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The challenge *of industrial* competitiveness

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Latin American manufacturing industry has undergone various changes in recent years. It has registered a favourable performance as far as exports are concerned, but production and investment have grown only slowly in a context of sluggish recovery of domestic demand and greater foreign competition. Other features are greater specialization in natural resource-based intermediate goods characterized by the importance of economies of scale, relatively long lead times for the heavy investments required, and the presence of privatized and transnational enterprises. At the same time, there are signs of the emergence of a varied range of competitive manufacturing activities of a scale which is as yet too small to be clearly reflected in the aggregate indicators. This article reviews some of these cases and concludes that it is necessary to establish a favourable environment for this type of activities: to this end, higher productivity needs to be promoted at the enterprise level. Finally, from a sectoral point of view, emphasis is placed on the need to continue to promote exports, adding new products and exploring new markets, while it is also noted that competitiveness on the domestic market needs to be raised, as this market continues to be the main source of demand for industry in the region.

I

Introduction

In the post-war period, Latin American industry developed considerable production capacity, designed above all to satisfy domestic demand. Subsequently, in the 1980s, a combination of changes faced manufacturing with the challenge of improving its competitiveness. The sharp contraction in domestic demand, the application of macroeconomic policies which realigned relative prices in favour of exports, and the changes in trade policies which increased competition on domestic markets, together with the trends towards the globalization of enterprises and the changes which took place in the industrialized countries in production and organizational practices, gave rise to an economic environment totally different from that of only a decade before. These changes, however, were neither linear nor completely foreseeable. The privatization process, for example, led to the reallocation of private investment resources from tradeable to non-tradeable activities, while the opposing nature of some elements of change gave rise to uncertainty which conditioned business behaviour in this stage of transition to another strategic model.

In view of these changes, it may be assumed that manufacturing in the region is in the midst of a complex process of adaptation. This process may take different forms, as the changes have different effects on businesses depending on the nature of the market and sector in which they operate, their size and type of ownership, and their innovative capacity.

The present article will examine some macro- and microeconomic phenomena which bear witness to this process of adaptation which has taken place in recent years. At the macroeconomic level, the analysis reflects positive evolution of exports of manufactures, but sluggish growth of production and investment in view of the only incipient recovery of domestic demand and the stronger foreign competition on the domestic market. It also reflects structural changes in the direction of greater specialization in the intermediate goods sectors such as basic chemicals, iron and steel, pulp and paper, and the processing of various minerals. These sectors are based on the availability of natural resources and are characterized by the importance of economies of scale, the

relatively long lead time of the heavy investments required, and the presence of (privatized) public enterprises and transnational corporations. This latter feature is explained by the fact that in these sectors the macroevaluations carried out gave competitiveness to the output of production facilities financed with investments made before the crisis. It is even possible that in some cases the exports are produced on the basis of marginal costs, without any possibility of recovering the original investments. The other phenomenon observed is the relocation of certain activities by transnationals to a limited number of countries of the region. Thus, in order to cope with the competition, especially from Asian products, some United States firms have transferred part of their production to locations like Mexico (automobiles, electronics, textiles) and some of the Caribbean countries (ready-made clothing and other activities using relatively unskilled labour).

This may seem a gloomy picture, as it would appear to indicate that Latin America has few options open to it except to take advantage, at discount prices, of the investments made in earlier periods, exploit its natural resources in the same way, and also take advantage of its unskilled labour. However, this interpretation is not entirely in keeping with some examples at the microeconomic level. There are indications that a variety of competitive manufacturing activities are emerging which, because of their as yet small scale, do not show up clearly in the aggregate data. In the next section we will review some of these examples, which may well be signals that there are possibilities of expansion in areas which are difficult to imagine or plan. The challenge of improving the competitiveness of manufacturing firms may be tackled in many different ways. The industrial policies of the countries of the region – a matter which is touched upon briefly in the Conclusions – should not only deal with the problem of how to increase investments, productivity and authentic competitiveness in the sectors which are still strongly reflected in the aggregate data, but should also seek ways to stimulate creativeness and production capacity in this range of activities which have not yet reached readily appreciable levels in the macroeconomic indicators.

II

An overview of Latin American manufacturing industry¹

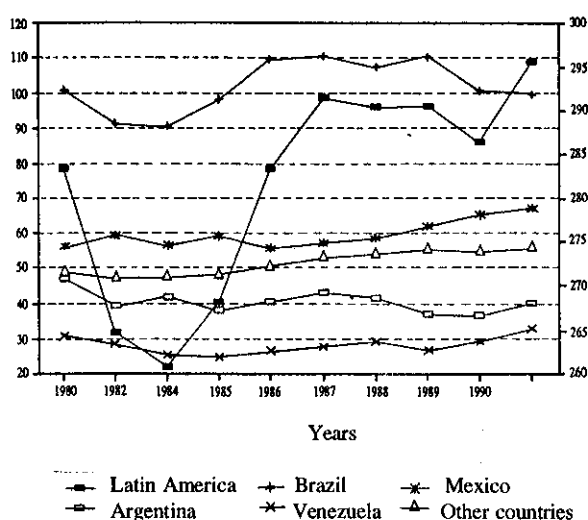
1. Evolution of the manufacturing product and the degree of industrialization

The gross domestic product of Latin America is showing signs of recovery after a decade of virtual stagnation. The manufacturing product, for its part, has displayed procyclical behaviour, reflecting the greater elasticity of demand for manufactures. In 1980-1985, in reaction to the crisis, it suffered an average annual decline of 0.6%, in 1986 its "spurious" recovery was greater than the growth in GDP (+6.8%), and between 1988 and 1990 its relative stagnation led to a fresh setback in absolute terms. Its recovery in 1990 was somewhat less than that of the economy as a whole, due to the deterioration in manufacturing output in Brazil and Colombia (ECLAC, 1993, p. 89). The performance of manufacturing is shown in figure 1, in which the figures on the right-hand vertical axis refer to growth of the sector in the region as a whole and the figures on the left-hand axis refer to the performance of each individual country.

The degree of industrialization of the region went down from 26% of the total product at the beginning of the 1980s to 24% at the beginning of the 1990s. This indicator conceals great differences between the countries, however. Three of them—Argentina, Brazil and Uruguay—register a degree of industrialization higher than the mean of 24% in 1991, but in fact they had suffered a significant setback in this respect in the 1980s. The countries with a degree of industrialization slightly below the mean (Chile, Colombia, Mexico and Venezuela) generally maintained their position, as did those with a relatively lower level of industrialization (ECLAC, 1993, p. 90).

¹ Gaining an overall picture is made more difficult by the processes of heavy overvaluation and undervaluation of national currencies and changes in the structure of relative prices. In order to calculate growth rates, we used data in constant prices which basically represent the physical volume of production, valued at 1980 prices. Analysis of changes in the structure of production and the degree of openness of the economies was based on data in current dollars, thus simply accepting all the problems due to fluctuations in currency valuations and relative prices.

FIGURE 1
Latin America: Industrial GDP, 1980-1990
(Billions of dollars)^a



Source: UNIDO Industrial Statistics Data Base.

^a At constant 1980 market prices.

