment grants and concessions Fiscal advantages Mobility and training grants	Subsidies and special grants for research and development Government procurement schemes Defence spending Labour training schemes
Restructure and modernize the industry	General merger policy Investment and dividend tax policy Early retirement and shorter working week Retraining and relocation grants	Added incentives for relocation of facilities Exemptions from crisis measures applicable elsewhere	State ownership and rationalization Capacity reduction schemes Promotion of mergers and takeovers
Relieve competitive pressures	Employment subsidies Investment grants tied to employment maintenance Competitive devaluation	Income maintenance schemes Support for continuing wage differentials	Trade protection Creation of crisis cartels Wage and employment freezes Employment subsidies, investment grants

Source: Adapted from José de la Torre, Clothing-Industry Adjustment in Developed Countries, Thames Essay No. 38 (London, Trade Policy Research Centre, 1984), p. 7.

against external competition from developing countries through trade restrictions negotiated by the EEC and they also benefited significantly from regional development programmes. For instance, in 1979, 1980, 1982 and 1984, investment subsidies or subsidized loans received by the textile industry under regional development schemes accounted for 9.4 per cent, 7.5 per cent, 8.8 per cent and 9.5 per cent of the industry's investment in those years.\*

Whereas the support given to textile enterprises in the Federal Republic of Germany was not limited to this branch and was in principle applicable to all industrial enterprises, other EEC countries did apply branch-specific incentives. As an example, the United Kingdom implemented a £20 million Wool Plan in the early 1970s and a £20 million Clothing Industry Scheme between 1975 and 1977; it intended in 1984 to institute a £20 million scheme to modernize small- and medium-scale enterprises, but the Commission of the European Communities intervened against this scheme.

In Italy, subsidized investment loans have been granted since 1971, and since 1978 State loans or loan guarantees have been provided for the restructuring of the industry. Even more important, there has been the direct involvement of the State through public enterprises, particularly in the man-made fibres segment. This involvement had a positive impact on downstream segments of the complex, which benefited from intermediate inputs at favourable prices. In the late 1970s, the Italian State financed the accumulated deficit of Montefibre. Through Ente Nazionale Idrocarburi, the State holding company, the State controls the country's largest textile company (Lanerossi); it also secured the survival of many marginal textile mills through Gestioni e Partecipazione Industriale (GEPI).\*\*

It is not only in Italy that public enterprises have been important to the textile industry. In France the Rhône-Poulenc group was nationalized and in the Netherlands in 1979 eight textile mills accounting for 90 per cent of the country's production capacity were merged into a holding in which the public share was 49 per cent.

Financial incentives have also been offered to the textile industry by industrialized countries that are not members of the EEC. For instance, Norway supported investment in new machinery from 1978 to 1982 and Canada implemented a programme of \$Can 250 million (approximately \$195 million) in 1981-1986; in the United States,

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\*The textile industries of Finland and Spain also benefited from regional development schemes.

\*\*GEPI is a public financing company whose aim is the financial restructuring of troubled private companies to ensure their survival. GEPI was intended to become involved in these trouble-shooting assignments only on a short-term basis, but political pressure to maintain employment has meant that its involvement often amounts to permanent State participation.

518 clothing and 71 textile enterprises benefited between 1975 and 1982 from adjustment support in the framework of federal trade legislation.

Although the measures pursued by these countries were more branch-specific than those pursued by the Federal Republic of Germany, they did not constitute comprehensive programmes for entire textile-clothing complexes, such as were implemented by Belgium, France, the Netherlands, Portugal and Spain. The textile plans of these five countries generally did three things:

(a) Specified industry-wide restructuring objectives based on a comprehensive assessment of the industry's status, development potential and resources;

(b) Provided financial support to companies to re-establish the financial viability of enterprises ("balance-sheet restructuring"), to modernize equipment and adapt the product mix to changed market requirements ("technological and product-mix restructuring"), and changes in company structure and technology consistent with the available labour force;

(c) Established new institutional arrangements whereby the main agents co-operated in the implementation of the plan and/or the monitoring of its progress.

The fact that the impact of these changes on the industry's labour force had been considered beforehand turned out to be a key factor in the success of restructuring programmes. First, modernization in the textile industries of industrialized countries has a scale effect, reducing in absolute terms labour requirements. In response to this reduction, various countries subsidized the reallocation of labour to other industrial branches (through training grants, for instance) or provided early retirement benefits. Second, the use of new machinery must be maximized, requiring labour legislation that is more flexible in the matter of night and weekend working hours. Third, the high investment cost of new technologies calls for them to be operated optimally, that is, with a reduced labour force. In response to this, governments subsidized labour studies at the shop floor level to improve work organization and material flows.

The next two sections review the key elements and instruments of restructuring plans implemented by industrialized countries in more detail, using as examples the textile plans of Belgium and Spain. The experience of Belgium is interesting not only because it was very successful, but also because it exemplifies the issues that were important in other industrialized countries.\* The experience of Spain is interesting because that country typifies the textile-exporting Mediterranean countries that will be competing strongly with Asian and Latin American exporters. Spain's industry

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\*In fact, Belgium's approach was very similar to that of France.

is under great pressure to adjust in the face of competition from other industrialized countries following its entry into the EEC. In this sense, Spanish industry is in a position much like that of industries in developing countries, where governments have taken (or are considering taking) measures to liberalize their trade régimes and to expose their industry to more external competition. The Spanish case was chosen to exemplify restructuring programmes that can help industry adjust to a new competitive environment.

