OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

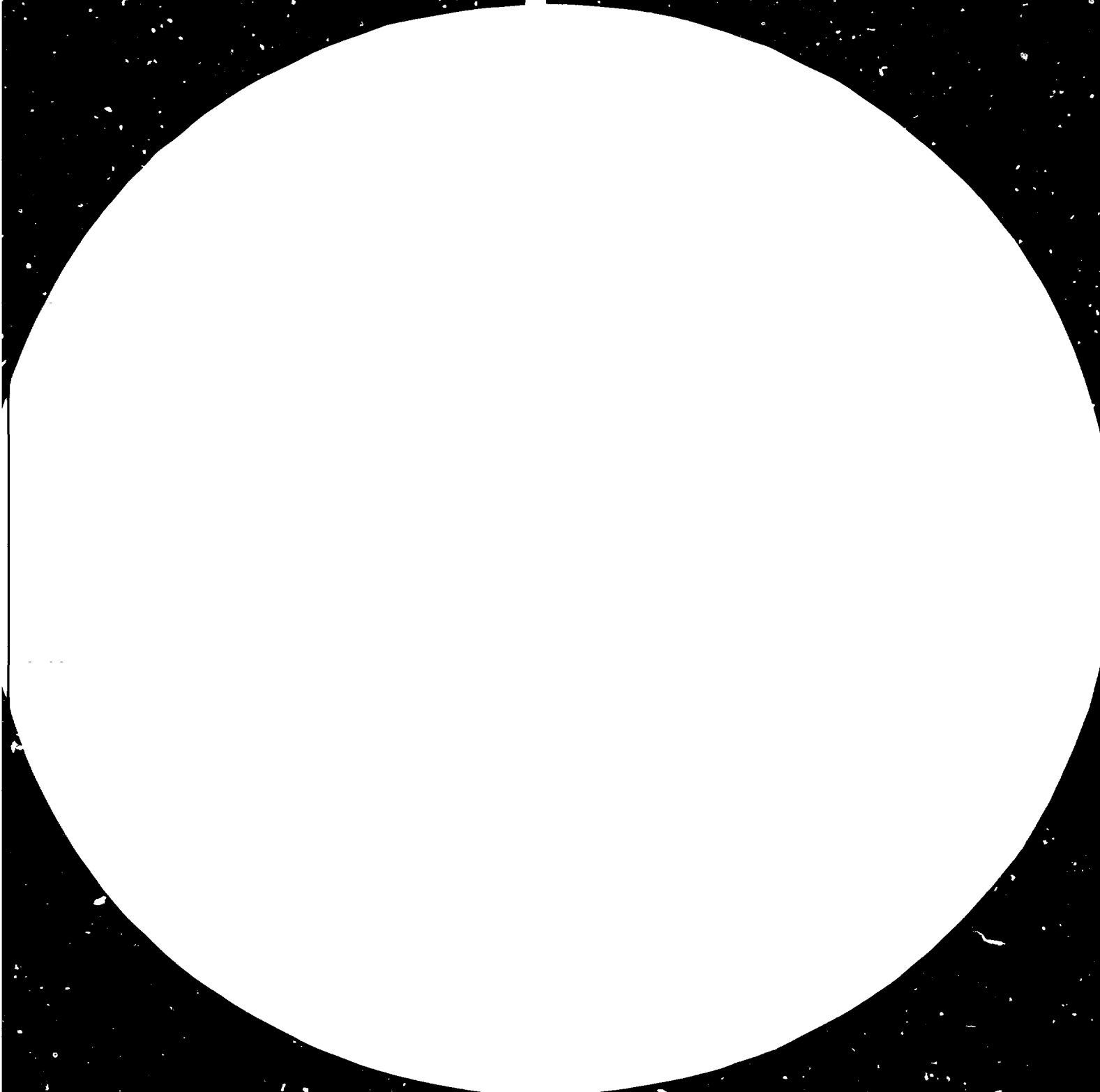
FAIR USE POLICY

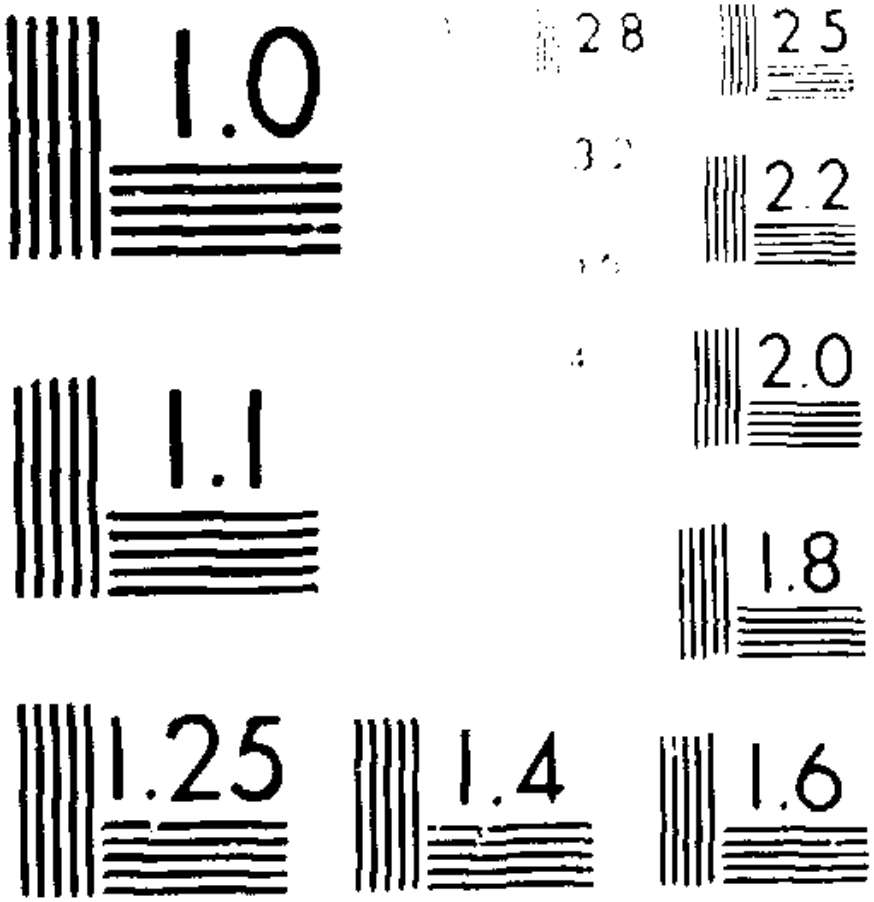
CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

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




1.0
2.8
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

10386

Distr.
LIMITED

UNIDO/IS.218
19 March 1981

ORIGINAL:ENGLISH/SPANISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

TECHNOLOGY EXPORTS FROM DEVELOPING COUNTRIES

The Cases of

ARGENTINA and PORTUGAL*

prepared by

Peter O'Brien and Jan Monkiewicz
UNIDO Consultants

000393

*This document has been reproduced without formal editing.

V.81-23061

TABLE OF CONTENTS

TECHNOLOGY EXPORTS FROM DEVELOPING COUNTRIES

A. Introduction

(1) The relationship between technology and industrialization in the developing countries have occupied the centre of international debate during the past decade. Most of the work has focused on the ways in which imports have occurred and the impact of them on: (i) the financial situation of the importing country (balance of payments) and of the importing firms (inter alia their vulnerability to take-overs); (ii) linkages in domestic industry; (iii) restrictions on the decision making freedom of importers and conditions of imports; and (iv) the capability for further technological development of the importing enterprise and perhaps also of associated firms. The last of these issues has received relatively less attention than the others yet it is clear that in the medium to long run the capacity of the developing countries to move away from a condition of technological dependence hinges on their own technological progress

(2) Trade in technology has not been entirely confined to north-south flows, however. Various pieces of evidence in the first half of the 1970s suggested that at least some developing countries in some sectors appeared to have generated certain abilities which could be so organized as to become saleable to other countries. Apart from the obvious fact that the ability to export technology is a priori confirmation that the countries concerned have indeed incorporated technology fairly successfully into their own production network, the existence of such south-south trade is one of the first practical examples of the possibilities for technical co-operation among developing countries (TCDC).

(3) UNIDO has, over the last two (2) years, devoted part of its efforts in the technology area to obtaining much more information

on this phenomenon and to elucidating several of the issues which it raises. As with any fairly new field, considerable time must be spent in collecting and analyzing fresh data in order to obtain a reasonable overall picture of what is actually happening. A first study on the subject was presented as a background paper to UNIDO's Third General Conference held one year ago (see O'Brien, Hasnain and Lechuga). A further survey of technology exports in software has been conducted drawing upon the support of the governments' members of UNIDO's Technological Information Exchange System (see Janiszewski), as well as countries outside this system.

(4) Within this period several intiatives at the international level have served to strengthen the need for detailed work on these matters. Already at the Fifth UNCTAD Conference held in Manila in May 1979, various references were made to the importance of developing relationships of this type (see Report of Fifth UNCTAD) and indeed at the Ministerial Meeting of the Group of 77 prior to that Conference (held in Arusha, February 1979) the need to develop south-south cooperation in the technical field was emphasized. Those arrangements themselves were the reflection of decisions taken at the first TCDC meeting among all members of the Group of 77 and which was held in Buenos Aires in September 1978. The Third UNIDO General Conference at the beginning of 1980 was a follow-up to these actions and its results supported them and encouraged the UNIDO Secretariat to pursue further its efforts in this field.