2. Employment and investment

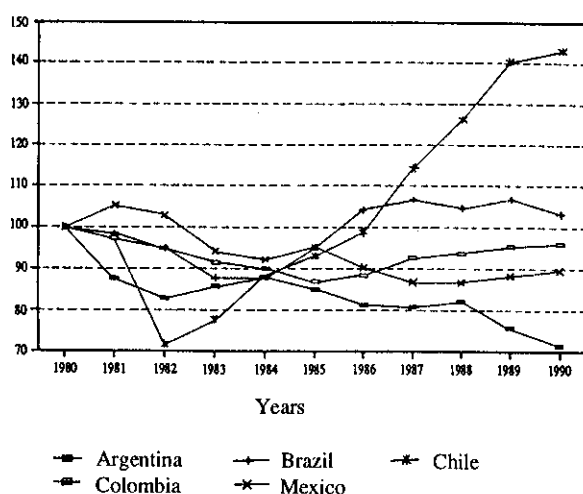
As regards employment,² the number of persons employed in the industrial sector of the region went down by 5% over the period 1980-1990, the reduction being most marked in the first half of the 1980s and being concentrated in Argentina (figure 2 and table 1). In Mexico and Brazil there was no net generation of industrial employment over that period, but there was an increase in such employment in some countries with a smaller industrial sector, such as Chile and Venezuela, especially in the latter part of the period. In other words, in the countries with the biggest concentration of industry in the region, the sector ceased to generate new jobs in the 1980s, whereas in the previous decade employment in this

² Data from the Industrial Statistics Data Base of the United Nations Industrial Development Organization (UNIDO).

FIGURE 2

Latin America: employment in manufacturing, 1980-1990

(Indexes: 1980=100)



Source: UNIDO Industrial Statistics Data Base.

sector in this group of countries had grown by 4.4% per year.³ Quite apart from the contraction in demand and the fall in investment, this decline in the capacity to create new jobs may be partly explained by the new pattern of sectoral specialization which is taking shape, as will be analysed in section 5 below. Another element which helps to explain this is the productivity strategy of the firms, which is marked by rationalization of labour use and low investments, which were limited to the replacement of old machinery but did not serve to bring about a significant increase in overall production.

3. Investment and productivity

Gross domestic investment, like the gross domestic product, only began to show signs of recovery in 1991, after its fall from 25% of the product in 1980 to only a little over 15% in 1990. There are also differences of behaviour among the countries: while Brazil and Colombia still maintained their downward trend in 1991, Mexico and Chile had been recovering steadily since 1988, whereas most of the other countries only began to recover as from 1991.

³ In terms of employment, it is not only the number of jobs which is of interest, but also their quality, the level of wages, structure by skills, age and sex, etc. There have been important changes in these respects which are not analysed here but have been dealt with in numerous country studies.

TABLE I

Latin America: number of persons employed in industry, 1970-1990

(Annual average growth rates)

	1970-1980 ^a	1980-1990 ^b
Whole region	4.4	-0.5
Argentina	0.8	-3.2
Brazil	5.9	-0.1
Colombia	2.6	-0.5
Chile	1.3	0.4
Mexico	6.6	0.0
Uruguay	0.3	-5.5
Venezuela	6.1	0.4

Source: ECLAC, 1993.

^a Industry includes mining, manufacturing, electricity and construction.

^b Annual growth rates between the averages for the periods 1978-1980 and 1988-1990.

Investment in machinery and equipment accounted for almost 39% of total investment in the peak year of 1980, but subsequently dropped even more sharply than investment in general, so that its share in the total was only 34% in 1985. Since then, it has grown rather more rapidly than total investment at the aggregate level, and its share of the latter was once again over 38% in 1991.

A central element in the competitiveness of industry is productivity. If we look at the labour productivity indicator, we see that in general terms manufacturing added value remained steady or declined a little between 1980 and 1990, while manufacturing sector employment registered a decline of 0.5% per year, due above all to the contraction of activity in Argentina. Taken together, these two facts mean that, in terms of value added per worker, labour productivity increased.

In analysing the evolution of labour productivity and, above all, that of all the factors taken together, there is a problem of shortage of reliable and comparable data. Nevertheless, it was possible to determine some interesting indicators in this respect for certain countries, on the basis of national studies (table 2).⁴

⁴ Data up to 1985 may be found, for example, in Elias (1992).

TABLE 2

Latin America: evolution of productivity, 1980-1990
(Annual growth rates)

Country	Labour productivity ^a			Total factor productivity		
	1980-1985	1985-1990	1980-1990	1980-1985	1985-1990	1980-1990
Mexico	1.1	2.5	1.5	-0.7	6.5	-
Chile ^b	2.0	-1.0	-	-0.6 ^c	-2.0 ^c	-0.9 ^c
Brazil ^d	0.4	0.1	0.2	-	-	-
Colombia	4.2	1.9	2.8	-1.8	0.5 ^e	-1.1
Argentina ^d	-0.5	1.8	0.7	-	-	-

Source: ILO, 1991; Brown, 1993; Bonilla, 1992; Kantis, 1993; ECLAC, 1993a; Agacino and Rivas, 1993.

^a Value added per person employed in industry.

^b Average physical labour productivity (firms with over 10 workers).

^c Firms with over 50 workers.

^d Value added per hour worked.

^e 1985-1989.

In the 1980s, industrial labour productivity in the five countries covered by table 2 remained bogged down at levels of between 0% and 1.5% per year (except in Colombia, where it rose by 2.8%), compared with the rates over 3% registered in Mexico and Brazil in previous decades. The productivity strategies adopted, although not identical in all the countries, had certain features in common. At the beginning of the crisis, the predominant objective was to minimize the loss of profits by *rationalizing* the factors of production in the sense of reducing them in absolute terms: less use of labour (reduction of staff) and of capital (use of plant which had already been depreciated), without making any substantial technological or organizational innovations. Whereas labour use could be reduced by cutting the number of jobs, in the case of machinery and equipment there was an increase in idle capacity and in the average age of the plant. The suppression of new investments led to a drop in net capital formation in a number of countries (table 3), as for example in Mexico, where this indicator went down by 20% in manufacturing firms between 1983 and 1987 (Hernández Laos, 1991). In spite of this rationalization, it was not possible to increase overall factor productivity—that part of growth attributable to advances in knowledge, technology and organization—, probably because of the increase in idle capacity.

Later on in the productivity strategies, the adjustment and rationalization phase changed to a phase of *intensification* of factor use, with increased efficiency, which coincided in a number of countries with the reactivation of demand. In this phase, the productivity

strategy consisted of producing more and better goods with the same level of production resources.

While investments in machinery and equipment continued to stagnate until the end of the decade, a process of partial innovation in the organization of work and production was begun. ⁵ These innovations

TABLE 3

Latin America: investment in machinery and equipment in the 1980s.
Gross fixed capital formation
(Annual growth rates)

Country	1980-1985	1985-1990	1980-1990
Mexico	-6.7	8.3 ^a	-0.3 ^a
Chile	-9.7	19.6 ^a	2.3
Brazil	-9.3 ^b	0.5 ^b	-8.8 ^b
Colombia	1.6 ^b	2.1 ^b	1.5 ^b
Argentina	-11.1	-4.8	-8.0

Source: Agacino and Rivas, 1993; Sarmiento, 1993; ECLAC, 1992.