## 2. Case study: the Belgian textile plan\*

Troubled by an accelerating decline in textile and clothing employment, a loss of market share in the EEC, and the bankruptcy or voluntary closing of a large number of textile and clothing companies, the Belgian Government decided in 1978 to intervene in an attempt to (a) stabilize employment and (b) revitalize the competitiveness of these industries, at least within the EEC.

### (a) Institutional framework

To develop appropriate policies and programmes, a tripartite committee was established consisting of representatives from Government, employers' associations and labour organizations. The restructuring proposals developed by this committee were based on the results of large-scale industry studies undertaken by three consulting firms.

On the basis of the committee's consideration of the recommendation of the consulting firms, the Council of Ministers formulated a restructuring plan that was approved by the Commission of the European Communities on 18 November 1981.\*\* The primary objective of the plan was to stabilize employment at about "100,000 commercially justified jobs in a modernized and competitive textile and confection sector by 1985".

A decision structure involving two institutions was put in place to implement the plan. First, the Institute for Textiles and Confection of Belgium (ITCB), a tripartite (Government, employers and labour) non-profit organization, was created to verify that the philosophy of the plan was being adhered to, and to receive and analyze the requests for assistance. It was also responsible for implementing the auxiliary service segment of the plan. Second, a public holding company, the National Company for Financing and Restructuring of National Sectors (NMFNS), received ITCB-approved requests and either ratified or disapproved them. Disapproved requests were submitted for arbitration to the Minister of Finance

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\*This section is based on Willy Ramboer, "The restructuring of the textile industry in Belgium - a success story", unpublished report prepared for UNIDO, November 1985.

\*\*EEC member States are in principle obliged to notify and gain approval from EEC authorities of any specific aid measures they intend to implement.

and the Minister of Economic Affairs. The holding company was also used as the financing vehicle for Government participation in approved restructuring projects.

The plan consisted of three distinct yet mutually supportive parts: financial and modernization restructuring; auxiliary service development; and social service support.

b) Financial and modernization restructuring

The purpose of the restructuring segment of the plan was to reduce fixed costs by reducing excess capacity and overhead costs. Variable costs were also to be trimmed through improved productivity, lower purchasing costs and lower energy costs. To achieve these objectives, it was believed necessary to strengthen the capital structure of individual companies.

A number of conditions were set:

(a) Companies participating in the restructuring programme were selected on the basis of their financial viability and the projects they had submitted. The companies had to be viable at the time the project was submitted or they had to achieve viability in less than three years. No aid was awarded to companies in serious financial difficulties;

(b) The project could not lead to an increase in capacity, as it was not the intent of the Belgian Government to create additional capacity in any sector or sub-sector of the country's textile and clothing industries;

(c) The company applying for support was required to contribute 30 per cent or more of the required financing, and the financial sector (banks) another 25 per cent in the form of a five-year loan at a subsidized interest rate of 7 per cent. The Government's share in the project could not exceed 45 per cent and was to be repaid within 15 years, with repayments starting in the sixth year. It was considered critical to the success of the project that the company bear a significant portion of the risk associated with its plan;

(d) The Government's involvement was through the MENS holding company, which purchased non-voting stocks in the targeted companies in the amount needed to finance the project.

Each company and its project was evaluated to determine whether it was commercially viable from the standpoint of the market situation, labour relations, management capabilities etc. These evaluations were undertaken by specialists hired by ITCB.

(c) Auxiliary services

The Belgian Government departed from the traditional approaches used to revitalize or restructure industry when it decided to subsidize several non-productive auxiliary activities associated with the marketing of textiles and clothing. These activities included

fashion and design, market studies and commercial undertakings, research and development, and training. The reason for including these market-oriented services was the overall purpose of the restructuring programme - to expand Belgium's share of EEC textiles and clothing markets.

A services centre created within the ITCB was responsible for implementing this segment of the plan. Its role was to overcome the industry's weak points - fashion, creativity, product innovation and marketing - and to consolidate the strong points - quality, flexibility, viability and customer service.

In addition to creating a better overall image of the Belgian textile industry in EEC markets, efforts were concentrated in three areas: (a) creativity and promotion; (b) research and development; and (c) training. Particular attention was paid to collective actions suitable for small and medium-sized companies, as it was felt that larger companies were able to deal with these areas on their own.

To stimulate creativity, ITCB provided assistance and financial aid to clothing, hosiery and home furnishings companies, allowing them to recruit stylists, mainly on a free-lance basis, and to produce more fashion-oriented clothing.

ITCB also encouraged image-improving activities in the appropriate markets. For example, a large-scale campaign bolstered the concept "This is Belgian". Also, competitions are being held to give young designers the opportunity to display their collections and develop their creative skills. Finally, the Belgian Office of Foreign Trade supports participation in foreign exhibitions and trade fairs, where it encourages collective stands.

Research and development activities, primarily collective ones,\* were also supported. Most R and D was carried out by existing laboratories; one project developed a colour-matching system; another, services for the evaluation of energy consumption and savings; and yet another, a service for the analysis of dye-baths. In the clothing sector, which lacks research centres, initiatives have been taken that jointly involve ITCB, professional organizations, and groups of mainly small and medium-sized firms. For example, support was given to six co-operative efforts to develop an economical system for computer-assisted grading and drawing of patterns, an integrated materials management system was introduced into the clothing, hosiery and spinning sectors and a production control system was introduced into the hosiery sector.