(5) In this document two (2) monographs are presented, the first dealing with the experience of Argentina in this field and the second with the experience of Portugal. Both monographs are based on field work and analysis of relevant documentation, and in both instances the support of the national administrations and of numerous enterprises and individuals is gratefully acknowledged. These enquiries were initiated for the purpose of examining in much more detail the processes which affect the ability of enterprises to undertake technology

exports and to indicate, to the extent possible, what changes there may be for continued exports in the future. It is expected that the Secretariat will continue its programme of country studies and attempt to widen the range of coverage and to go on consolidating the information at its disposal. In this respect the direct participation and assistance of all member governments and industry concerned are welcome since it is only through their help that an appropriate base of information and analysis can be obtained. It is stressed that this information forms a direct input into UNIDO's INTIB system.

(6) The two (2) brief sub-sections of this introduction which follow are designd only to provide an overview of the present state of knowledge in this field and to summarize tentative conclusions which may be drawn on the basis of the studies so far concluded.

(7) The studies presented were prepared by Mr. Peter O'Brien (Country Study on Argentina) and Dr. Jan Monkiewicz (Country Study on Portugal).

B. The Global Picture

(8) Current data are far from offering a strong basis for estimating the totality of intra-developing country flows of technological assets. Most of the numbers pertain to a small number of 'source' countries, mainly the larger Latin American states (Argentina, Brazil, Colombia, Mexico and Venezuela) plus a mixture of Asian countries including India, Republic of South Korea, Hong Kong and Singapore; and some subsets of 'recipient' countries covering most of Latin America (where many countries, large and small, play host to resource packages from other parts of the region), East Africa (Kenya, Uganda, Tanzania), English speaking countries of West Africa (Ghana, Nigeria), West Asia (the petroleum producers), and South-East Asia (especially Indonesia, Malaysia, Philippines and Thailand). The figures suggest a pronounced compartmentalization in transactions with geographical and/or cultural proximity (particularly Chinese

and Indian communities overseas) an important influence on some decisions, above all when direct foreign investment (DFI) is involved. One or two (1-2) countries (India, Republic of South Korea) show some signs of venturing, via DFI, into OECD countries but the operations are so far on a tiny scale.

(9) The following presentation summarizes evidence under the two (2) broad headings of DFI and technology exports, the latter sub-divided into turn-key arrangements and other less packaged forms of technology sales.

82. Direct Foreign Investment (DFI)

(10) On a multi-country basis the figures collected do not distinguish between investments in industry and all investments (including services). Aggregate data are therefore given here. There is a high probability that they underestimate substantially the actual movements as well as stocks since: (i) many flows are certainly not recorded, either in country of origin or destination; (ii) due to strong foreign exchange controls in most developing countries, much of the equity build-up for some of the exporters is requited through the corresponding sale of machinery and equipment; (iii) under or over invoicing is probably practiced; and (iv) even in those countries now beginning to keep account of movements, the valuation of investments which took place many years ago may be ignored.

(11) For nine (9) Latin American countries the intra-regional flows as of around end 1978 amounted to some US$274 million, with Argentina, Brazil, Colombia and Ecuador the main recipients and Venezuela, Brazil, Argentina and Colombia the main source countries. Even allowing for an element of statistical stock at the middle of the decade so the growth, intra-regional investments account for only about 1% of all DFI in the region as of now. Due to the importance of integration efforts, part of the investment is associated with intergovernmental agreements and the creation of multi-national enterprises which are new

entities rather than an expansion of older ones. As in Asia, investors include public sector corporations which go transnational, large domestic organizations which are frequently holding positions of considerable market power in their own economies, affiliates of TNCs, and medium and small local enterprises. Thus far the data do not permit a clearcut view of the relative significance of each of these groups of corporations but it does seem that the large majority of the investment does indeed come from local capital.

(12) In Asia the figures on a regional basis are still less clear than in Latin America since registration procedures in much of the region are very limited. The overwhelming largest recipient is Indonesia with a 1976 accumulated stock of some US$1.3 billion. The major investing country seems to be Hong Kong with a stock abroad of more than US$750 million of which apparently the majority is managed by Hong Kong based firms and not by subsidiaries of foreign firms operating in Hong Kong.

(13) The patterns of this investment in terms of organization and control are of some significance. IN the Indian case they are very clearly joint ventures in that local firms usually have majority participation in the enterprises. To some extent this is because the Indian Government has frequently stipulated that there should be strongly local involvement, to some extent because the Government of the host country has also done so, and partly through business motivations themselves connected with establishing a foothold in relatively new markets. This pattern is not borne out by Korean investments where nearly 90% of the DFI is either through wholly owned subsidiaries or in enterprises where there is Korean majority ownership. These patterns are partly linked to the sectors and technologies involved and are relevant to any evaluation of the organization adequacy of this type of DFI. In the Latin American context, as the Indian investments, there is a fairly pronounced tendency towards joint ventures with majority local participation.

B2.1 Turn-Key Arrangements

(14) The ability to organize the construction and operation of whole industrial plants is a good indication of the degree to which a country has been able to master a whole range of skills going from project design to the production of capital goods to the provision of satisfactory financing for the client. Only developing countries currently possessing a significant capital goods production capability will be able to handle these operations in the industrial sector; for some types of civil construction works, it may be possible for countries with a weak capital goods sector to compete successfully. The evidence available suggests that the dominant countries in this area are Argentina, Brazil, India and Republic of South Korea, as well as Spain, Portugal and Greece in Europe; it is more than likely that further research would reveal Mexico to be a notable exporter as well.

(15) In every case the striking feature is the range and complexity of the projects. For example, the Argentinian figures include integrated communication systems, a water treatment plant for industrial uses, and a projects for the production of radio isotoeps; in India the plants include power generation technologies, steel mills and petro-chemicals; the Republic of South Korea also is exporting chemical plants, a rolling mill and various other items which demonstrate domestic command over an impressive array of skills; while the Brazilian figures, though concentrating heavily on civil construction activities, nevertheless imply the capability to organize big projects. Portugal, for example includes a complex repair shipyard. It should be noted that these figures are drawn from very imperfect sources of information and they certainly underestimate the true scale of activities. The gaps may be particularly severe for India where it is known that smaller scale turn-key projects were exported some years ago.

(16) Several features of these statistics are worth underlining. First, of all of the countries the majority of contracts have been won through international tenders in competition, in most cases, the OECD

enterprises. Moreover, and this is especially true for the turn-key sales of Indian and Koran figures, the types of transaction have often involved fairly well informed buyers who should be able to distinguish alternative proposals not only according to cost but also with regard to the quality of work performed. It is also clear that some of the enterprises have sold similar technologies on more than one occasion, which suggests that the original plants were satisfactory. Given that this is a field where the establishment of a good reputation is of prime importance, these indications are encouraging with respect to future market possibilities.

(17) Second, for each of the countries the majority of the turn-key plant exports have been conducted by domestic firms. The Argentinian data show that four-fifths of the enterprises obtaining contracts were local firms, although one or two valuable contracts have been obtained by international enterprises. For India most of the firms are private, fairly big companies though there are some important instances of public sector enterprises engaging in technology exports. Most of the Indian firms and many of the Argentinian ones already had experience of capital goods production at home and had often sold similar plants within the domestic market (although in the Argentinian case there are some firms, mainly engineering companies, which undertook more complex tasks abroad than they had ever handled at home). With the Republic of South Korea the experience refers entirely to domestic enterprises though with the important qualification that sometimes parts of the technology have been supplied by developed country firms. It seems, therefore, that with limited exceptions, the technology and the organization have been supplied from domestic sources.

(18) Third, for virtually every case the technologies exported represent modifications of items originally imported from the developed countries. In many instances the firms selling turn-key plants retain their links with foreign enterprises from whom they import technology; the picture is therefore one of continuing imports and growing exports.

(19) Fourth, there is some evidence, particularly in the Indian case, that local firms are acting as subcontractors for foreign firms who have obtained overall turn-key contracts. In general this arises because of the lower costs, particularly for detailed engineering, charged by the Indian firms. There would appear to be much more scope for these types of activities and this has in fact been conceived as a strategy for entering foreign markets by one or two of the principle Indian consultancy enterprises. Nevertheless, it has to be recognized that this type of subcontracting does not allow the domestic firms to obtain the organizational experience which comes from setting up the whole turn-key operation. Given that, it was estimated, as of 1976-1977, that some 26% of Indian capital goods sectors (weighted by value of output) were able to export complete machinery and equipment, it is clear that the crucial point is to obtain the chance to organize complete operations.

(20) Fifth, on balance the average size of the operations conducted from the two Asian countries is considerably greater than that of the Latin American countries. Despite the range of activities noted above, for all of the countries the technology exports in the industrial area have been more closely linked to the building of the conditions for manufacturing production than to provisions of manufacturing technologies as such. For instance many of the Indian turn-keys in manufacturing are related to food processing and textiles, though there are some arrangements in the chemical industry as well. In Argentina, as may be expected, food processing is also important and there have been a series of rather small contracts in the metal products area. Both Brazil and the Republic of Korea have concentrated their activities so far on infrastructure projects. This pattern is not surprising in view of the learning process in the technology area and we would expect it to alter only gradually; by the same token, it is likely that other developing countries which may in the near future begin technology exports will follow a similar pattern.