^a 1985-1989.

^b Investment in machinery and equipment in all sectors of the economy. This has been taken as an approximation to the evolution of investment in machinery and equipment in industry. In the case of Mexico, where both sets of figures were available, the difference was one percentage point more for industry. In other words, the growth rate was 1% more on average.

⁵ We refer to organizational innovations designed to ensure product quality and update production standards and times (reduction of lost time in production processes). Integral innovations would correspond to strategies designed to raise the quality and efficiency of the relation between direct and indirect areas of production and between suppliers and clients/consumers.

were designed to improve process and product quality. No big investments in equipment were made, and technical innovation was limited to making adaptations rather than reaching new technological frontiers. The exception to this was the increased investment in computers in the indirect areas of production⁶—information and process control systems. The strategy consisted basically of making better use of the existing capital and labour factors. Thus, overall factor productivity in industry began to improve in the second half of the decade in various countries.⁷

If the levels of productivity are compared with those attained in manufacturing in the United States, however, we note that the ratio remained constant at about one-third of the level registered in the latter country. This ratio conceals very different performances by the different sectors, as there was an excellent performance in terms of productivity in the leading sectors, such as chemicals, iron and steel, and non-metallic minerals, whereas productivity stagnated in the metal products and machinery industry and actually went down in the non-durable consumer goods sector (UNIDO, 1992, p. 71).

The need to raise levels of productivity has become a central element in economic policy in most countries of the region, especially Argentina, Chile, Colombia and Mexico. The importance of this objective is even more obvious in view of the urgent need to increase exports and compete on the domestic market in a context of appreciating national currencies and the rising cost of services because of the privatization processes: factors which have raised local production costs.

It may therefore be concluded that the productivity strategy based on more intensive use of production factors must be followed by a phase involving the *transformation* of those factors through integral innovation in the technical, organizational and human resources bases of the enterprises. This is reflected above all in the need to achieve a steady increase in the levels of investment in machinery and

equipment and in systems for the organization and development of human resources. In some countries of the region, this phase only appears to have begun in the early 1990s, while in others there is still no sign of it beginning.

4. Foreign trade in manufactures

Because of the debt crisis, Latin America had to generate big trade surpluses in order to cope with external debt service commitments. Thus, in contrast with a trade deficit of over US\$14 billion in 1981, the region registered a *surplus* of nearly US\$36 billion in 1984. This was attained without any increase in exports of goods and services, which stood at US\$113 billion in both years. The change was achieved entirely through the reduction of imports by US\$50 billion, almost the whole of this saving being used to service the external debt.

Only from 1988 onwards was there an increase in exports of goods and services, which in that year exceeded for the first time the level of US\$113 billion registered at the beginning of the decade. In three years, exports grew by a total of rather more than US\$150 billion, 80% of which was due to exports of goods. At the same time, the trade surplus went down significantly, standing at US\$5.5 billion in 1991, with a downward trend, and in 1992 there was a trade deficit for the first time since the debt crisis (ECLAC, 1992). This change was due to the recovery of imports, the policies of greater openness, and the process of appreciation of national currencies (except in Brazil) in more recent years. In 1991 total imports came to the unprecedented figure of nearly US\$147 billion.

These figures rather underestimate the export effort, however, since generally speaking the terms of trade were unfavourable for the region. In fact, at the end of the decade the index of export volume was 75% higher than at the beginning.

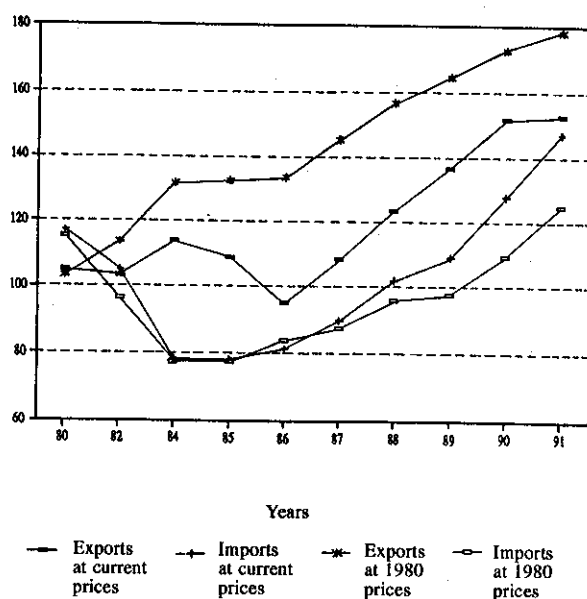
Figure 3 reflects the above situation in two ways. In current dollars, it first of all shows the creation of a trade surplus, then a recovery in imports, which grow at the same rate as exports, and finally even faster growth of imports which ends up by virtually wiping out the trade surplus. In constant dollars, however, it shows the export effort made by Latin America and the results of the deterioration in the terms of trade.

⁶The annual growth rate of investment in office equipment in Mexican manufacturing firms averaged 0.7% between 1980 and 1985 but 26.3% between 1985 and 1989 (Brown, 1993).

⁷This process did not take place in the same way in all countries. In Chile, for example, the increase in domestic demand led firms to adopt a strategy based on more extensive use of the factors of production (Agacino and Rivas, 1993).

FIGURE 3

**Latin America: trade balance
(goods and services), 1980-1991^a**
(Billions of dollars)

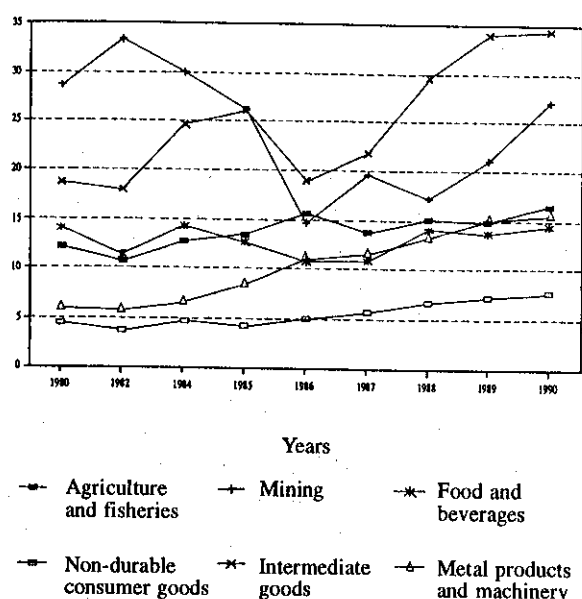


Source: UNIDO Industrial Statistics Data Base.

^a At current prices and 1980 prices.

FIGURE 4

Latin America: exports of goods, 1980-1990
(Billions of current dollars)



Source: UNIDO Industrial Statistics Data Base.

If manufactures are defined as the products in major division 3 of the ISIC—a very broad definition of the manufacturing sector—they more than did their share in contributing to export growth. Whereas primary commodity exports turned in a poor performance between 1980 and 1986, mainly because of the fall in prices, exports of manufactures began to grow immediately. Thus, exports of manufactures rose from US\$15 billion in 1982 to over US\$40 billion in 1989 (figure 4).