The lack of trained specialists (e.g. textile engineers) has created some problems for the affected industries. To improve the image of these industries as places to seek and develop careers, the ITCB has launched a number of press campaigns. It has also

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\*Group projects received greater subsidization than individual company projects.



undertaken a study to determine the kinds of training required and the number of specialists needed for the textile and clothing industries.

(d) Social services

Many countries, particularly the developed countries (e.g. the Federal Republic of Germany, the Netherlands and Japan) implemented adjustment programmes to shift labour to more productive industries or provide for early retirement or the retraining of displaced workers. The Belgian restructuring plan included the following provisions in its social services segment:

(a) Unemployment allowances were granted to female and male workers less than 52 and 57 years old, respectively. These allowances were granted in addition to normal unemployment allowances for two-year periods and were linked to the cost-of-living index;

(b) Female and male workers 52 and 57 years old or older, respectively, who had lost their jobs were given interim allowances equal to 80-95 per cent of their net salary until they reached pension age;

(c) Early retirement benefits were granted to female and male workers at the age of 52 and 57 years or more, respectively, who had been dismissed from their jobs between 1 January 1981 and 31 December 1985. About 7,000 persons applied for this retirement allowance between 1981 and 1985.

(e) Evaluation of the plan

The plan has achieved many of its original goals. For example, instead of employment declining to 75,000, which had been forecast for the case in which no action was taken, employment in the textile and clothing industries actually increased from 101,500 in 1983 to 102,100 in 1984. In addition, the industries succeeded in regaining their shares of market in the EEC. The Belgian share of overall EEC production of textiles increased from 6.5 per cent to 7.5 per cent and its share of clothing production increased from 3.6 per cent to 4.0 per cent.

One important reason the plan was successful was its emphasis on the supply of risk capital. However, the companies needed to be financially viable at the time they received support or they at least needed to have good prospects of becoming financially viable within a short time. Also, the projects had to be practical and in line with market conditions.

A second reason for success was the multi-dimensional, internally consistent nature of the plan, whereby financial restructuring was being complemented by activities in the areas of modernization, commercialization, creativity and product innovation, and training.

The Belgian example supports the contention that the textile and clothing industries are suffering more than just a lack of financial resources. Well-conceived national plans can play a

significant role in solving their problems. The Belgian experience also demonstrates that the modest size of the companies does not need to be an insurmountable barrier. Aggressive marketing, originality, promotion and collective undertakings can overcome the deficiencies normally associated with small and medium-sized companies.

### 3. Case study: the Spanish textile plan\*

#### (a) Background and objectives

Policy intervention in the textile and clothing industry dates back to 1960. From October 1960 to April 1980, eight textile plans were approved and implemented. Concerning the objectives of these plans, two phases can be distinguished. During the first phase, from 1960 to 1967, emphasis was placed on the modernization of equipment, including the scrapping of outdated machinery, the rationalization of enterprises, and increases in the capacities of existing enterprises or the establishment of new enterprises. Preferential credits were provided for these purposes by the Industrial Credit Bank, which financed up to 70 per cent of such investments. In the second stage, from 1968 to 1980, the emphasis shifted to consolidating the industry and closing non-viable plants. In addition, the plan had a mechanism for compensating workers who lost employment as a result of plant closures.

The key policy instruments during this period were rules governing investment. A law introduced in 1963 liberalized industrial investments from authorization requirements but did not cover the textile industry, where investment rules differed from one segment to another, and included advance authorization requirements for investments or minimum scale requirements. Beginning in 1974, however, the rules for investments in the various segments of the complex began to be liberalized and by 1980, reform had been completed.

This sequence of Spanish textile plans in the 1960s and 1970s was implemented in an economic setting characterized by full employment, substantial private investment and a high degree of protection against external competition. State intervention through investment authorization requirements was therefore a feasible way, although not necessarily an effective one, to control the industry's structure. By the early 1980s, however, the parameters had changed completely. The international economic recession affected Spain, too, and meant that the stabilization and promotion of new investment demand was now required, rather than support for the scrapping of obsolete machinery. In preparing itself to join the EEC, Spain needed to make its industry as competitive as the industries of other member States. The emphasis of past plans on the capital stock was not adequate to these new parameters, which called for efforts to improve design, marketing, organizational structure and trade promotion. The key objectives

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\*This section is based on an unpublished report prepared for UNIDO in September 1985.

of the new textile industry restructuring plan, initiated in 1981, are therefore to raise the competitiveness, productivity and productive flexibility of the Spanish textile industry to international levels, to upgrade its production mix by increasing the share of higher-value-added items, and to improve the managerial, productive and financial structures of participating firms. Employment is to be stabilized, although it is expected to be distributed differently throughout the various segments of the textile/clothing complex. In the spinning and weaving segments, where more than 40,000 jobs were lost between 1983 and 1985, it is expected that the labour force will be stabilized at existing levels by making the available jobs more productive and economically sound. New jobs are to be created by increasing exports of clothing, both directly (clothing manufacture) and indirectly (fashion, design, marketing, training, manufacture of textile machinery, and services).

**(b) Incentives and other measures**

Both fiscal and financial incentives are being provided by the new textile plan. In general, the fiscal incentives consist of tax credits related to plan-associated investments in fixed new assets and include the following:

(a) Tax credits for customs duties, turnover taxes and provincial surcharges when the investments are for the establishment of new plants using equipment and tools not manufactured in Spain;

(b) Deductions on investments, up to 40 per cent of the corporation tax;

(c) Deductions in corporate taxes and in income taxes of entrepreneurs when new establishments are substituted for existing ones.