B2.2 Other Forms of Technology Export

(21) Less ample data are available for 'software' exports of technology, e. e. consultancy, licensing and provision of technical services. However, the study mentioned earlier (Janiszewski) summarized information in Table 1 which follows:

TABLE 1 - Structure of Technology Exports from 1974 to 1978 (000US$)*

	Pakistan	1974	1975	1976	1977	1978
(a)	Patent License	-	-	-	-	-
(b)	Know-How License	-	-	-	-	-
(c)	Consulting Services	-	-	-	1,425.0	-
(d)	Technical Assistance	-	-	-	-	-
(e)	Composite Agreement	-	-	-	-	-
(f)	Others	-	-	-	-	-

	Portugal	1974	1975	1976	1977	1978
(a)	Patent License	78.7	8.6	-	-	-
(b)	Know-How License	-	-	-	-	30.0
(c)	Consulting Services	37.4	-	3,505.9	2,283.8	4,925.0
(d)	Technical Assistance	178.7	-	-	2,826.6	1,250.5
(e)	Composite Agreement	59.0	8,286.6	1,486.6	1,983.3	3,641.8
(f)	Others	-	-	-	-	-

	Republic of South Korea	1974	1975	1976	1977	1978
(a)	Patent License	-	-	-	-	-
(b)	Know-How License	-	-	-	-	-
(c)	Consulting Services	-	2,151.0	5,151.0	42,078.0	20,326.0
(d)	Technical Assistance	-	-	-	-	-
(e)	Composite Agreement	-	-	-	-	-
(f)	Others	-	-	-	-	-

	Spain	1974	1975	1976	1977	1978
(a), (b)	Patent License, Know-How License	7,400.0	10,500.0	10,300.0	13,700.0	15,200.0
(c), (d), (e), (f)	Consulting Services, Technical Assistance, Composite Agreement, Others	28,600.0	38,300.0	50,300.0	43,000.0	57,300.0

India	1976/77	1977/78
(a) Patent License		
(b) Know-How License		
(c) Consultancy and Engineering Services	10,910,000	11,590,000
(d) Technical Assistance Agreements		
(e) Composite License		
(f) Others		

Kenya	1978/79
(a) Patent License	
(b) Know-How License	
(c) Consultancy and Engineering Services	100,000
(d) Technical Assistance Agreements	
(e) Composite License	
(f) Others	

Israel	1972	1974
(a) Patent License		
(b) Know-How License		
(c) Consulting Services		
(d) Technical Assistance		
(e) Composite Agreement	1,047,400	897,900
(f) Others		

*Composite agreements include a, b and d of this table.

(22) As can be clearly seen from the above data, the predominant form of technology exports are consulting and engineering services, amounting to 100% in the case of Pakistan and the Republic of South Korea, and some 60% to 70% in the case of Spain.

It is, however, interesting to note that in such countries as Spain and Portugal, as well as Israel, clear visible exports of growing volume in the form of patented and non-patented know-how also took place. It is difficult, at the moment, to judge the extent of such exports from other countries, but there is evidence of such exports from India as well

as other countries, notably Mexico (e. g., sponge iron technology), Argentina and Brazil.

The analysis of scarce available data will not be exhaustive without finding out whether the above-mentioned technology exports are in a category of intra-developing country flows or whether they are directed towards the market of the industrialized countries. In this respect Pakistan indicated that its exports were entirely to the Middle East region; in the case of Portugal the exports were more spread, e. g., in the period from 1974 to 1976 out of thirty-two (32) agreements ten (10) were with West European countries, eight (8) with Latin American and seven (7) with African countries; the bulk of sales in terms of volume, however, were directed to Africa, followed by Latin America and Western Europe; a similar trend was observed in the period of 1977/78 where out of fifty-six (56) agreements, thirty-nine (39) were signed with African countries, representing approximately 80% of the total value of the exports. Unfortunately, no breakdown was received neither from South Korea nor from Spain. However, according to Rhee and Westphal[1/] the majority of South Korean exports were oriented to South East Asia (65.2%), followed by the Middle East region (16.5%). Incomplete data indicate also that a great majority of the exporters of technology were domestic-owned enterprises. In the case of India, the period of 1976/77 34% of exports went to the Middle East which in 1977/78 25% of exports were diverted to Africa with Middle East countries, hence dropping to 14%. In the case of Israel, in the period 1972-74 ca 51% of all technology exports went to Europe and USA, while to developing countries only 43%, which indicate the rather high level of exported technology.

1/ Rhee and Westphal - "A Note on Exports of Technology from the Republics of China and South Korea", by the World Bank, mimeograph.

C. Some Conclusions

(23) The developing country enterprises do not, as yet, possess the same integrated structures as the well known firms, nor the domestic industrial roots which permit such a rapid expansion process as occurred for other MNCs in the period 1955-1975. But they do show signs of having acquired several of the features necessary for successful international corporate activity - significant technical command, the ability to put together investment and technology packages attractive to would-be recipients, some capacity for after sales servicing, and the seeds of relationships with their home country governments which would allow them to receive greater support from the latter. Certainly the gaps, too, are important ones - very limited research and development bases confining them to follower rather leader positions in their main activities, inability (in most cases) to generate big credits for buyers, weak marketing skills meaning their success is rarely in more specialized consumer items, and a lack of flexibility to respond to fresh opportunities. All the same, the presence of these firms as suppliers of investment and technology bundles creates an alternative (albeit still one of limited scope) in certain markets to the reliance on 'traditional' MNC sources for starting up domestic industry in developing countries. Given at least some similarities in the industrial experiences of developing countries, it is also likely that the new sources will be more 'appropriate' in the sense of size, nature of foreign participation, products manufactured, and financial flows, than are the old ones.

(24) Developing countries receiving investment and technology from others can obtain two kinds of advantages. First, the mere presence of other sources of supply increases the potential range of choice and thus creates possibilities for recipient countries to conclude better deals, whoever the ultimate supplier may be. Second, the actual offers from other developing countries may be more appropriate with regard to the organizational/control aspects and the

technical conditions of production. On control it has already been shown that developing country investors are quite happy to engage in minority joint ventures, an arrangement which is generally much more attractive to recipients worried about foreign penetration of the economy. On production itself the chief advantages spring from more adaptable scale (shorter production runs), higher utilization rates of equipment, and not so much reliance on external sources of raw materials - in sum, better use of domestic labour, capital and raw materials. Combined with the less exacting conditions of foreign control, these production characteristics tend to yield more favourable net foreign exchange impacts for the recipients. When to this is added the fact that nearly all the investments/ technology sales from developing country firms are in fairly basic items (whether consumer or capital goods), then the overall balance is a positive one.

The country surveys provide a rather detailed picture in terms of conditions leading to exports of technology as well as insight as to particular considerations which lead into those situations inter alia in terms whether and to what degreee "originally" developed technologies were the source of those exports.

It should be stressed that while majority of exported technologies were based on imported and improvement of foreign origin, quite an impressive amount were based on original R and D which enables optimistically to look into the development of indigenuous technological base, at least of two (2) surveyed countries. The available data suggest, that the total technology exports (in terms of royalties, know-how fees, engineering and consultancy payments) amounted in 1978 to ca US$100-US$150 million, versus the total imports by developing countries of ca US$2-US$3 billion.

In this context the country surveys attempt to identify certain preconditions for the promotion of such type of economic activities at the country and particularly enterprise levels.

It seems here that international organizations such as UNIDO may find a very exciting field of activity in assisting by drawing up of a system by which countries will provide incentives in this area. Those efforts, as far as it was possible to be ascertained should be directed towards both Government, particularly at the policy levels, but as well towards enterprise in terms of providing direct assistance and even training in identifying and promoting such opportunities.

Finally, certain efforts at the international level should be made in terms of opening for recipients of technologies, the possibility to make use of stock of technologies coming from other developing countries.

Only in this way the gradual evolution and change in traditional patterns of international transfer of technologies will take place, providing developing countries with yet another source of supply.

It is the intention of the Secretariat of UNIDO to undertake soon surveys of technology exports in other developing countries with the objective of not only studying the current situation but predominantly search for such patterns of industrial and economic development that will accelerate and promote this vital activity.

THE ARGENTINIAN EXPERIENCE IN EXPORT OF TECHNOLOGY: RETROSPECT AND PROSPECT

CHAPTER I - An Overview of Argentina's Industrial Performance

A. Introduction

Among the numerous changes in the location of production for, and trade in, industrial items during the 1970s, the export of industrial technology (goods and services) by various developing countries (DCs) is one of the features which has attracted the attention of researchers and, to a lesser but growing extent, of DC governments. The two principal and inter-related reasons for the interest are: first, that the capability to export industrial technology contributes to shifts in the overall pattern of exports and in particular helps to diversify them towards higher value-added activities; and second, that the ability to export in competitive markets is at least prima facie evidence that local technological learning and/or development is taking place, whether through the successful incorporation of foreign origin techniques or through the spread of domestic innovations. Those reasons suggest, in their turn, a series of questions spanning relations among DCs and between them and industrialized countries (ICs), strategies of industrial growth within DCs, and the micro-economics of growth and change within firms. A short list of such questions would include:

i) Does the export of industrial technology by firms in some DCs offer a basis for technical co-operation among DCs as a whole (TCDC)?

ii) To what extent and under what conditions can the import of technology from ICs provide DC enterprises (public or private)

with the means to alter and upgrade not only their output for the domestic market but also to create fresh export markets, both by product and country?

iii) How do government strategies and policies in individual DCs influence the technological and product marketing behaviour of their firms, bearing in mind that overall macro-economic variables often bite much more strongly on technological activity than do measures explicitly aimed at that subject?

iv) To what extent does the export spring from local firms as against the affiliates of trans-national enterprises (TNCs)?

v) How have the firms which export industrial technology built up their capabilities and how have they been influenced by internal and external market developments?

vi) Is the recent growth in such exports likely to be maintained or do they represent ad-hoc responses to specific circumstances, lacking the support (within and without the firms) to consolidate and expand in the medium to long term?

The present study is an attempt to explore these issues in the Argentinian context. It is by no means the first analysis made with respect to Argentina - on the contrary, a good case could be made for arguing that far more research has been done there than in practically any other DC with the possible exception

of India[1/]. The analysis is also by no means complete, in the sense of claiming to offer full replies to the matters raised above, for a data base adequate to their resolution still does not exist. Furthermore, the research has been undertaken in a period when the Argentinian economy as a whole, and the industrial economy most especially, is going through a significant restructuring which is affecting, negatively and positively, the export of industrial technology. This last point implies that the set of firms who have been identified as exporters, and in relation to whose circumstances and behaviour some conclusions have been drawn, may change radically in the short to medium term. It is thus an open question as to how "robust" our findings may prove when faced with quite different conditions for the economy as a whole.