In 1989, half the region's exports of manufactures came from Brazil and another quarter from Mexico. The other countries accounted for the remaining 25%—a good deal less than in 1980, when they accounted for 40%. Even though the growth in exports was due mainly to Brazil and Mexico, however, most of the other countries in the region also registered an upward trend in this respect.

5. Structural changes in the manufacturing sector

If we look at the sectoral structure of manufacturing in Latin America, we immediately see the favourable performance turned in by intermediate goods: wood, paper and pulp, chemicals, mineral processing, and iron and steel. This progress was registered in each of the countries in question, both in terms of added value (table 4) and of exports (table 5).⁸ The sector whose share went down most in the global figures was that of foodstuffs, beverages and tobacco. However, this tendency was observed above all in Brazil and Mexico: in Argentina and the rest of the region the sector registered a slight upward trend.

If we look at the sectoral structure of growth of exports of manufactures, we see that the intermediate goods sectors have made a growing contribution to foreign exchange earnings, with notable relative increases in Argentina and Brazil. There has also been a significant—threefold— increase in the exports of the metal products and machinery sector, mainly concentrated in the Mexican automobile industry, which registered growth of US\$6.5 billion.

The structural changes in the relative position of the metal products and machinery industry are not of

⁸ These figures are affected by the fluctuations in relative prices, which in general have been favourable to the metal products and machinery sector. The structure in terms of constant prices or—which amounts to the same thing— physical volume therefore shows a decline for this sector (ECLAC, 1993).

TABLE 4

Latin America: structure of manufacturing added value, 1980-1990
(Percentages)

Sector ^a	Latin America		Brazil		Mexico		Argentina		Other countries	
	1980	1990	1980	1990	1980	1990	1980	1990	1980	1990
A	19.8	16.5	15.1	11.5	25.3	19.9	19.1	21.6	25.0	27.4
B	17.8	16.0	17.6	16.6	19.0	16.5	17.8	13.8	16.2	14.4
C	38.8	43.8	37.7	43.0	34.8	43.5	39.2	44.9	45.7	46.0
D	23.7	23.7	29.6	28.8	20.8	20.1	24.0	19.8	13.1	12.2

Source: Prepared by the authors on the basis of the UNIDO Industrial Statistics Data Base. The years correspond to three-year averages (1980=1978-1980; 1990=1988-1990).

^a A: Foodstuffs, beverages and tobacco, ISIC 31.

B: Non-durable consumer goods, ISIC 32, 332, 342 and 390.

C: Intermediate goods, ISIC 331, 341, 35, 36 and 37.

D: Metal products and machinery, ISIC 38.

TABLE 5

Latin America: structure of exports of manufactures, 1980-1990
(Percentages)

Sector ^a	Latin America		Brazil		Mexico		Argentina		Other countries	
	1980	1990	1980	1990	1980	1990	1980	1990	1980	1990
A	32.5	20.1	47.4	22.1	21.3	5.6	53.1	44.4	14.8	17.7
B	10.3	10.7	9.2	11.3	8.3	6.5	15.4	11.1	10.3	12.2
C	43.6	47.8	20.7	40.8	47.8	37.1	19.6	35.2	71.2	66.2
D	13.6	21.5	22.7	25.8	22.5	50.8	12.0	9.4	3.7	3.8

Source: Prepared by the authors on the basis of data from ECLAC, 1993.

^a A: Foodstuffs, beverages and tobacco, ISIC 31.

B: Non-durable consumer goods, ISIC 32, 332, 342 and 390.

C: Intermediate goods, ISIC 331, 341, 35, 36 and 37.

D: Metal products and machinery, ISIC 38.

a monolithic nature. Whereas in terms of added value this sector displayed relative stagnation, in terms of exports it was the sector with the highest relative growth. This indicates that heterogeneous structural changes took place within the sector: relative increases and setbacks took place at the same time in different subsectors or companies. In the foodstuffs, beverages and tobacco sector, this heterogeneity is reflected in differing behaviour between one country and another: the smaller economies registered relatively dynamic growth in this area, in contrast with the bigger economies. In the non-durable consumer goods sector, heterogeneous trends are observed both between countries and within the sector: there was a relative increase in terms of exports, at the same time as a relative decline in terms of added value.

The sector of greatest absolute importance as regards export of manufactures was the intermediate goods sector, whose exports doubled between 1982 and 1990, with outstanding performances not only by Brazil and Argentina but also by Chile and Colombia.

Exports of non-durable consumer goods, including textiles, clothing, leather and footwear, rose from US\$4.4 billion in 1980 to US\$7.7 billion in 1990. Particularly noteworthy were the extraordinary performances of Chile and Venezuela, whose exports in this sector grew from almost nothing at the beginning of the period to over US\$200 million in 1990, and the above-average growth registered by Colombia and Mexico.

The region's export effort is expressed in the ratio of exports of goods and services to the value of domestic production. In aggregate terms, Latin America's exports of goods and services amounted to 14% of its gross domestic product in 1980, but this ratio rose steadily until it exceeded 20% in 1990 (ECLAC, 1993, p. 74).

Using data from the United Nations Industrial Development Organization (UNIDO), it is possible to make a breakdown by sectors. Thus, the main increases in the export effort (exports/gross value of output) were in transport equipment (from 7.2% to 19.2%), iron and steel (from 5.5% to 18.2%), paper (from 5.9% to 13%), and chemicals (from 12.7% to 19.1%). The export effort of the foodstuffs sector remained constant at around 15% (Buitelaar, 1992).

Finally, a more disaggregated breakdown of Latin America's performance on international markets shows a large number of relatively small product lines where the region is increasing its share. A study of the shares of the 240 sectors making up the three-digit SITC classification was carried out for the 11 ALADI countries, and it was found that in 183 of these sectors these countries have increased their share in the import market of the Organization for Economic Cooperation and Development (OECD). Annex 1 of this article shows the share of these countries in the OECD's imports of machinery and equipment, and it may be noted that this share grew steadily in 34 out of 45 product areas between 1970 and 1990, and in 37 areas between 1980 and 1990. However, the outlook with regard to the smaller countries is a good deal less encouraging.

The diversification of the region's export structure is also reflected in the data on the export importance of each country's ten main products (ECLAC, 1993), which show that the relative importance of these products is declining in all the countries.

At the same time (1982-1986) that exports of manufactures grew by 66%, imports of intermediate goods went down by 33% (from US\$60 billion to US\$40 billion). The total value of such imports rose again after 1986, but in 1990 it had still not reached its 1980 level.

Imports of capital goods went down in two years by 50% in terms of current dollars, from US\$22 billion in 1982 to US\$11 billion in 1984, and though they began to recover again as from that year, in 1990 they had still not returned to the

level of ten years before. This means, *inter alia*, that there was an increase in the share of consumer goods in total imports between 1980 and 1990 (from 12% to 14%).

To sum up, manufacturing was a fundamental factor in the increase in the value of the region's exports during the 1980s, as well as in the reduction of imports of intermediate and capital goods.⁹ Despite the growth in total exports, however, manufacturing activity as a whole did not register an increase because of the deterioration in domestic demand and the increase in foreign competition on domestic markets.