In addition to these fiscal incentives, direct financial assistance is being granted. For example, a subsidy of up to 20 per cent is given on tangible investments and up to 30 per cent on intangible assets. The latter subsidy is aimed particularly at activities in the fields of design, fashion, quality improvement and marketing. The subsidies may not, however, exceed 70 per cent of the total investment. Subsidies being granted as part of existing regional incentives will be continued provided they do not exceed 30 per cent of the investment.

The plan will also increase the productive flexibility of the industry and enable it to react to seasonal fluctuations in demand. For example, dismissal indemnification payments can be spread over a twelve-month period. Also, payments to social security may be suspended for up to 60 days when workers are temporarily laid off as a result of seasonal demand changes.

**(c) Evaluation of the plan**

Between October 1981 and July 1985, 476 company reconversion projects were approved. Results have been positive. The number of jobs lost among the companies participating in the plan was about

9.4 per cent compared to 15 per cent for the whole sector. Exports grew by more than 370 per cent for the participating companies, and productivity increases averaged about 60 per cent for the period.

The main problems to date are (a) a lack of interest in the plan on the part of small and medium-sized clothing companies and (b) insufficient development in the areas of fashion and marketing, product standardization, training of personnel, and the development and dissemination of information. To overcome these deficiencies, a special plan to promote design and fashion was approved. This particular programme has three goals:

(a) To improve the overall creativity and quality of Spanish textiles in order to increase their competitiveness in domestic and international markets;

(b) To increase the value-added of Spanish textile products, targeting them at the up-scale segments of the domestic and international markets;

(c) To integrate the Spanish textile and clothing industries more firmly into international markets.

To achieve these goals, the Government will provide services and investments for developing a promotional infrastructure; for stimulating textile and clothing companies to improve the design and fashion aspects of their products; for enhancing the industry's image in the domestic market; for developing a prestige image for Spanish textile and clothing products in foreign markets.

The Government plans to set up and staff centres for the education of textile and clothing personnel. To ensure that these centres are used, it has taken steps to increase contact between these centres and the targeted industries.

At the same time, the plan calls for the development and international dissemination of promotional materials on Spanish textile and clothing products. These promotional materials will identify Spanish products with the Spanish culture.

Finally, a centre for the promotion of design and fashion has been created. This centre will evaluate applications received from individual firms that would like to benefit from the design and fashion promotion plan, and it will initiate studies and implement action plans requested by the Ministry of Industry and Energy. It is also required to develop proposals for promoting design and fashion in the targeted industries.

**D. The restructuring of textile complexes in developing countries: key areas and policy issues**

Both developed and developing countries have actively pursued policies in support of their textile and clothing industries. There were, however, differences in objectives. Developing countries aimed at establishing and expanding their relatively young industries and at strengthening their comparative advantages.

Developed countries replied with restructuring programmes to meet low-cost competition from emerging competitors and to re-establish their comparative advantages. In many industrialized countries, these programmes have been very successful and have led to highly efficient, versatile, but also very capital-intensive industries. It appears, therefore, that the 1990s will witness a third round of competition between developed and developing countries for international market positions, in which the crucial objective will not be restructuring to meet low-cost competition, but restructuring to meet high-efficiency competition. The main actors in this round will need to be the developing countries, which now have to re-establish already lost competitive advantages or to consolidate threatened comparative advantages. This concluding section will summarize the key issues and policy implications that emerge from the international restructuring experience and that constitute the framework within which restructuring programmes of individual countries will have to operate.

### 1. Assessment of restructuring requirements and prospects

The first step in the design of a textile industry restructuring programme, be it for a single segment or for the entire complex, is a comprehensive stock-taking and evaluation of the industry. This assessment should be done from both national and international perspectives and should incorporate both supply and demand aspects.

From a national perspective, the textile industry's performance should be evaluated in terms of its past, current and potential contribution to key development objectives, such as economic and industrial growth; foreign exchange earnings/savings; employment and income generation; price stability; satisfaction of basic domestic needs; and regional development.

From an international perspective, it is industry's competitiveness that counts most. Product prices, product quality, wage costs, capital costs, input costs and the structure of production costs need to be ascertained and compared with the corresponding parameters of international competitors. This assessment should be complemented by an analysis of demand aspects, in which the actual and potential (given the country's resource endowment) product mix are compared to national and international demand trends. Once the industry has been assessed from these perspectives, the direction and extent of the restructuring process can be decided.

In a final step, these restructuring objectives need to be transformed into a policy programme, including an estimation of resource requirements. For this purpose, the relevant national parameters need to be established in terms of the textile industry's capital stock and its technological vintage, productivity, rehabilitation potential and modernization needs, again using international standards as a yardstick ("best practice" norms and levels achieved by main international competitors). The relevant national parameters would include factors decisive for the "market effectiveness" of an industry, such as distribution channels, marketing efforts and design activities.

## 2. Technological upgrading: a selective approach

A key factor in enhancing the international competitiveness of textile and clothing complexes is modernization of the capital stock. The technological advances embodied in machinery manufactured in developed countries and the diffusion of these advances to the textile industries of these same countries have led to higher production speeds and corresponding productivity gains, which are eroding the wage cost advantages of developing countries. Yet, while the continuing wage cost advantages of developing countries may still allow them to hold their own against the technology-based productivity increases of industrialized countries, these countries have no way to offset the advantages associated with the new technologies: quality improvements and increases in production versatility and flexibility. Although the economic relevance of these advantages varies from one product category to another, it becomes more and more obvious that in the production of textiles, developing countries will have to follow the modernization efforts of industrialized countries if they want to remain competitive in areas other than simple, low-value-added products.