This introductory part of the study endeavours to situate the Argentinian industrial economy in time and in relation to other DCs, including other semi-industrialized countries. The contemporary history is important to an understanding of the ways in which industrial progress, and within that technological change, has been conditioned by internal and external circumstances and policies. A comparative look at Argentina in relation to other DCs is indispensable for an appreciation of the degree of competitive push the Argentinian firms may have vis-a-vis their actual and potential rivals in export markets. It is true that intra-DC trade in industrial products is still highly compartmentalized in a geographical sense, and that within the Latin American region Argentina retains a major position. Yet the growing trade barriers

---

[1/] The principal studies on Argentina include Campos (5) (6), Consejo Argentino para las Relaciones Internacionales (10), Díaz-Alejandro (13), Katz (17), Katz and Ablin (18) (19), Roulet (31), White (37) (38), White, Campos and Ondarts (39). For information on India see Balakrishnan (2) and Lall (20). Work on other countries includes Rhee and Westphal (30), and Wells (34) (35) and Wells and Vella Warren (36). Analyses of the phenomenon on a comparative basis are contained in O'Brien (24) (25) (26) (27), and O'Brien, Husnain and Lechuga (28).

in the ICs could readily encourage the more aggressive DC firms elsewhere to seek outlets for their technology exports in the Latin American area and thereby both increase competition in traditional Argentinian markets and compel Argentinian firms to expand their own horizons. Where major industrial restructuring is under way, as is currently the case, the directions of change can be more relevant than current levels - hence the look at Argentina as against other DCs.

B. Growth and Change in the Argentinian Industrial Economy

As of mid 1980 Argentina's GDP measured in 1970 dollars was of the order of 80 billion, implying a per capita figure of around US$2,600. Manufacturing output, measured in domestic prices, accounted for around US$25 billion, or slightly less than one third of the total, while industry as a whole produced about 45% of GDP; these proportions varied a little with respect to the 1960 figures, when manufacturing was 31% and industry 38% of the total. In the 1960s the average annual growth rates of industry (6%) and manufacturing (5.7%) outstripped GDP (4.2%) by a sizeable margin but the gap narrowed greatly, and was perhaps even reversed, during the past decade. For the period 1970-77 the three growth rates were practically identical (2.8, 3 and 2.9, respectively), while since then GDP has grown further, though with the sharpest rise concentrated in 1978-79, whereas industrial output has yet to recover to its 1974 levels and the recession in manufacturing appears to be even more pronounced[2/]. Cyclical shifts in output have been a permanent feature of the industrial economy and they are relevant to an examination of the stimuli to technological development and

---

1/ Data from World Bank (41) and Ferrer (14). For a longer term analysis but concluding in the mid 1960s Díaz-Alejandro (12); an up-to-date synopsis is given in Financial Times (16).

to exports facing the enterprises. We will return to the role of domestic demand later: for the moment we emphasize only that industry occupies a relatively large place in the Argentinian economy.

Within manufacturing three (3) branches have notably increased their shares in the period 1960-77: chemicals, petroleum derivatives, rubber and plastics rose from 14.7% to 19.9%, basic metals from 4.1 to 5.7%, and metals, machinery and transport equipment from 28.2 to 35.2%. Taken together, these three (3) dynamic sets of products increased their share of manufacturing value added from 47 to 60.8%. In general these branches did not benefit from either nominal or effective rates of protection above the average, though there were important within branch exceptions viz. iron and steel, and electrical machinery. Along with the rest of manufacturing the rates of capacity utilization in these branches have fallen through the 1970s and as of 1978 hardly differed from the (unweighted) average for all manufacturing[1/]. They were branches, however, where the degree of participation of TNCs was much above the average (the only comparable branches were tobacco and paper) and where in every case the extent of industrial concentration was medium to high[2/]. It will be shown later that a substantial part of Argentina's technology exports have come from firms in these branches, above all in the area of metals, machinery and transport equipment. However, to a certain extent the enterprises involved are <u>atypical</u> of the branches in that they frequently do not have foreign participation and are frequently medium to small units i. e. are well away from the apex of the pyramid of concentration. It is true that they have benefitted, in their domestic sales, from the protection afforded to the branches to which they belong but this does not mean, of course, that the learning necessarily took place because of the protection or even that the protection was an effective way of encouraging the activities of such firms. To these matters also we return later in the study.

1/ See Botzman, Lifschitz and Renzi (4), p. 145.

2/ <u>ibid.</u>, p. 152.

Until very recently the Argentinian manufacturing sector was heavily protected. Calculations for 1969 showed an average for the sector of 57% nominal rates with effective protection of close to twice the nominal figure. Non-tariff barriers were considerable; in that same year no fewer than 3,800 tariff positions were subject to prior import deposits of 40% of the import value for a period of six (6) months, while various items were prohibited altogether. Furthermore, a system of multiple exchange rates was in force such that the effective price of many imports was driven well above what it would have been if a "normal" exchange rate had been applied. The protection, through both tariff and non-tariff means, increased during the first half of the 1970s such that, by the time the present government took control, protection was high, there was much redundancy in many of the tariffs, and the rates across industries were widely dispersed. In fact, more than 50% of the tariff positions had nominal rates in excess of 100% in April 1976[1/].

An important element of the current economic plan is the elimination, or at least drastic reduction, of protection of domestic industry: the steps taken can be summarized as follows. Most of the import prohibitions were removed during 1976, while both quantitative import restrictions and advance import deposit requirements were completely eliminated by 1977. With these clarifications, the first part of a tariff reform could be carried out in November 1976. At that time nominal tariff rates for 4,000 of the 7,600 positions in the tariff schedule were reduced by an average of 25%. maximum duties to be found in the schedule were limited to 100% (they had been at 200% before), and input duties were reduced by proportionately less than those for final products so that effective protection would fall faster than nominal rates on final goods. At end December 1977 tariffs on manufactured goods came down from an average of 94% to 53%, with the

---

[1/] For more details see Berlinski (3).

average effective rate (Balassa measure) down to around 39%. These changes made a substantial contribution to reducing the spread between high and low rates such that at end 1977 the standard deviation from the average (effective rates) was only about half what it had been fifteen (15) months earlier.

By December 1978 a bare 2.2% of the tariff positions showed rates above 60% while, as noted earlier, nowhere did nominal tariffs exceed 100%. From that point, some two years ago, a tariff revision programme was established for the period 1979-1984: the details are reproduced in Table 1. They show that by January 1984 some 48% of the tariff positions would have nominal rates of 10% while a further 34% of the positions would have rates between 10 and 20%; in total 99.6% of the positions will be below 30% and the absolute maximum rate will not exceed 40%. The unweighted average of nominal tariffs, according to the plan, will be less than 25% in 1984. Since publication of the programme, however, additional steps have been taken. In March 1979 the rates for capital goods (item 7 of Table 1) were put already at the scheduled 1984 levels of 20 to 27% (last column of Table 1), on the ground that re-equipment and modernization of Argentinian industry ought to proceed at a faster tempo than hitherto. In July 1980 tariffs on all goods not produced in the country were removed entirely, a maximum tariff of 55% was set for all goods which are made locally (a change which affected both the rates then prevailing for item 1, consumer goods, of the Table as well as the subsequent schedule of reductions for that group) and it was decided that this should be reduced to 20% for 1984, thereby modifying a considerable proportion of the remainder of the Table[1/]. It is not clear what the anticipated schedule is at the time of writing but certainly the recent decisions have underlined the sweeping nature of the reforms initiated by the present government. To the extent that the past structure of Argentinian industry was strongly influenced by the protective system (including all its elements), that structure is bound to alter significantly in the

---

1/ See Ferrer, op. cit.

near future. Indeed, the government has itself emphasized its objective of rebuilding Argentinian industry on fully competitive lines in the sense that no sector of industry should benefit from special privileges[1/]. The force of these measures is well illustrated by the fact that several major foreign controlled enterprises (General Motors, Fiat, Olivetti, to name but a few) have closed their operations in the country and that private direct foreign investment (DFI) is stagnant or falling. The restructuring process is therefore profound and affects, along with many other things, both current performance in and prospects for exports of industrial technology. It is essential to keep this in mind when, later in the study, we consider performance in technology export.

The protective system on the one hand, and the nature of the international economic system on the other, meant that Argentina began to export industrial products rather later than several other DCs (particularly the small to medium size Asian countries). In 1960 only 4% of merchandise exports were in the form of manufactures. From then until the second half of the 1970s, however, major changes occured. In 1963 the total value of manufactured exports was US$79 million whereas by 1976 it had reached US$975 million and then accounted for one-quarter of all merchandise exports. No less than 10% of merchandise exports were from the machinery and transport equipment branch which, as noted above, substantially increased its share of domestic industrial output over the period, with 2% from textiles and clothing and the remaining 13% in diverse manufactures[2/]. By 1973 the average ratio of industrial exports to output was 6%, with especially high ratios in processed food items and leather and leather products but

---

1/ An analysis of the experience is contained in Canitrot (8), while the linkages between the pattern of economic development and the interests of particular groups in the period prior to 1976 are examined in O'Donnell (29).

2/ Preceding figures from World Bank, op. cit.

also with figures above 10% for non-electrical machinery and for scientific instruments and equipment[1/]. At the beginning of the previous decade the all industry average could scarcely have exceeded 1%. This expansion of industrial exports was taking place within an overall growth of merchandise exports, which rose by 3.3% per annum during the 1960s and by 5.5% per annum from 1970-77.

Within the period there was further evidence of changes in the composition of industrial exports. Though the share of capital goods plus what Chenery and Keesing[2/] have called "clearcut" consumer goods in total exports of manufactures did not rise greatly from 1965 to 1975 (from 28 to 33%), exports of items employing relatively sophisticated technology had reached more than US$745 million by 1974. Moreover exports of machine tools, a mere US$66,000 in 1961, totalled US$8.3 million by 1976 while twenty (20) large, sophisticated enterprises, mainly affiliates of TNCs, had increased their foreign sales from some US$62 million in 1969 to US$231 million in 1974 with available information suggesting that most of the sales did not represent intra-firm trade of simple items[3/].