These changes set off restructuring processes which were reflected, in aggregate terms, in the relative strengthening of the chemical, paper and pulp and mineral processing (iron and steel) industries, with the other sectors turning in a varied performance. This tendency may be explained in the first part of the 1980s by the availability of natural resources, the completion of big long-term investment projects begun in the period before the crisis, and the devaluations which took place. Its subsequent continuation was probably due to the improvement in productivity and the development of systemic competitiveness in those sectors, facilitated by the high degree of concentration of these types of industries. This pattern of sectoral specialization has some negative aspects from the standpoint of the regional development strategy, however, due to its capital-intensiveness, degree of concentration, and the international demand prospects of the sectors in question. In these types of sectors, the direct and indirect distributive effects and capacity for generating employment are less than in others. Technological innovation and the improvement of productivity often demand heavy investments and very long-term projects, while the endogenous contribution to product and process development is only limited. Moreover, the profit margins in these kinds of sectors which are "distant" from the final consumer are small and tending to decline.

The trend towards specialization in intermediate goods does not mean that capacity for competitiveness does not exist in other sectors. In the other sectors of the economy, opposing trends have been

⁹ In the case of intermediate goods, this could be attributed to the greater competitiveness of domestic production, while in the capital goods sector it was due to the failure to make investments.

observed: there have been some cases of improvement in the competitiveness of individual firms, but fewer in the sector as a whole. It would be interesting to identify the determinants of such competitiveness, in order to advance in the formulation of policies designed to support an alternative form of sectoral

specialization or more balanced sectoral growth. After describing some general trends in microeconomic productivity and competitiveness strategies, section III below gives some examples of the varied range of activities which seem to be emerging at the company level.

III

Microeconomic strategies in the trend towards a new industrial production model

1. Evolution of competitiveness and productivity strategies

The parameters of industrial competitiveness that prevailed in the 1980s have been evolving, both internationally and in the region, towards higher demands in terms of quality, design and satisfaction of clients' needs. The challenge has been to meet these demands without affecting the cost structure too much, since price continues to be a key factor in competitiveness, in addition to the other dimensions (quality, design) (Mertens, 1992).

Latin American companies have not only been faced with the need to produce goods at international levels of price and quality, but have also had to adapt to more demanding relations with the outside world: that is to say, they have had to comply with the rules of international competition, which means applying international standards in terms of environmental conservation, labour relations, subsidies and incentives.

Both the requirements in respect of quality, products and processes and those connected with the environment are being incorporated in international standards governing company operations, such as ISO 9000 for the European market and EN 29000 for the United States and Japan. In other words, if a company wants to have access to these markets it must comply with these new rules.

The new parameters of international competitiveness therefore mean that the region's manufacturers must go through learning processes designed to raise their levels of productivity, and this involves

the introduction of technical and organizational innovations.

The productivity strategies of the different companies may follow differing paths, but they are bound to have common elements in keeping with the objectives pursued (price, quality, design, customer service, or all of these together). The common feature of these strategies would appear to be the priority they assign to the reorganization of production practices through innovations (total quality control, continual improvement, adoption of "just in time" methods, reduction of the number of management echelons) in order subsequently to make effective use of the new technologies so as to reduce costs and at the same time improve quality and flexibility (Mody, Suri and Sanders, 1992).¹⁰

¹⁰ The following stages have been observed in the implementation of the productivity strategies of Latin American companies: i) partial improvement of productivity through the production factors: ensuring product quality; increasing the volume produced per worker, and reducing down time of machinery; ii) improvement of process productivity: reduction of the quantity of goods in the course of manufacture and improvement of the various types of lead time; and iii) integral improvement of productivity by reducing movements and activities which serve no real purpose and/or add little value in the eyes of the consumer; reduction of losses of time and materials by directly linking production with indirect areas, suppliers and consumers. Although from the analytical point of view these stages can be identified separately, in practice they overlap and dovetail with each other (Mertens and Palomares, 1993).

The capacity to generate competitive advantages consists, on the one hand, in moving ahead in the learning process through faster introduction of technological and organizational innovations,¹¹ and on the other hand in minimizing the cost of making such innovations, that is to say, minimizing the costs which are external to the production process.¹²

When the concept of lean production was developed a few years ago, Western companies had before them the Japanese example of how to produce goods of high quality at low prices, with frequent design changes, by placing greater emphasis on innovation and on improved organization of work and production. Within a relatively short space of time, many companies went over to this system, and now that almost all the leading firms are using it, the question is how to gain a competitive advantage if all the competing firms are using the same strategy. Thus, something more is now needed to gain such an advantage, and this "something more" is beginning to be seen as the capacity of a firm to mobilize the available resources effectively in the pursuit of productivity. These resources are, on the one hand, those available for the actual process of production—labour, machinery and technology—and on the other hand those that could aid in the production process but are located outside it: that is to say, the resources of suppliers, marketing and sales departments, engineering and even those of customers must also be mobilized in order to gain competitive advantages (De Meyer, 1992).

It may be concluded from the foregoing that in their process of building up comparative advantages, companies are faced with the challenge not only of keeping up to date in the application of technological and organizational innovations, but also of making the necessary adaptations and improvements in them in line with their specific market and production

conditions. In this latter aspect, the strategy has only limited leeway, for it is here, in the final analysis, that competition is concentrated: on the achievement of maximum innovative capacity at minimum cost. This is an individual optimization function of each firm, and it is a complex business because of the many interrelations that exist between costs, results and time. It is an organizational learning process: it involves learning to mobilize and manage the internal and external resources available for production. Although this concept of the strategic challenges that face manufacturing is based mainly on the ideas prevailing in advanced countries, it is also increasingly valid for Latin American firms.

In Latin America there have been many forms of mobilization of resources, aimed at making innovations in the fields of technology and organization. In the case of manufacturing firms in Santiago, Chile, out of a total of 301 firms interviewed, 26% stated that they had made technological and organizational innovations between 1988 and 1990, while 29% had only made technological changes, and 16% had only made changes in the area of organization (Geller, 1993). Of the firms which stated that they had made technological changes, over 80% referred to innovations in the electrical and mechanical field, while 16% said that they had made innovations in the area of microelectronics. A 1990 survey of export assembly firms in Mexico revealed that approximately 50% of them were using the "just in time" method in respect of at least 75% of their inputs (Carrillo (ed.), 1991). With regard to innovations in the organization of work, 40% of the staff directly involved in production was trained to carry out various tasks, and 30% rotated frequently between different tasks. According to a recent study made in Brazil among 132 leading manufacturing firms, in 44% of them at least 20% of their staff took part in total quality programmes, while 39% of the firms reported that they employed a similar percentage of their labour force on internal "just in time" programmes (Ferraz, Rush and Miles, 1993).

This information from surveys shows that there is at least an incipient trend towards innovation and learning processes in the manufacturing firms of the region. The following section analyses in greater depth the experience of some firms which have achieved commercial success with these types of learning processes.

¹¹ Companies which learn quickly have cumulative advantages over their slower competitors because of the complementary relationship which exists among innovations, which makes prior learning essential (Mody, Suri and Sanders, 1992).