Unfortunately, the developing countries appear to have rather limited freedom to determine their own modernization path. The technological innovations of machinery manufacturers have been closely linked to the needs of the markets and the factor costs in the industrialized countries - that is, their main thrust has been to develop equipment that will offset the comparative advantages developing countries have in labour-intensive activities. They have also emphasized the flexibility associated with short production runs of high-fashion, high-premium fabrics and clothing. As a consequence, technological innovation in textiles and clothing manufacture has not paid attention to the specific needs and relative factor endowments of the developing countries. A few developing countries (most notably Brazil, India and the Republic of Korea) have managed to establish their own textile machinery capacities. However, many of the manufacturers remain closely linked to large machinery manufacturers in industrialized countries and have not pursued the intermediate technologies that would answer the specific needs of developing countries. Yet, developing countries do have a choice of technology in one respect, since different "vintages" of technology continue to be offered in the international machinery market-place.

Crucial decisions must be made in this context. Which types of modernization investments should benefit from incentives to a modernization programme? Which types of machinery and which segments of the production chain, which enterprises and which vintages of equipment will be eligible? It is realistic to assume that limited resources would preclude deploying the latest technological advances in all segments of the production chain. A selective approach would necessitate a thorough study of the industry to identify those links in the production chain that deviate most significantly from international standards and that prevent the industry from achieving international levels of efficiency. Based on this identification, eligibility criteria can be established to determine which companies would benefit most from modernization

incentives. In many developing countries, one of the critical links is the dyeing/finishing segment. As was pointed out in an earlier section, the Republic of Korea responded to this situation by persuading dyers to move into special industrial complexes established with Government funding. Such concentration of a specialized function can be a financially feasible solution to modernization needs, particularly for industries having a high proportion of small and medium-sized enterprises and relatively pressing modernization needs across the whole production chain.

Yet, in many developing countries the textile industry is dualistic: a large number of small to medium-sized enterprises, operating with an outdated capital stock and serving mainly the domestic market, co-exist with a small number of medium- to large-scale enterprises, serving both the domestic and external markets. The latter sector often comprises some technologically highly advanced enterprises and many technologically heterogeneous enterprises, operating modern and outdated equipment at the same time. The co-existence of two vintages of equipment within a single manufacturing stage (e.g. spinning) or between one manufacturing stage and another (e.g. modern weaving equipment, but outdated finishing equipment) is a major obstacle to achieving international standards of efficiency.

From a cost-benefit standpoint, enterprises that are already halfway along the road to modernization form a promising target for modernization programmes having limited resources, because minimal financial support would lead to a sizeable increase in efficiency. Focusing on these enterprises when it comes to deciding which companies should benefit from modernization incentives would amount to a "pick-the-winner" strategy. At the operational level, partly modernized companies may be identified by examining investments already undertaken. However, this criterion does not by itself necessarily identify future "winners": although a company may have made a significant investment, the investment may have been in production lines that would not particularly enhance the country's long-term comparative advantage. Company-specific variables will not, therefore, be a sufficient basis on which to assess eligibility. Instead, there must first be a comprehensive stock-taking of the industry's cost-efficiency and its standards of quality and design and then, based on this, a decision as to what structural changes are needed, before eligibility criteria can be established.

International productivity standards can be combined with standards derived from the restructuring objectives to decide whether technology of an older vintage should benefit from modernization incentives. This issue is an important one because in some countries industrialists took advantage of modernization incentives to purchase out-of-date equipment.

### 3. Auxiliary services

While production efficiency remains an important concern of revitalization and restructuring programmes, a new concern, market effectiveness, is gaining ground. In many countries, government and industry are jointly seeking ways to become more responsive to

international market trends and shifts in demand. This is being accomplished primarily through the growing use of market intelligence, a concentration on productive flexibility, fashion, design and quality control, and redoubled efforts to develop international market linkages.

Ideally, technological advances such as computer-aided design should enable developing countries to quickly respond to changing fashions in their main export markets. Yet, given the high costs of introducing these technologies, few individual companies are large enough to afford these technological advances. The establishment of a national design centre would be one way of making these facilities widely available. A shortage of skilled designers has also become a bottleneck in some developing countries. To remedy this shortage, several countries have awarded contracts to international designers or have sent their own designers abroad for training. Such a centre could advise individual companies on how to incorporate design and fashion improvements into their restructuring plans.

Financial backing for design centres and similar institutions could come from various sources and should to some extent be tied to benefits. Thus, activities that benefit specific enterprises, such as quality control centres, could be financed mainly by those enterprises, who would pay for services rendered. Public financial support might be required at first, but in the long term, demand for the services should be promoted through appropriate policy action, such as requiring quality certifications issued by the institutes. Joint undertakings could also be partly financed through levies on imports and/or domestic production, as is currently being done in several European countries.