In one respect, viz. the destination of manufactured exports, Argentina differed from many of the other DCs, above all the New Industrialized Countries (NICs), which had started earlier on export led industrialization[4/]. From 1963 to 1976 the proportion of these exports going to the non-oil producing DCs rose from 46 to 64%, accompanied by a sharp fall in the percentage received by the OECD countries, from 52 to 32%. The point will be explored in the next sub-section of this chapter and again later in the study but one aspect needs to be underlined here. Industrial exports from

---

1/ Calculated from data provided by the Ministry of Economy.

2/ See Chenery and Keesing (9).

3/ See Katz and Ablin (18), op. cit.

4/ A recent survey of the NICs is given in Lall (21).

Argentina have not been the product of following either the creation of low wage conditions in which TNCs could use Argentina as an export platform for assembly operations or fabrication of components nor have they been the result of a concentration by local firms on relatively simple items. The exports have been of fairly sophisticated goods which, though they cannot often find markets in OECD countries because the technology they incorporate is not sufficiently high and/or the wage costs are not sufficiently low, can find markets in other DCs, above all in the Latin American region. It is true that a fair proportion of those exports were handled by TNCs but the evidence does suggest that Argentina was becoming, for at least some of them, the base for their sales in the Latin American market, often of finished manufactures. In this respect the nature of Argentina's participation in international markets for manufactures showed significant qualitative differences from the NICs.

The expansion into foreign markets was also profoundly influenced by the commercial policy regime. Protection of the local market was a major stimulus both to domestic producers and to TNCs to situate their plants on Argentinian territory. Yet from the late 1960s on exporters of industrial goods had benefited from substantial incentives, especially in terms of credit provisions offered at negative real rates of interest and global tax reimbursements. These measures were originally designed to offset the anti-export bias inherent in the protective system and overvalued exchange rate at that time but as the export incentives were sharply increased the possibility that exports could, on balance, be favoured became more relevant. A study in 1973 of twenty (20) product groups indicated that the prevailing incentives were such that profits from export and domestic markets would be equated with prices of the former only some 70% of prices of the latter[1/]. Subsequent developments in 1974-75 tended to increase the margins from export as domestic price controls coincided with appreciable increases in external inflation. The combination of monetary and fiscal incentives meant that by 1977

1/ Calculations from WorldBank.

the average incentive to industrial exports was worth about one-third of the domestic price. The average, however, hides the greater relative support for exports of capital goods, which were often subsidized up to around half of their domestic market value while other manufactures received considerably less in the way of incentives. Machinery and transport equipment was well favoured under this regime and that branch, as emphasized above, has been a major factor in the structural change of both domestic industry and exports of manufactures. To the extent that the technology exports were tied in with this type of expansion, changes in the pattern of incentives are bound to affect such exports.

The programme of the present government has indeed sought to create a state of unified effective exchange rates so that the fiscal and monetary conditions prevailing in the economy, as well as commercial policy itself, do not provide any advantages or disadvantages to any sector or branch of the economy. In practice, the large-scale reductions in export incentives combined with the internal price explosion (wholesale prices rose 350% between June 1978 and June 1980) and the massive inflows of short to medium term money while the authorities follow a programme of regular but small devaluations has meant that in the recent period there has been a sharp fall-off in industrial exports. That reduction is taking place concurrently with the appearance of much greater competition in domestic markets due to cheaper imports: on both counts domestic producers are finding it much more difficult to sustain production and sales. At the time of writing, therefore, it seems doubtful whether, at least in the short run, the growth rates of industrial exports observed in the past can be maintained and even whether similar enterprises and industries will continue to figure prominently in the list of exporters. By extension, the analysis made later of exports of industrial technology may be of greater relevance as retrospect than as prospect. The contemporary political economy of Argentina is thus crucial to any evaluation of experience as an industrial technology exporter.

TABLE 1

ARGENTINA

PRINCIPAL FEATURES OF TARIFF REVISION PROGRAM, 1979-1984

Schedule of Average Tariff Rates by Major Categories

	Sub-Group /a	1979				1980				1981				1982				1983				1984
		January	April	July	October	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July	October	
1. Consumer Goods	1	65	64	63	62	61	60	58	56	54	52	50	48	46	44	42	40	38	36	34	32	30
	2	75	74	73	72	70	68	66	64	62	60	58	56	54	52	50	48	46	44	42	40	38
(excl. Group 2)	3	85	84	83	82	80	78	76	74	72	70	68	66	64	61	58	55	52	49	46	43	40
2. Food, Beverages, and Tobacco Products	1	39	38	37	36	35	34	33	32	31	30	29	28	27	26	24	22	20	18	16	14	12
	2	45	44	43	42	41	40	39	38	37	36	34	32	30	28	26	24	22	20	18	16	14
	3	52	51	50	49	48	46	44	42	40	38	36	34	32	30	28	26	24	22	20	18	16
3. Intermediate Goods	1	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	28	26	24	22	20	18
	2	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	29	27	25	23	21
	3	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	30	28	26	24
4. Raw Materials (industrial origin)	1	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	15
	2	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	19	17
	3	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	22	20
5. Raw Materials (agricultural origin)	1	21	21	20	20	19	19	18	18	17	17	16	16	15	15	14	14	13	13	12	11	10
	2	25	25	24	24	23	23	22	22	21	21	20	20	19	19	18	17	16	15	14	13	12
	3	29	29	28	28	27	27	26	26	25	25	24	23	22	21	20	19	18	17	16	15	14
6. Goods not produced in Argentina	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
7. Capital Goods	1	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	30	28	26	24	22	20
	2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	31	29	27	25	23
	3	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	31	29	27

Source: Ministry of Economy

/a according to elaboration of product.

C. Argentina in the Developing Country Context

Comparative data for Argentinian industry and exports of manufactures are shown in Tables 2, 3 and 4. It is well-known that Argentina has traditionally been the Latin American country having the highest share of industrial value added in GDP (measured at domestic prices) and that it initially (i. e. up to 1960) accounted for the largest share of all manufacturing value added in the region. These features are borne out by Table 2 yet the data also reveal that, by the middle of the last decade, its weight in the area's net output of manufactures had fallen several percentage points, due mainly to the expansion of Brazil and Mexico, whereas the weight of industry in GDP was still well above that of the next country (Mexico). If the comparison is extended outside the region then only a few of what the World Bank defines as "middle income" DCs have similar shares of industry in GDP while in 1975 only Brazil, Spain and Mexico had greater absolute levels of value added in manufacturing among all DCs. Argentina produced slightly more than India and those two (2) countries exceeded by some 35% the figure of the next highest (Yugoslavia). These numbers are sufficient to show that the industrial structure created was one of the largest, on a per capita basis the industrial output was rivalled only by that of Spain and the smaller Asian NICs, while the remarks made in the preceding subsection have already hinted that the composition of output in Argentina was much more towards capital goods than in most other DCs.

Tables 3 and 4 explore in more detail the comparative patterns of exports of manufactures. The statistics confirm that Argentina was around the bottom of the list (for country groups I and II) in both 1960 and 1975 on the criterion of manufactures as a proportion of total merchandise exports. Yet that share, as noted earlier, had quadrupled and the real average growth of manufactured exports had been by no means low. On the contrary, it exceeded that of such notable DC exporters as Singapore, Hong Kong, Yugoslavia and

Portugal. The share of simple manufactures in the aggregate was also fully comparable to that of other countries and indeed the figure of 23% was almost entirely due to footwear and leather products, building on by-products of Argentina's cattle rearing activities. More generally, data from other sources confirm that by the mid 1970s manufactured exports based on industrial inputs (as opposed to those stemming from agricultural activities) were around 40% of total exports of manufactures as compared with some 20% a decade earlier[1/]. There was clearly a strong trend towards pushing Argentina into the most important group of DC exporters of manufactures with a composition of that trade far more sharply weighted towards high value added items than for most other countries. This last point is forcefully supported by Table 4, which serves to emphasize that only Spain, Yugoslavia and Brazil were in similar situations to Argentina from the structural point of view.

Argentina's industrial exports have tended to differ from those of other DCs not only in their product composition but also in their destination. A study of DC exports of manufactures to OECD countries in the period 1970-76 commented that, in the light of actual growth rates of OECD imports of "dynamic" manufactures, "the least favourable export structure was held by Argentina, Ghana, India and 'Other Africa'. The latter four at the same time experienced below-average actual export growth and it is safe to conclude that the initial concentration on relatively slow-growing products partly explains their below-average export performance"[2/]. Further refinements of the same numbers demonstrate that Argentina accounted for only 1.4% of the increment of all DC exports of manufactures to the OECD countries over the period 1970-76, and that the share of the fifty (50) most dynamic products

---

[1/] Calculated from data provided by the Argentinian Secretariat of Foreign Trade.

[2/] UNCTAD (32), p. 5.

(in terms of DC imports of manufactures) in the increase of Argentina's exports was 64% as against an average of 79% for DCs as a whole[1/]. These figures, taken together, underline the fact that, while Argentina certainly participated in the rapid expansion of DC exports of manufactures to DCs in the first half of the last decade, the orientation of industrial exports from that country remains much more linked with other DCs, especially those of Latin America. In those circumstances it is scarcely surprising that most of the DFI and related technology exports from Argentina have likewise been within the region.