¹² These external costs, which form part of the production overheads, refer to the costs of the competitiveness strategy which are not directly linked to production, such as research and development; closer relations with customers; establishment of branches and/or sales points abroad; improvement of logistics; etc., (Coriat and Taddéi, 1993).

2. Examples of successful firms

In 1991, the Spanish Government's CYTED-D programme invited Latin American manufacturing firms to take part in a study and competition designed to determine the level of technological innovation reached by them. Several hundred firms from a dozen countries of the region provided information, which makes it possible to get an idea of the range of activities engaged in by them, and the activities in which they had had clear commercial success (Waissbluth, Testart and Buitelaar, 1992).

Altogether, the Latin American enterprises selected for more detailed study, including interviews and visits to the firms, registered average growth in their sales of 16% per year between 1989 and 1991. This growth was due mainly to increased exports. Since these are firms which achieved success through technological innovation, they are marked by the high proportion of professionals on their labour force (31% of the total staff), high levels of investment in research and development (almost 4% of their total sales, on average), and unusually close attention to training and investment in human resources (expenditure of US\$272 per worker in 1991).

The cases described below are examples of *integral* productivity strategies in which elements of technological change (improvements in products, processes and designs) are combined with organizational innovation and the penetration of new markets. In this process, resource management is of crucial importance, both in respect of ideas and creativeness and internal and external financial, material and human resources.

Analysis of the types of activities carried out by these firms permitted identification of the following list of elements favouring innovation, illustrated with some examples of specific firms. A distinction is made between elements in the environment of the firms and those actually within them.

a) *Elements in the environment of the firms which have promoted innovation*

i) *Availability of natural resources.* In firms engaged in the processing of natural resources and the production of intermediate goods, improvements in productivity and product quality are of fundamental importance for turning static advantages into dynamic ones.

It comes as no surprise to find that in the study of the hundred most innovative Latin American

firms, processing of local natural resources is one of their main strengths. In fact, the competition for innovative firms was won by the Argentine firm ALUAR, a private company with local capital which has achieved high productivity and quality by world standards thanks to its own research and development efforts.

ALUAR's primary aluminium plant came into operation in 1974, and since 1979, when the Futaleufú hydroelectric power station began to operate, it has been working at full capacity.

Its first exports of metal go back to 1978, when they amounted to nearly US\$8 million FOB; by 1991, in terms of volume, they had increased practically tenfold. As from 1985, the execution of a number of projects which increased the operational efficiency of the plant by incorporating new technologies made it possible to expand production levels to 20% more than the initial capacity. In recent years the level of utilization of installed capacity has been of the order of 97%-99%. The purity of the metal produced has been maintained at very high levels, making it possible, for example, to export 99.9% pure aluminium to Japan. Direct sales to foreign markets represented 65% of the firm's total sales, so that in 1990 it reached fifth place among the Argentine companies with the biggest exports, with external sales of US\$185 million FOB in that year. It is worth noting from the scientific and technological point of view that some of its technological innovations have been incorporated into aluminium plants in other parts of the world. There is an ongoing exchange of information, and there are also close links with the Aluminum Company of America (ALCOA), the world leader in this sector.

ii) *Activities which were originally based on use of natural resources but subsequently acquire their own level of competitiveness.* Many of the activities of the firms covered by the study of the hundred most innovative companies may be linked in some respect with the natural resource endowment of the region. An outstanding example of this is the case of Xeltron of Costa Rica. This firm produces electronic equipment for sorting seeds by colour, originally for the Costa Rican coffee industry. This company has developed its own technology, protected by international patents, in the field of the application of microelectronics to sorting machines. The success of this home-grown technology is shown by the fact that a German firm has taken out a licence to use it. These

operations have caused accounting problems with the Central Bank of Costa Rica, which was not used to registering foreign exchange income from the sale of technology to Germany. In order to ensure a stable flow of exports it has been necessary to establish direct presence in the buying markets. Thus, the firm has a factory in Brazil and has marketing subsidiaries, which are important for after-sales service, in the United States, Guatemala and Panama.

iii) *Problems typical of the region which call for specific technological solutions.* Some Latin American firms have had success in dealing with production, economic and social problems specific to the region. Finding solutions to these problems may also open up interesting prospects on international markets. Three specific problems are mentioned below.

— Health and nutrition needs

The "Proteínas Uruguayas" firm set out from the idea that Latin America's food deficiencies could be solved with low-cost protein supplements. Through scientific research, the founder of this firm succeeded in obtaining a new protein from fish, and this was placed on the domestic market several decades ago, with reasonable success. The problem was, however, that the product had an unpleasant smell and an unattractive appearance. For open markets where consumers have a higher level of information, more attention needed to be given to the presentation of the product. The new generation of businessmen who inherited the firm realized this, and research was undertaken to change the basis of the product.

An example taken from the study on the hundred most innovative firms which is interesting from several standpoints, although it is to be hoped that it will not need to be repeated, is that of a Salvadorian firm producing canned and packaged foodstuffs. The food requirements of the Salvadorian army created an interesting captive market for typical Salvadorian dishes in cans, although because of their quality the products supplied to the army probably would not have had much success on open markets. After several years of experiments, however, it was possible not only to perfect the technology for the canning of Salvadorian vegetables but also to build up a raw material supply structure, through peasant cooperatives. The firm's experience in exports began

with a contract with the Reynolds group to prepare these products in a form adapted to the needs of the Mexican market. Today, after substantial investments in a new production plant, the firm is venturing into the Hispanic food market in the United States, with its own brands which highlight the products' Salvadorian origin.

— Deterioration of the environment

A serious problem in various countries of the region is that of deterioration of the environment. There are several firms offering innovative solutions for improving environmental protection. The "Julio Berkes" company in Uruguay, for example, is a small engineering firm which occupies second place on the domestic market in the manufacture of industrial boilers. This firm has made interesting innovations in boiler design which permit more effective fuel use. In order to understand how a small Uruguayan firm has come to make significant technological innovations in this field, it should be noted that Uruguay is one of the countries which make the most use of firewood as an industrial fuel in the whole world. Thanks to its research efforts to gain a better understanding of the process of combustion of firewood and other solid materials, it was able to patent a boiler with exceptional features. The heart of the innovation is the spiral combustion chamber, which, by precisely controlling the circulation of the air, achieves near-perfect fuel utilization. These boilers have great advantages for agroindustries, which require a great deal of energy and have large amounts of waste material which can be used as fuel. Among the biggest installations made are those of large boilers for the Uruguayan sugar industry, and also that of Paraguay. Such boilers have also been installed for the rice and soya industries, and they can be used for almost any solid fuel, making possible big energy savings and causing less damage to the environment.

— Different scales of production and appropriate technologies

The third typical Latin American problem requiring specific technological solutions is that of achieving suitable scales of production. Technology developed in the industrialized countries is often not the most appropriate from the point of view of its capital/labour ratio, or because it does not permit the optimum scale for the market. Suitable solutions

have been found in this respect, however, especially in the field of telecommunications. Thus, Siemens Argentina and Microtel of Venezuela have produced telephone exchange systems which are smaller than those of the advanced countries and are more in keeping with the needs of the countries of the region. This makes them particularly attractive for rural areas of low telephone density. Likewise, for the same reason, Interfase of Uruguay has designed low-capacity switchboards for small telex systems and multiplex packages.

iv) *Need to adapt international technological advances to the specific circumstances of Latin America.* Because of the rapid rate of technological change, it is essential that companies should have the technological capacity to give users after-sales advice and service, for which direct contact with them is vitally important. Outstanding examples of this need for technological innovation are to be found in the fields of microelectronics applications and software development.