Marketing is another priority area for joint industry-government efforts. In the past, many developing countries pursued passive marketing strategies. Now, however, trading houses in Europe, Japan, and the United States are channelling information to developing countries on quality standards, product variety, design and fashion. Large trading houses also provide access to their import markets and reduce the difficulties and costs of establishing outlets and distribution chains. Arrangements between producers of intermediate products in industrialized countries and textile mills and clothing industries in developing countries are another means of communicating information on market trends, fibre developments, and associated textile technology requirements, and licensing and management contracts provide experience in the manufacture of products acceptable in international markets, in the selection of appropriate equipment and in the training of personnel.

Yet, international linkages do not automatically spill over into the development of indigenous market intelligence capabilities. Rather, the developing countries continue to be price, quantity and design "takers". In particular, the more advanced textile and clothing industries of developing countries will have to play a more active role in the future. Regional co-operation (for instance, the holding of joint exhibitions) may be another way of strengthening marketing capabilities.



Finally, the establishment and expansion of training facilities is a necessary complement to, and possibly even a precondition for, programmes that aim to improve industry efficiency. In fact, a lack of skilled textile technicians in many countries prevents companies from achieving the efficiency they should be able to achieve with equipment they already possess. Just as serious are the quantitative deficiencies in existing curricula, which, owing to the rapid pace of technological innovation, no longer fully correspond to the needs of industry. The stock of skills must be inventoried and compared with the skills needed to implement a modernization programme, after which the training programmes can be adjusted accordingly in size and content.

#### 4. The role of labour

In some developing countries the labour force works at wage costs that do not correctly reflect the relative factor endowments and that are therefore higher than the wage costs in competing countries. Such a distortion may be due partly to the prevailing exchange rate and partly to the structure of the labour market and to existing labour legislation. The negative impact on the country's international competitiveness reinforces the cost disadvantages that come from operating outdated machinery.

An exchange rate that keeps manufactured exports competitive, and financial and technical assistance to help enterprises improve their productivity and quality are therefore necessary, but they are by no means the only necessary elements of a restructuring programme that aims for both increased efficiency and changes in the composition of output. Another element for success would be to increase the flexibility of the labour market. Often, the policies of labour unions, and their strong positions, become obstacles to improved efficiency. In some developing countries, for instance, the number of looms and spindles that unions allow to be taken care of by one worker falls far short of the number in industrial countries. In other cases, when the number of machines per worker was raised, salary increases in line with the increased productivity were spurned by the unions.

As to the second aim of a restructuring programme - changes in the composition of output - it cannot be expected that these changes will be achievable within a single enterprise. Labour might have to be reallocated between enterprises, which would be easier if labour legislation allowed greater flexibility.

It is not being argued here that the acquired rights of the labour force should simply be eliminated. Instead, one should look for solutions that consider the interests of all parties, as well as the requirements of and prospects offered by the restructuring programme itself. One possible approach would be to negotiate a specific collective agreement that pertains only to enterprises that participate in the restructuring programme. This agreement would couple (a) more flexibility for entrepreneurs to reallocate or temporarily reduce the labour force with (b) wages or other forms of compensation that are higher than in non-participating enterprises. Higher wages would be justified by increased labour

productivity, but they should not, of course, be so high as to cancel out the positive effect of productivity increases on profitability and international competitiveness. To be effective, a specific collective agreement would need to include all the major trade unions established in a country's textile industry.

#### 5. Establishing an institutional framework

It is not enough to simply provide financial assistance to selected enterprises in an attempt to promote technological modernization. To get the desired results, an institutional framework has to be created. As indicated in the preceding section, the active co-operation of labour in a restructuring programme is a pre-condition for the success of the programme. While there is no doubt that a successful restructuring programme will affect the labour force in terms of the allocation of jobs within and between enterprises, skill requirements etc., it will not necessarily lead to a reduction in the labour force. In many developing countries, moreover, the significant demand potential of the domestic market is barely being scratched, owing to the lack of purchasing power and the high cost of locally produced goods. A successful restructuring programme, by generating income and reducing costs, will tend to stimulate this market. Ultimately, the failure to implement a restructuring programme could endanger existing jobs if the country were to lose its comparative advantage in the face of increasingly fierce international competition.

To ensure that the programme functions smoothly, it is essential that all parties concerned be consulted on its design and that they co-operate in its implementation. Typically, a country will set up a permanent tripartite body, involving the Government, industry and labour, to discuss the key elements and instruments of a restructuring programme, to monitor the restructuring process and to serve as a forum for settling disputes between participants.

Such a tripartite body could be closely attached to, or form part of, an institution that would be in charge of implementing the programme. This institution might have several functions, among them:

- (a) Evaluating and approving company restructuring plans;
- (b) Providing special financial support to the modernization efforts of small and medium-sized companies;
- (c) Supporting the horizontal amalgamation of companies, in order to create more efficient units;
- (d) Financing collective activities undertaken by the industry.

The exact composition of such a body, its organizational structure, its decision-taking rules and its power to enforce its decisions would vary from one country to another, depending on the political culture, the political philosophy and the social and economic structure. Yet, a country planning a restructuring

programme should carefully analyse the experience in countries that already have a programme and apply the lessons of this experience to its own situation. Carefully designed restructuring programmes, which would be supported by the main actors concerned, would provide new, powerful stimuli to the growth of developing countries' textile industries, and thus, by the same token, contribute significantly to employment generation, foreign exchange earnings and the fulfilment of basic needs.