A recent comparative analysis has argued, from a sample of the major DCs engaged in exports of manufactures and DFI, that a country's relative position as a foreign investor (and by extension as a seller of technology) is strongly correlated with its exports of manufactures to the same set of countries in earlier years i. e. that investment follows trade among the DCs[2/]. Even when allowance is made for the well-known Argentinian enterprises operating elsewhere in Latin America prior to 1939 (Alpargatas, Bunge y Born, and Siam di Tella) it seems that this hypothesis is on balance consistent with the evidence for Argentina. Given the much greater emphasis of Argentinian manufactured exports to DC markets than of its major rivals in Latin America (in 1976 42% of Brazil's and 23% of Mexico's exports of manufactures went to other DCs as compared with 64% for Argentina), it is not surprising that Argentina has DFI on a scale similar to that of Brazil and that most of the foreign activity, for investment and technology, is focused on Latin American countries. Indeed, of 157 manufacturing projects set up abroad by Latin American based firms, only 39 (or one-quarter of the total) are located outside the region. This is in contrast to the pattern observed for the leading

---

[1/] ibid., Table 2.

[2/] Wells (35).

Asian industrial technology exporters and investors: for India, for example, the comparable percentage would be around 36[1].

The paucity of relevant data makes it difficult to assess the situation of Argentina vis-à-vis other DCs in terms of the product composition of exports and productivity. UNIDO calculations show that in 1974 some 68% of DC exports of manufactures (to all destinations) were items intensive in the use of unskilled labour with the remainder divided up among goods best classified as R and D, human and/or physical capital intensive[2]. The figures given earlier for exports of items with relatively sophisticated technology from Argentina show that they accounted for about 40% of all manufactures exports in 1974 and to this it may be necessary to add a proportion for items intensive in physical capital. Clearly the degree of sophistication of Argentina's exports was significantly in excess of that for the average of other DCs and it seems likely that at best only Brazil, Mexico and India were serious rivals.

Industry level statistics tend to support the view that Argentina was competing fairly successfully with other DCs in the exports of goods embodying significant amounts of industrial technology. Comparisons of value added per worker in thirteen (13) industrial branches among Argentina, Brazil, Mexico and Spain using 1970 physical output figures converted to 1975 dollars, showed that the two (2) former countries had productivities well above the latter pair. In advanced manufactures, such as metal products, machinery and transport equipment, and rubber and petrochemicals, the former two (2) were again very similar to each other and well ahead of the latter countries[3]. On the basis of mid 1970s data, Argentina had exports of agricultural

---

[1] ibid.

[2] UNIDO (33), Table V.6, p. 154.

[3] Calculated from UN statistics on industrial production.

machinery in excess of those of Brazil with machine tool exports (90% of which went to other Latin American countries) only a bit below the Brazilian figure. When we bear in mind the considerable difference in the absolute size of the industrial sectors of the two (2) countries, the Argentinian performance does not seem at all unsatisfactory. Moreover, price comparisons for nine (9) types of agricultural machinery as of 1977 showed that in seven (7) of the cases Argentinian prices were either less than, or no more than 5 percentage points above, international levels, which also suggests that the competitive state of that sector was not bad[1/].

The restructuring not only of Argentinian industry but of that of many other DCs, along with the sea changes in the international economy which have occurred during the past five (5) years, make it especially hazardous to judge:

i) the extent to which the capability to produce and export reasonably sophisticated industrial items has been maintained in Argentina;
ii) whether and in what ways present policy would wish such exports and production to continue;
iii) the prospects for other DCs, particularly Brazil and Mexico, to amplify their international projection in this area, and
iv) the barriers which might be raised by ICs and DCs to further external penetration of their markets.

Answers to these questions are germane to any evaluation of Argentina's

---

[1/] See AFAMAC (1).

possibilities as an exporter of industrial technology and the following remarks are designed to throw some light on the issues - the detailed analysis of later chapters likewise reverts to this theme.

In 1980 the share of industrial value added in GDP was below 34%, its lowest level in the decade 1970-80 and appreciably less than its ten-year maximum of 38.3%, attained in 1974. Industrial output fell by an average of 0.5% per annum from 1975 to 1980[1/] and in the latter year industrial output was still below its 1974 level and some 24% less than its potential[2/], taking account of stocks of industrial equipment in place. Chemicals and petro-chemicals, along with machinery and equipment, did manage to register marginally positive growth rates in the second half of the decade and together produced some 56.5% of all industrial output in 1980. Within the machinery branch, however, the maintenance of output levels was due to the automobile industry where production rose by 12%, domestic sales by 11.4% and the number of units exported by 131%. The sector is one dominated by affiliates of TNCs with the top four (Ford, Sevel (the fusion of Fiat and Peugeot), Renault and Volkswagen) capturing 95% of the market[3/]. In terms of domestic production in the technology intensive branches, therefore, the levels are at best being maintained, with the probability being that capacity to produce and actual production are dropping.

Private investment has stagnated and exports too, appear to be less than in the middle of the past decade. Some of the larger enterprises which were am[illegible]ne leading exporters of more sophisticated goods have, as noted earlier, closed down their operations in Argentina and it will be shown in later chapters that technology exports also have been declining. The thrust of policy is towards the re-organization

---

1/ Data from Mercado (22).

2/ Ferrer, op. cit., p. 15.

3/ See Mercado (23).

of domestic industry in line with comparative advantage and in the short to medium term this is affecting the export markets for manufactures since the high foreign value of the peso, maintained by substantial inflows of short term money in response to favourable interest rate differentials and exchange rate guarantees, is effectively pricing those products out of foreign countries. The contraction of domestic demand and the impossibility of bringing down local costs of production to anything like the degree which would be necessary to compete at prevailing exchange rates and relative rates of inflation, means that production as well as exports is under severe pressure.

On the international scene the picture is more mixed. Most DCs are faced with difficulties in their internal and external markets for manufactures though none of a size comparable to Argentina is pushing through a similar restructuring with such short to medium term pressure on the manufacturing sector. So from the perspective of domestic supply possibilities Argentina is almost certainly faring worse than its competitors at the moment. What will happen in the longer term is harder to judge: in a nutshell the answer revolves around the ability of Argentinian industry to accomplish a unique historical feat i. e. reach international levels of technological incorporation and advance under a regime of completely open commercial policy. On the demand side the position is different. Given the destination of Argentina's industrial exports it is, at present, notably less affected by the rise in protectionism of ICs than are most other DCs. That protectionism is biting on items where Argentina has been of minor importance as an industrial exporter. The extent to which it can continue to penetrate its "traditional" Latin American markets depends not only on the competitiveness of its products, in prices and quality (including appropriateness), but also on whether those markets remain open to regional suppliers. On the whole the signs as of now are reasonably positive, with recent efforts to revitalize regional co-operation in trade and technology. Nevertheless effective expansion will require determined moves towards providing

"infrastructural" support for exports e. g., market information, as well as much greater attention to African and perhaps Asian markets. With those attempts it should be possible for demand for Argentinian industrial goods to be created.

The above remarks serve to underline, if that were necessary, that Argentina is at a crossroads in its industrial history: the brief sub-section which follows tries to summarize the points made in this chapter designed to set the scene for the explicit analysis of technology exports in subsequent chapters.

D. An Overview

Argentina has a relatively long industrial history. By 1960 it was, along with India, the foremost producer of industrial goods among all DCs but the proportion of industrial exports in total exports, as well as the share of industrial output destined for external markets, were both very low. During the 1960s and up to the second half of the 1970s industrial, and particularly manufactured exports, became far more significant. Those exports undoubtedly owed much to the support they received from commercial, fiscal and monetary policy, to the role of TNCs as exporters, and to the stimuli for regional trade provided by multilateral arrangements in Latin America. The evidence suggests, however, that they also owed much to the relatively sophisticated nature of the industrial sector. Compared to other DCs, Argentinian industrial exports embodied fairly advanced technology and were particularly strong in machinery production, machine tools, certain branches of chemicals, and some of the basic metals areas. The direction of these exports was far more oriented to other DCs than was the case for most other parts of the developing world, and this tends to reinforce the findings on the relative degree of industrial advance in Argentina. The brief data given in this chapter, to be supplemented later, further indicate that DFI from Argentina tended to follow the direction of industrial exports.

Since the second half of the 1970s the Argentinian industrial sector has been going through a radical process of restructuring. The leitmotiv of that process has been the attempt to reduce, drastically and in a programmed fashion, the overall protective system in order that the economy as a whole may respond to signals of international comparative advantage. The reduction of protection programme has been and is being implemented simultaneously with the programme of small but regular devaluations of the peso, the elimination of controls over all capital movements, and the use of monetary policy to ensure, inter alia, positive real rates of interest. In practice the policy has, up to the present, succeeded in eliminating many of the inefficient erterprises which undoubtedly had flourished in the decade and a half prior to the introduction of the present strategy. The speed and depth of the changes, however, coupled with the fact that they have been implemented in a period of international as well as domestic recession, has meant that the very bases on which many efficient firms were functioning have been undermined.

To incorporate technology and devise strategies for technological development takes time: to create foreign markets for technologically sophisticated items takes time: and both are high risk activities which, for those countries nowadays commonly recognized to be successful practitioners of the art, have been marked by flexible and effective government encouragement designed to reduce the risks as perceived by private entrepreneurs. In Argentina the advances which were being made are now required to prove themselves in much more difficult conditions than when the process began. The outflow of skilled people, the much higher costs of local production following on the removal of support systems while the foreign exchange cost of domestic labour has risen rather than fallen, and the growing competition in international markets in a period of recession, together mean that time has been cut very short, and may even have run out, for many of the firms which were going along the technology adaptation/ technology export path. In future years there may be a continuation

of some of the recent export patterns and even the introduction of new lines. One of the aims of reducing sharply the tariffs on capital goods was to encourage modernization of plant and equipment, and that could lead to greater international competitiveness. Yet the time and costs of technological learning cannot be bypassed: under the new system, just as under the old, there is no escaping the need for a technology strategy at micro and macro levels. The difference is that now it has to be handled where the tempo will be determined by external rather than internal conditions.