Medix i.c.s.a. is an Argentine firm producing incubators for newly-born babies. This equipment contains microelectronic control boards of the company's own design. This is a case where the technological learning process reflects special features of the region. The existence of a fair number of incubators of earlier generations, using obsolete technology, together with the hospitals' shortage of resources, generated a need for technological solutions to permit the re-use of old incubators. The firm's contacts with various organizations abroad, and its participation in scientific congresses and exhibitions (MEDICA in Dusseldorf, for example), provided it with sufficient experience and prestige to win the Middle East market and make occasional exports to South-East Asia and Europe. Mention may also be made of a cooperative production agreement with Cuba, where the firm set up a technical office for the transfer of technology.

Although it is very useful to "explain" the innovation strategies successfully applied by some manufacturers in the light of the special features of the environment, it is important to note that there are also cases where it is not easy to detect any clear influence of the environment in the adoption of innovation strategies by firms. The effort to make innovations is often motivated by the corporate vision of the firm or its sense of "corporate mission",

frequently without there being any major direct stimulus from the environment. What is clear, however, is that there is a set of internal factors in firms which are essential for the success of innovation strategies.

b) *Internal elements in firms which stimulate innovation*

The study of innovative firms can bring out some elements which are of key importance for the reorientation of corporate strategies. Two leading elements of this type are described below.

i) *Human resources.* These resources are often the main asset of companies in their attempts to win markets on the basis of productivity.

This could be illustrated with almost any of the examples already mentioned in this section. The President of Xeltron, the Costa Rican manufacturer of equipment for sorting seeds by colour already referred to earlier, attributes his company's success to its technological capacity and considers that the best means for maintaining this is the ongoing contribution made by the firm's human resources. This view is an intrinsic part of the company's outlook. A suitable organizational environment is therefore highly favourable to ongoing innovation in all aspects (processes, markets, organizational structure, etc.). The Argentine firm Nicrodur (see section iii below) places emphasis on team work and the creation of a favourable working environment. At all organizational levels, it gives priority to functions rather than timetables, it uses a system of rotation so that all its workers are familiar with the different tasks, and in terms of human relations the organization structure is free and open, with direct relations between the workers and the management, including the Director himself. In the case of Medix (also from Argentina), the company invested in the training and professional development of its staff, which, together with competitive wage-levels, has contributed to the firm's high degree of retention of staff, especially in the case of workers. Because of the type of equipment it produces, an above-average sense of responsibility is needed, and this spirit is transmitted from the management down to the rest of the staff, giving them a sense of pride in their work.

ii) *International contacts and knowledge of foreign markets.* This element is of fundamental importance for the export of manufactures.

The Colombian firm Andrés Garzón Acero (AGA) Ltda., which began its operations in 1949, is engaged in the manufacture of spare parts for beer bottling machines. In recent years it has registered substantial growth, with annual sales of a little over US\$1 million, and its exports have increased to a current level of 50% of total sales. This success has been possible because it embarked on a research process to improve the Italian Simonazzi bottling machine. The innovation consisted basically of changing the filling tubes and valves for others of its own design. The support of the Barry Wehmiller Co., of the United States, was a decisive element in developing this idea, and direct contacts with domestic (Cervecería Unión, Cervecería Aguila) and foreign users (Cervecería Cuauhtemec, Miller Brewing Co., CSS, and Simonazzi itself) also aided in carrying out this project.

iii) *In-house design as a strategic weapon.* Nicrodur (Argentina) began as an electroplating firm, but from 1986 onwards it devoted itself to the production of photo-sensitive cylinders, the technology for which belonged to big world firms like Xerox, Nashua and Ricoh. After the participation of some of its staff in a 1984 conference in Sweden, the company carried out research work on the product and the construction of the necessary machinery. The design developed by Nicrodur is unique because of its double input. Within a few years, the firm won half of the Argentine market for replacement photo-sensitive cylinders. The strategy followed was to promote an innovative outlook within the firm in both the production process and the areas of organization, marketing and management, and to place emphasis on team work and worker participation. In terms of customer relations, the strategy was personalized, and records were kept of every cylinder sold. The firm's current activities are based on an export contract with Brazil, under the MERCOSUR agreements, to supply the Brazilian replacement cylinder market.

iv) *Corporate outlook.* The attitude to change is an essential element for mobilizing internal and external resources for innovation.

At present, when Latin America is in a stage of transition from one system of industrialization to

another, firms seeking to compete on international markets on the basis of productivity often run into conflict with their environment. The inertia of the institutions and policies of the previous industrialization system raise serious obstacles to the expansion of companies operating in open markets on the basis of their competitiveness. For example: employers' and workers' organizations were originally formed in order to gain participation in the determination of national-level policies, but today their role is conditioned more by the support that businesses need at the company level in shaping productivity strategies.

The change to a strategy based on competitiveness on open markets often begins with *greater international contacts*. Employers' and workers' organizations can play an important role in the many forms that this change can take, ranging from the appearance of foreign products on the local market, the intensified use of telecommunications, visits by foreign businessmen, study tours and participation in fairs and congresses, to the formation of strategic alliances and the establishment of international marketing networks.

However, change gives rise to conflicts not only between modern businesses and their sluggishly-adapting environment, but also within companies themselves, where institutions and policies designed under the previous system still persist. It is necessary to change the prevailing climate in the firm so as to guide the attitudes and actions of all its members towards the establishment of an organizational structure capable of responding quickly to the signals of a changing environment. For example, the change to less vertical organizational structures is effective provided that it forms part of a broader change in the values, prevailing climate and image of the firm (Mertens and Palomares, 1993).

Handling the change in corporate strategies must begin with the will of the management to make changes, which permeates the whole management structure, and it must also be based on active participation by the trade unions. In quite a few cases it has been noted that the will to change enters a firm along with a change in the generations responsible for its management.

IV

Conclusions: towards the establishment of a more favourable environment

The challenge raised by the need to increase the competitiveness of Latin American industry takes the form of the need to promote a process of continual improvement in company productivity. At the macrosectoral level, this challenge is expressed in foreign trade. Thus, action must be taken to strengthen the capacity to impart ongoing dynamism to exports, for which purpose it is necessary to add new families of products, renovate the existing ones, and explore new markets, while at the same time maintaining competitiveness on the domestic market, which is still the main source of demand for industrial products in the region.

At the company level, the challenge is to make progress in learning how to combine efficiency, quality and competitiveness in terms of costs. The difficulty of reconciling these variables has led to a search for a balance between technological and organizational innovations, which is made more difficult by the accumulated lag in terms of investment in both machinery and equipment and in human resources and management capacity.