**Appendix**

**BACKGROUND DATA FOR THE TRENDS SHOWN IN FIGURES III-VIII**

**Table 9. Composition of DNE exports and imports, 1965-1985  
(Percentage)**

Product group	1965	1970	1975	1980	1985
<b>Exports</b>					
Grey yarn	3.3	2.0	1.6	3.2	3.1
Processed yarn	2.5	1.4	1.7	0.4	0.5
Synthetic yarn	16.9	22.2	18.9	15.9	14.9
Natural fabrics	24.2	11.8	12.3	13.0	12.7
Synthetic fabrics	11.6	17.9	20.0	17.7	16.4
Clothing	18.7	20.1	22.9	26.2	27.7
Accessories	4.5	3.6	3.4	2.8	2.9
Knitwear	18.3	21.0	19.2	20.8	21.8
<b>Imports</b>					
Grey yarn	3.5	2.5	2.5	4.0	4.0
Processed yarn	1.4	1.4	1.0	0.2	0.2
Synthetic yarn	13.4	16.7	11.7	9.6	8.0
Natural fabrics	22.3	13.2	12.2	11.2	9.6
Synthetic fabrics	7.7	9.4	10.8	9.1	7.9
Clothing	22.9	25.9	32.1	37.1	40.3
Accessories	4.9	3.8	3.2	2.7	2.5
Knitwear	23.9	27.1	26.5	26.1	27.5

**Table 10. Composition of ATE exports and imports, 1965-1985  
(Percentage)**

Product group	1965	1970	1975	1980	1985
<b>Exports</b>					
Grey yarn	4.2	3.0	4.1	5.1	1.6
Processed yarn	0.6	0.5	0.4	0.2	0.1
Synthetic yarn	0.5	0.7	2.7	3.8	3.4
Natural fabrics	26.4	16.0	9.6	8.2	6.2
Synthetic fabrics	1.9	3.5	5.7	9.8	10.6
Clothing	36.6	39.9	42.5	44.6	45.7
Accessories	3.4	5.0	2.7	2.1	1.6
Knitwear	26.4	31.4	32.7	26.2	30.8

continued

Table 10 (continued)

Product group	1965	1970	1975	1980	1985
<u>Imports</u>					
Grey yarn	4.6	5.9	10.0	9.4	6.3
Processed yarn	1.3	1.1	1.4	0.4	0.2
Synthetic yarn	11.5	22.3	18.4	13.7	11.1
Natural fabrics	43.3	19.6	21.7	21.0	19.0
Synthetic fabrics	16.5	40.5	35.7	33.7	29.7
Clothing	11.5	4.5	5.5	11.0	16.4
Accessories	2.3	1.5	1.8	1.9	1.6
Knitwear	9.0	4.6	5.5	8.9	15.7

Table 11. Composition of ODE exports and imports, 1965-1985 (Percentage)

Product group	1965	1970	1975	1980	1985
<u>Exports</u>					
Grey yarn	8.9	16.6	12.5	10.0	8.9
Processed yarn	1.7	3.0	1.7	0.3	0.1
Synthetic yarn	0.2	0.5	1.1	1.6	1.4
Natural fabrics	57.0	41.6	26.6	18.6	13.4
Synthetic fabrics	1.7	4.1	3.5	5.3	4.8
Clothing	16.4	16.9	33.3	41.6	45.3
Accessories	5.7	7.4	4.6	4.5	3.4
Knitwear	8.4	9.9	16.7	18.1	22.7
<u>Imports</u>					
Grey yarn	4.7	4.5	1.9	3.0	1.5
Processed yarn	5.0	4.4	2.3	0.5	0.3
Synthetic yarn	9.5	16.6	18.7	15.9	17.4
Natural fabrics	42.2	24.7	15.9	15.1	15.0
Synthetic fabrics	13.6	24.6	32.9	30.1	32.9
Clothing	13.7	13.8	15.4	21.9	19.8
Accessories	3.7	3.6	3.8	3.9	3.8
Knitwear	7.6	7.8	9.1	9.6	9.3

Table 12. Data base for tables 9 to 11 and figures I-IX

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Product group	SITC <u>a/</u>
Grey yarn	651.3
Processed yarn	651.4
Synthetic yarn	651.6
Natural fabrics	652.0
Synthetic fabrics	653.5
Clothing	841.1
Accessories	841.2
Knitwear	841.4

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Source: UNIDO data base.

a/ Standard International  
Trade Classification  
(SI/ESA/STAT/SER.H/34/Rev.1).

SOMMAIRE

Le développement de l'industrie et la politique industrielle  
en République de Corée, plus particulièrement  
sous l'angle des industries mécaniques

Wilfried Lütkenhorst

Après avoir donné un aperçu du développement industriel en République de Corée, l'auteur évalue le poids du sous-secteur des industries mécaniques, élément particulièrement dynamique de l'industrie du pays. Il analyse ensuite la politique industrielle nationale, avant d'examiner de manière plus approfondie les mesures qui représentent un intérêt spécifique pour l'avenir du développement des industries mécaniques et pour l'élimination de certains déséquilibres affectant actuellement ces industries, en particulier l'existence d'entreprises de tailles très diverses, propice à la constitution de grands conglomérats, l'orientation trop marquée des activités de transformation vers les produits finals et l'insuffisance de la spécialisation horizontale.