TABLE 2

ARGENTINA

GROWTH RATES AND INDUSTRY SHARES OF GDP IN ARGENTINA AND OTHER MAJOR LATIN AMERICAN COUNTRIES

(in Percent)

ANNUAL GROWTH RATES a/

	Gross Domestic Product			Industrial Value Added	
	1960-70	1970-73	1973-75	1960-70	1971-75
Argentina	4.3	7.5	3.6	5.6	5.1
Brazil	6.0	11.0	8.3	7.3	10.5
Chile	4.4	1.6	-4.1	5.4	-4.0
Colombia	5.2	6.6	5.9	6.0	7.0
Mexico	7.0	6.1	5.9	9.0	6.3
Peru	5.3	6.1	5.5	6.3	7.8
Venezuela	5.9	4.2	6.0	7.3	5.2

INDUSTRIAL VALUE ADDED SHARE OF GDP b/

	1960	1970	1975
Argentina	31.1	35.3	36.8
Brazil	21.6	24.3	23.8
Chile	21.9	25.4	19.7
Colombia	17.9	19.2	19.2
Mexico	22.6	27.0	27.9
Peru	17.2	19.0	25.7
Venezuela	14.2 (19.3) c/	16.2 (20.1)	16.7
United States	27.4	28.5	25.1
United Kingdom	32.2	28.3	26.9

MANUFACTURING VALUE ADDED IN THE REGION

	1960	1971	1975
Argentina	27.1	24.5	22.4
Brazil	27.1	28.3	32.7
Chile	6.4	5.9	3.1
Colombia	3.7	3.4	3.5
Mexico	18.2	21.0	21.7
Peru	3.7	3.9	4.0
Venezuela	5.0	4.9	5.0

a/ Average annual growth rates in 1970 prices.
b/ At 1963 prices; 1973 shares at current prices.
c/ Figures in brackets indicate industrial share of Venezuela's GDP exclusive of the petroleum sector.

Source: UN, Year Book of National Accounts Statistics, and Monthly Bulletin of Statistics; IDB, Annual Reports.

TABLE 3

EXPORTS OF MANUFACTURES AND COUNTRY CHARACTERISTICS OF SELECTED LDCs

Country	Population (mils; 1976)	GNP Per Capita (US$ 1976)	GNP Per Capita Avg. Growth (% p.a.) 1960-1976	Manufactures as % of Goods Exports 1960	Manufactures as % of Goods Exports 1975	Exports of Manufactured Goods Total (US$ mils) 1976	Exports of Manufactured Goods Per Capita (US$) 1976	Exports of Manufactured Goods Textiles, Clothing, Footwear and Leather Products (% of Total)	Exports of Manufactured Goods Real Average Growth (% p.a.) 1965-75
I. Specialised in Exports of Manufactures									
Israel	3.6	3,920	4.3	61	83	1,850	514	10	11.1
Singapore	2.3	2,700	7.3	26	43	1,790	778	13[a]	15.0[c]
Greece	9.1	2,590	6.1	9	48	1,252	138	45	26.7
Hong Kong	4.[illegible]	2,110	6.5	80	97	6,480	1,440	58	11.9[d]
Portugal	9.7	1,690	6.5	55	71	1,198	124	44	7.8
Taiwan (Rep. of China)	16.3	1,070	6.3	14	81	6,921	425	44	28.8
Korea, Rep. of	36.0	670	7.3	14	82	6,675	188	50	36.0
II. Large Semi-Industrial Countries									
Spain	35.7	2,920	5.5	12	70	6,025	169	19	22.6
Yugoslavia	21.5	1,680	5.6	44	72	3,383	157	21	9.9
Argentina	25.7	1,550	2.8	4	25	972	38	23	16.7
Brazil	110.0	1,140	4.8	3	27	2,332	21	29	25.4
Mexico	62.0	1,090	3.0	12	52	2,327[b]	38	15[b]	21.2
Turkey	41.2	990	4.2	25	36	466	11	70	32.2
III. Emerging from Primary Specialisation									
Venezuela	12.4	2,570	2.6	0	1	115[c]	8[c]	2[c]	20.1
Iran	34.3	1,930	8.2	3	1	208[c]	6[c]	71[c]	8.9
Chile	10.5	1,050	0.9	4	8	109[d]	11[d]	0	n.a.
Malaysia	12.7	860	3.9	6	18	667[c]	54[c]	14[c]	18.2
Tunisia	5.7	840	4.1	10	20	203	36	49	15.0
Colombia	24.2	630	2.8	2	21	306[c]	13[c]	39[c]	17.3
Ivory Coast	7.0	610	3.4	1	12	117	17	27	17.4
Morocco	17.2	540	2.1	8	13	197[c]	12[c]	61[c]	16.6
Philippines	43.3	410	2.4	7	17	255[c]	6[c]	27[c]	7.8
Thailand	43.0	380	4.5	2	23	305[c]	7[c]	28[c]	30.0
IV. Large Poor Countries									
Egypt	38.1	280	1.9	10	34	386	10	73	7.8
Indonesia	135.2	240	3.4	0	1	119	1	(low)	14.1
Pakistan	71.3	170	3.1	22	55	589[c]	9[c]	79[c]	[g]
India	620.4	150	1.3	44	45	1,961[c]	3[c]	52[c]	2.8
Bangladesh	80.4	110	-0.4	..	63	220	3	97	[g]

a/ Including reexports.

b/ Estimated including border zone, with help of U.S. as well as Mexican data.

c/ 1975

d/ 1974

g/ For Pakistan and Bangladesh together, exports of manufactures grew at 8.5 percent.

Sources: Chenery and Keesing (9), p. 22.

TABLE 4

PERCENT COMPOSITION OF MANUFACTURES EXPORTED FROM SELECTED LDCS AND DEVELOPED COUNTRIES IN 1975

Country	Capital Goods	Consumer Engineering	Clothing & Footwear	Other Clear .ut Consumer Goods	Textiles incl. rugs	Standardized Intermediate excl. Textiles	Other and Miscellaneous
Developed Countries	31.8	9.4	2.7	4.0	4.6	24.1	23.3
Developing Countries[a/]	12.5	5.8	21.8	9.8	14.9	16.2	19.0
Group I							
Israel	8.9	1.7	6.9	4.1	3.2	6.4	68.8
Greece	5.2	1.3	17.3	3.1	17.3	40.1	15.2
Hong Kong	2.8	11.3	45.7	19.7	9.7	0.7	10.0
Portugal	9.0	5.9	18.4	2.5	23.0	15.2	25.9
Taiwan	9.5	9.8	27.8	14.9	15.1	8.5	14.4
Korea	7.0	5.2	32.4	12.3	15.7	14.7	12.7
Group II							
Spain	23.5	5.6	11.4	8.4	4.6	22.3	24.2
Yugoslavia	25.4	3.1	13.2	5.5	6.1	21.1	25.5
Argentina	18.0	7.8	2.8	4.3	0.3	24.9	41.9
Brazil	25.4	6.1	12.2	5.0	12.4	21.1	17.8
Turkey	2.8	0.5	25.2	2.0	33.6	22.6	13.4
Group III							
Venezuela	0.3	-	-	0.7	2.1	40.3	56.6
Iran	0.7	0.5	10.9	1.0	60.1	6.5	20.3
Malaysia	11.4	4.5	8.5	3.4	5.1	16.6	50.5
Tunisia	1.1	0.4	26.7	1.4	11.5	51.8	7.1
Colombia	6.7	1.2	11.4	12.1	21.9	25.7	20.9
Ivory Coast	20.2	0.9	2.1	-	20.5	26.4	29.9
Morocco	2.4	0.2	26.6	6.4	29.2	20.9	14.4
Philippines	-	0.4	14.1	25.5	8.7	22.2	29.1
Thailand	0.9	2.9	16.2	7.4	24.5	16.5	31.6
Group IV							
Egypt	1.0	0.3	22.0	6.5	47.7	13.6	8.9
India	9.3	1.2	11.2	4.4	30.6	21.0	22.3
Pakistan	2.0	-	7.2	6.4	66.1	13.1	5.2
Bangladesh	-	0.4	-	0.3	88.2	9.5	1.6

a/ Countries listed only.

Sources: Chenery and Keesing (9), p. 31.

CHAPTER II - Exports of Industrial Technology from Argentina: An Examination of Evidence

A. The Nature of Technology Exports

Enterprises can obtain returns on their command of technical knowledge in many ways, ranging from the straight rent of professional time (consulting services) and the grant of patent licenses to would-be users, to the provision of fully operating industrial plants or infrastructural works (turn-key and product in hand contracts) which involve extensive human, material and financial inputs by the supplier(s), to the incorporation of own technical knowledge in the establishment of industrial ventures abroad (DFI). Obviously there can be overlaps among these methods of capitalizing technical capabilities, and it can readily happen that what begins as one type of arrangement is transformed into another as the original circumstances alter. The typology of exports of industrial technology can thus involve elements of double counting any any one point in time, while a given arrangement could be classified under one heading in an initial period and under a different one in a later period. The figures presented in this chapter should be interpreted with these caveats in mind. The data used will refer almost entirely to transactions where the Argentinian supplier, but not necessarily the foreign demander, is a private entity: the only exceptions will be some comments on the supply of technical assistance from the Atomic Energy Commission. There is also little need to stress that the data are partial, in the dual sense that, for various reasons, some firms may have never declared their foreign operations or the descriptions (quantitative and qualitative) provided of them may be incomplete. The administration, for its part, has not always had registration procedures to keep track of foreign activities so that often material has to be gleaned from unofficial sources.