The problem at the macrosectoral level is that the financial resources needed for a structural increase in such investment are only generated gradually during the process. On the other hand, the concept of productivity is changing in the sense of assigning more importance to efficiency in the overall production process (flow) and to customer or user satisfaction than to the partial productivity of individual factors. Ultimately, it is not just a question of increasing investment in machinery and equipment, but also of changing and enhancing the prevailing climate and organization of the firm. It is therefore necessary to prepare a set of policies, at both the company and the public sector level, which support the efficient use of the available resources, mobilize new resources for furthering investment and organizational change, and promote the learning process both in companies and in public institutions.

There is a high level of consensus on the factors in the environment which limit the sound growth of

a competitive manufacturing sector. Emphasis is habitually placed on price structure and stability, restrictive trade and industrial policies, the undesirability of State ownership of production activities, and the need for an efficient and above-board civil service, but what is less clear is the nature of what might be termed a "favourable environment" for the development of a competitive industrial sector. A *passive approach* would be the elimination of the factors responsible for a "restrictive environment". It would involve price liberalization and macroeconomic stabilization, the elimination of protectionist trade policies and arbitrary and unclear industrial policies, the removal of market monopolies, and the modernization and reduction of the State civil service. A "favourable environment" must not be confused with an environment which ensures higher profits for companies, however. Negative interest rates, downward wage trends, failure to include environmental costs in company operating costs, and subsidized energy prices would all favour company profitability, but cannot be considered as suitable elements of a favourable environment which is sustainable in macroeconomic, social or environmental terms.

The essence of a "favourable environment" could include: i) Provision of the elements needed to face competition on open markets, namely, information, efficient communications and transport systems, technological and organizational know-how, and skilled human resources. The nature of these elements presupposes suitable collaboration between the public and private sectors. ii) Measures to ensure that the profitability structure between the various economic activities is globally in line with the development priorities. In general, this structure should be basically determined by the market forces. However, there is a need for the creation of a larger number of markets (long-term markets, for example). There are also serious market distortions which will need to be corrected. In a new industrialization strategy, such correction should not discriminate

between sectors of production, but should rather seek to promote areas with positive externalities, such as the incorporation of technological progress and training of human resources in the companies, and to discourage activities with marked negative externalities, such as those which damage the environment. iii) Action to ensure the availability of financial resources for investment. To this end, steps must be taken to place financial institutions on a sounder footing, improve the procurement of long-term savings through reform of the social security system, and modernize the supply of financial instruments for investment. iv) Measures to further social cohesion and promote the necessary adaptation of labour relations and the upgrading of human resources in the context of the new parameters of competitiveness and productivity.

It is therefore necessary to develop the possibility of adopting an *active approach* which seeks not only to eliminate restrictive factors but also to create conditions in the environment which did not previously exist, in order to enable companies to

compete successfully on a macroeconomically, socially and environmentally sustainable basis. This active approach could include areas of cooperation between the public and private sectors aimed at objectives such as improving the physical, economic and social infrastructure to support production; expansion of the channels for technological and trade information; strengthening of the relations between the educational and academic systems and production activities; promotion of improved entrepreneurial capacity, and exploration and development of areas of complementation and cooperation between companies.

This active approach is itself an ongoing learning process, specific to each country, on the part of the competent institutions and actors of the production sector. Publicizing the examples of successful experiences and public management strategies which have been accumulated over the years will naturally form part of the process of designing new policies in this direction, although this does not mean, of course, that single universal formulas should be sought.

(Original: Spanish)

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ANNEX I

**Shares of the ALADI member countries
in OECD imports of machinery and equipment**

Sector	ALADI			Less Brazil and Mexico		
	1971	1980	1990	1971	1980	1990
711 Steam boilers	0.12	0.18	3.71	0.01	0.15	0.97
712 Steam engines	0.03	0.05	0.17	0.02	0.03	0.01
713 Internal combustion engines	0.72	3.96	8.23	0.01	0.06	0.11
714 Non-electrical machinery	0.30	0.33	0.78	0.14	0.17	0.13
716 Electrical equipment	1.08	2.30	4.93	0.01	0.05	0.07
718 Other energy-generating machinery	0.18	0.48	0.34	0.18	0.18	0.03
721 Agricultural machinery	0.10	0.15	0.58	0.04	0.01	0.06
722 Tractors	0.02	0.63	0.66	-	0.21	0.10
723 Civil engineering machinery	0.08	0.47	1.32	0.01	0.04	0.04
724 Textile machinery	0.14	0.34	0.94	0.03	0.01	0.01
725 Pulp and paper machinery	0.02	0.17	2.10	0.01	0.01	0.03
726 Printing presses	0.06	0.5	0.29	0.02	0.01	0.01
727 Food processing machinery	0.11	0.23	0.37	0.02	0.06	0.10
728 Other industrial machinery	0.12	0.74	0.35	0.01	0.02	0.02
736 Metalworking machine tools	0.07	0.31	0.32	-	0.03	0.02
737 Metalworking machinery	0.11	0.09	0.41	0.01	0.02	0.01
741 Heating equipment	0.05	0.30	2.33	0.03	0.07	0.07
742 Pumps for liquids	0.17	0.67	1.33	0.04	0.06	0.10
743 Pumps and compressors	0.04	0.30	2.31	0.01	0.02	0.04
744 Goods handling equipment	0.03	0.26	1.80	-	0.04	0.02
745 Other machinery	0.12	0.46	0.99	0.02	0.02	0.04
749 Non-electrical machine parts	0.17	0.55	1.38	0.02	0.12	0.09
751 Office equipment	0.38	0.67	0.86	0.28	0.03	-
752 Automatic data processing equipment	0.92	1.52	1.26	0.32	0.32	0.10
759 Exclusive parts and accessories	2.33	1.80	1.12	0.19	0.26	0.07
761 Television receivers	2.19	0.19	8.26	-	-	-
762 Radio receivers	0.14	1.39	8.62	0.01	-	0.01
763 Phonographs	0.13	0.52	1.53	-	-	-
764 Telecommunications equipment	2.82	7.09	3.28	0.05	0.05	0.02
771 Electrical equipment	-	5.03	6.85	-	0.05	0.04
772 Electrical connection equipment	0.84	2.97	4.38	0.01	0.03	0.02
773 Electrical switchgear	1.12	7.87	18.58	0.01	0.50	0.34
774 Electrical medical equipment	0.07	0.28	0.71	0.01	0.02	0.01
775 Domestic appliances	0.02	0.58	2.28	-	0.02	0.01
776 Lamps	3.25	1.95	1.45	0.01	0.01	-
778 Electrical machinery and equipment	0.77	2.42	3.20	0.02	0.02	0.03
781 Passenger cars	-	0.24	1.87	-	0.01	-
782 Goods vehicles	-	0.13	1.75	-	0.02	-
783 Road vehicles	0.02	0.05	0.21	0.01	0.05	0.03
784 Vehicle parts	0.40	1.62	3.57	0.02	0.12	0.18
785 Motorcycles	0.07	0.24	0.51	0.01	-	0.02
786 Trailers	0.04	0.26	0.66	0.01	-	0.09
791 Railway vehicles	0.86	2.74	0.98	-	-	0.02
792 Aircraft	0.15	0.52	1.02	0.05	0.13	0.03
793 Ships and boats	0.64	0.65	0.30	0.15	0.08	0.05

Source: UNIDO Industrial Statistics Data Base.