Faits récemment intervenus dans l'industrie des machines-outils :  
perspectives en matière d'investissement étranger direct,  
en particulier pour les pays en développement d'Asie

Peter O'Brien

Les machines-outils ont une grande importance car elles servent à fabriquer les machines sur lesquelles se fonde l'industrialisation. Cette étude vise trois objectifs principaux : donner un aperçu analytique des tendances récentes de la production, de la consommation, et du commerce des machines-outils dans le monde, étudier l'envergure et les perspectives actuelles de l'investissement étranger direct dans l'industrie des machines-outils; et évaluer les possibilités dont disposent les pays en développement - en particulier ceux de la région du Sud-Est asiatique où l'industrialisation progresse rapidement - pour canaliser les investissements étrangers directs vers le secteur en question. La conclusion en est que les pays qui ont le plus de chance d'y parvenir sont ceux qui sont fermement décidés à mener

une politique industrielle de développement et de la modernisation de leur industrie du travail des métaux et de leur industrie mécanique. Les bas salaires ont peu d'importance d'autant que fabrication des machines-outils fait de plus en plus appel aux matériels électroniques. L'avenir immédiat ne s'annonce donc pas particulièrement brillant pour les pays en développement d'Asie, sauf pour le très petit nombre de nouveaux pays industriels.

Problèmes de politique pour l'industrie textile  
des pays en développement

Secrétariat de l'ONUDI

Cette étude couvre de nombreux aspects de l'industrie du textile et de la confection dans le monde entier, et plus particulièrement les liaisons internationales intéressant ce secteur et les politiques nationales axées sur sa promotion et sa restructuration. L'auteur analyse d'abord l'évolution des structures commerciales au cours des dernières décennies, qui s'expliquerait par la phase de développement atteinte par les pays, et examine ensuite les changements intervenus au niveau des entreprises sur le plan de l'organisation et de la structure des produits. L'étude porte également sur les problèmes ardues auxquels se heurtent les exportateurs des pays en développement (en particulier les difficultés dues à la relance de l'industrie dans de nombreux pays développés) et sur les mesures prises par les pays en développement pour y faire face : mesures protectionnistes et d'aide au secteur, stimulants fiscaux, services auxiliaires. Elle expose en outre le cas de la République de Corée et décrit, en les évaluant, les mesures de restructuration récemment appliquées dans les pays développés, avec des informations détaillées sur les plans appliqués en Belgique et en Espagne. Dans la partie finale de l'étude, les besoins et perspectives des pays en développement en matière de restructuration sont évalués à la lumière des réformes entreprises par les pays développés concurrents.



**EXTRACTO**

**Desarrollo y política industriales en la República de Corea,  
con especial referencia a la industria mecánica**

Wilfried Lütkenhorst

Tras presentar un breve panorama del desarrollo industrial de la República de Corea, se estudia la importancia del subsector de la industria mecánica, parte especialmente dinámica de la industria del país. Sigue un análisis de la política industrial nacional, complementado por un examen más detallado de las políticas que se refieren concretamente al desarrollo ulterior de las industrias mecánicas y a la supresión de ciertos desequilibrios a que éstas tienen que hacer frente en la actualidad, en particular una pauta errada de dimensión que favorece a los grandes conglomerados, una pauta de procesamiento predispuesta hacia el producto final, y un grado insuficiente de especialización horizontal.

**Recientes avances en la industria de la máquina herramienta:  
perspectivas de inversiones extranjeras directas, con  
especial referencia los países asiáticos en desarrollo**

Peter O'Brien

La máquina herramienta tiene una gran importancia porque se utiliza para hacer las máquinas que sirven de base a la industrialización. El presente estudio tiene tres objetivos principales: primero, presentar un estudio analítico de las últimas tendencias de la producción, el consumo y el comercio mundiales de las máquinas herramienta; segundo, analizar las perspectivas y el ámbito reales de inversiones extranjeras directas en la actual industria de la máquina herramienta; y, tercero, evaluar las posibilidades de los países en desarrollo -especialmente los ubicados en la región del este asiático, de rápida industrialización- para atraer a la inversión extranjera directa en máquinas herramienta. El estudio llega a la conclusión de que las posibilidades de atraer a esta inversión son mejores para los países que han adoptado una rigurosa política industrial destinada a desarrollar y mejorar sus industrias metalúrgica y mecánica. Los bajos salarios tienen poca importancia, especialmente porque la fabricación de máquinas herramienta depende cada vez más de la electrónica. Es decir, que las perspectivas a corto plazo no son muy brillantes para los países asiáticos en desarrollo, con la excepción de los poquísimos países recientemente industrializados.

Cuestiones de política textil para los países en desarrollo

Secretaría de la ONUDI

Se trata de un amplio estudio a escala mundial de la industria textil y la del vestido, que enfoca especialmente las vinculaciones internacionales y las políticas nacionales para promover y reestructurar la industria. Comienza con un análisis de las pautas cambiantes del comercio en los últimos decenios. Se presenta una explicación de estas pautas basada en las fases del desarrollo. Se exponen los cambios en la organización de las empresas y la estructura de los productos. Se examinan los desafíos que actualmente enfrentan los exportadores de los países en desarrollo, especialmente los derivados de un renacimiento de la industria en muchos países desarrollados, así como también las reacciones de los países en desarrollo en cuanto a políticas, tales como el proteccionismo, las medidas de ayuda al sector, los incentivos fiscales y los servicios auxiliares. Contiene un estudio casuístico de la República de Corea. Se describen y se evalúan recientes políticas de reestructuración de los países desarrollados, y en especial detalla los mecanismos aplicados en Bélgica y España. En una sección final se evalúan los requisitos y las necesidades y perspectivas de reestructuración de los países en desarrollo, a la luz de las reformas ya iniciadas por sus competidores de los países desarrollados.

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