The export of technology, however it occurs, can be interpreted as the continuation of a learning process which begins with the export of industrial products. As contacts are made abroad, greater information

is acquired more rapidly and reliably, and enterprises are better able to identify opportunities to earn profits from their command over a technical knowledge which their counterparts do not have (although, of course, that knowledge may be available in many other locations). But the extension of learning is only a permissive condition: it is quite possible that it is neither necessary nor sufficient for all exports, especially given the particular circumstances which have prevailed in Argentina and elsewhere in Latin America over the past decade or more. The condition is not sufficient because greater knowledge alone is not enough to guarantee technology exports. At the private level, the relative profitability of foreign against domestic operations has to be weighed - under the "stop-go" pattern of the Argentinian economy, that relative profitability has probably switched quite frequently in the last years. At the public level, restrictions on activities implying capital export from Argentina, as well as obstacles in the investment and technology transfer laws of recipient countries, may have sufficed to block many transactions which would otherwise have been realized. The condition is not necessary because some of the technology exports have taken place without any discernible prior contact with foreign markets. Put more simply: technology exports can be the first exports.

The abundant literature on technology exports has been concerned mainly (and justifiably) with the ways in which TNCs have capitalized that asset as part of inter-related packages of resources. The technical superiority, market power and ample options for engaging in disguised international financial transfer which these corporations possess have given them major bargaining advantages such that most of the analysis has been focused on how to build up countervailing power of the DC purchasers. As will be seen later, the Argentinian exports of technology do not emanate from such entities. Naturally those exports are profit seeking and undoubtedly the sellers make use of whatever devices they can both to raise returns and collect them at the places, times and in the currencies which suit them. Yet the relative bargaining power of sellers and buyers is almost certainly much more

equal among Argentinian sellers and other DC buyers, while the knowledge the firms have about ways of carrying out such transactions is in general far more circumscribed than when TNCs are involved. To export technology is also a skill which has to be learned and, unlike the TNCs, most Argentinian firms have neither the power nor the experience (as yet) with which to dominate their counterparts. The position maintained in this study is that the data reflect a period of exploration or groping as the firms have sought to extend the range of their foreign activities but have, save in a few instances, been unable to consolidate them. It is thus a very open question as to whether the phenomenon is at a threshhold or has already reached stagnation. To consider these matters in greater depth, we turn now to the aggregate evidence, and focus mainly on DFI, turn-key and product in hand exports, and licensing contracts.

B. Argentinian Direct Foreign Investment, 1967-1980

Table 5 shows the country destination of DFI by firms based in Argentina over the period 1967-1980 and Table 6 gives the sectoral distribution of the same data. The cumulative value of these investments was close to US$63 million spread over eighty-nine (89) projects i. e. with an average project value of DFI of around US$700,000. Close to 90% of the investments were in Latin America with the major destinations of them being Peru, Uruguay and Brazil which together accounted for nearly US$40 million invested in thirty-eight (38) projects. Some US$52 million were authorized in the period 1 January 1978 to 31 March 1980, or close to five times the amount (at current exchange rates) in the preceding eleven-year period. The growth of investment is therefore recent: in that period the average project value has increased (it was below US$0.5 million from 1967-77) and the number of countries receiving investments has likewise risen. The country distribution in the earlier period showed that fifteen of twenty-four projects were concentrated in Uruguay and Brazil, which tends to reinforce the tentative hypothesis that Argentinian firms were gradually spreading out from operations in neighbouring and presumably more familiar countries (the pre-1939 investments by Alpargatas, Bunge y Born and Siam di Tella followed the same pattern).

Table 6 shows that almost half (by value) of the DFI was in manufacturing industry with more than one-third in petroleum. Yet the petroleum investments, which were almost entirely in the later period, were concentrated on three projects only while the manufacturing investments were spread over no fewer than forty-seven (47) projects, with a consequently low average value. There is, unfortunately, no comprehensive breakdown of DFI by firm or industrial branch yet published but the evidence available indicates that the metallurgical, machine tool, automotive and food processing branches were the principal ones and that some fifty (50) firms, of varying sizes and domestic market importance, seem to be involved[1/]. With the possible exception of one or two large firms which have investments dating from a long time back, there does not appear to be anything which suggests that the Argentinian firms are building transnational networks. The investments are responding to specific opportunities and are in any case mainly of a minority kind: nothing resembling the powerful TNCs is as yet to be found. This does not mean that the enterprises established abroad are without weight in the markets of the recipient countries - 1974 data show that two of the ten largest firms in Paraguay were Argentinian subsidiaries as were six of the top fifty (50) in Uruguay in 1977.

The figures given relate to authorizations and do not therefore guarantee that the investments actually took place: on the other hand, as noted earlier, there may be various investments which were in fact realized but had never been registered. As a cross check, and also by way of a comparative picture, Table 7 gives a matrix of intra-Latin American DFI constructed with data from the recipient countries. The grand total for Argentina, on a cumulative basis, is some US$43.5 million which, bearing in mind that the recipient country figures are not quite so up to date as those from Argentina itself and that they

---

[1/] Information given to the author in interviews.

refer to Latin America alone, seems to tally well enough with the total given in the preceding Tables 5 and 6.

How do these numbers match other aggregates? How good a proxy are they for technology exports? What do they suggest about the behaviour of industrial enterprises? Evidently we can offer only tentative replies yet they should serve as a pointer to the nature of the foreign projection of Argentinian industrial firms.

From Table 7 it is plain that Argentinian DFI to other countries of the region is small indeed compared to their total stocks of such investment - in only one case, Ecuador, does it amount to slightly more than 1% of the stock, and in all other countries it is but a fraction of 1%. It is true that, along with Brazil, Argentina is the leading intra-regional investor with about 13% of the total - but the intra-regional investments are little more than 1% of all DFI in the area. As an investor, then, Argentina is certainly not of great weight.

If the DFI is compared to the trade in manufactured items the percentages remain small: using 1977 exports of manufactures to DCs as a yardstick, the total was around US$1 billion whereas the accumulated stock of all DFI in manufacturing at the end of that year was only some US$10.5 million, or just over 1% of the single year's exports. Certainly the DFI in manufacturing has risen since then but at this order of magnitude the 1980 accumulated stock could not be more than some 3% to 3.5% of a single year's manufactured exports to other DCs. What the stock might represent in terms of foreign exchange earnings is very unclear since, partly because of the restrictions on currency flows which were in force for some of the period and partly because gains might have been reinvested abroad, there is no information on profit repatriation. At best it would only be a small fraction of the earnings from manufactured exports even if those exports were assumed to have a considerable import content, such that their net contribution to the balance of payments was much less than the gross recorded value

of trade. The investments may give rise to a little intra-firm trade and/or generate some industrial exports from other Argentinian enterprises yet it is most unlikely that all these elements, added together, would yield more than a few per cent of the returns from industrial exports. All in all, the investment flows remain of a far smaller order of magnitude than trade.

Along with other DCs Argentina has scarcely entered the field of producing brand-name consumer items[1/] and does not possess marketing chains on an international scale. It is therefore most unlikely that any of the DFI could be predicated on that asset. By the same token, the ability to raise and manage substantial amounts of finance capital has not been a feature of the Argentinian scene where in any case, and until recently, the private banks were locked into the money management behaviour of the Central Bank. The most likely explanation for the DFI is indeed that the Argentinian firms find that an adequate method of exploiting some technological advantages which they hold in relation to local producers in the recipient countries. To some extent, as will be seen later, the activities concerned may not bring the Argentinian enterprises into conflict with other, technologically more powerful, foreign investors because the scale of activity, kinds of products and processes, and end use markets are quite different for Argentinian investors as compared to others from outside Latin America. Even where competition of this kind is involved, the size of the Argentinian activity may not be great enough to warrant strong reprisals. From the side of the partner enterprises and their governments it is also quite likely that the Argentinian firms would need to demonstrate some technological input for their presence to be acceptable. The well known preference for OECD technology on the one hand, and the fact that the Argentinian connexion is most unlikely to give rise to international market links on the other, suggest that the Argentinian investor would have to show he has some technology to offer. The same arguments also would lead us to expect

---

1/ White (35) gives one or two examples.

that the partner enterprises in the recipient countries would tend to be smaller ones which have few established links with other foreign suppliers: the absence of date makes it unfortunately impossible to check that hypothesis at this stage. On the whole, then, knowledge of the characteristics of the investors makes us suspect that DFI is, at least in the "productive" sectors, a proxy for technological advantages and is the chosen way of capitalizing them.

The degree to which the DFI will create fresh behavioural patterns is problematic, most of all because the ability to turn foreign activities into successful long-term endeavours depends on continued injections of new technologies and ideas which, for a DC firm, must stem from dynamism in the internal market. Wells has recently assessed the Argentinian experience as follows. "The subsidiaries of all three of the early Argentine multinationls have, to a large extent, broken their close ties or dependence on the Argentine parent. Siam di Tella has sold all its foreign subsidiaries. The parent never seems to have developed any of the operations into very successful enterprises. Eventually, the parent itself ran into financial problems. On the other hand, Alpargatas' Brazilian affiliate is now larger than the Argentine parent. In that case, new ideas and new technology are, it seems, as likely to come from Brazil as from Argentina. The management ties between Brazil and Argentina are loose; the degree of Argentine control (at least actively exercised) appears to be small. The Brazilian affiliate has, for many purposes, simply become a Brazilian firm, providing occasional ideas to its parent. The Argentine experience tempts one to conclude that the parents of developing country multinationals are likely to make a major contribution to a subsidiary in the form of technology at the outset, but that they are unlikely to have a continuing impact, as have some U. S. based multinationals. With little new input of know-how from home, the subsidiaries are likely to take on lives of their own, becoming more like national firms of their host countries. One should, however, extrapolate only with great caution from the Argentine experience. At home Argentine firms may have lost their

dynamism because of the stagnation of the Argentine economy. The larger firms might have continued to develop know-how had the economy advanced."[1/]

These comments underline the difficulty of welding together and holding together any network of foreign operations without steadily pushing forward the frontier of technical command. It is perfectly reasonable to argue, as has been done recently, that the external projection of Argentine firms "forms part of a process that went beyond the first stages of import substitution and of exports of manufactures to enter more recently into a period of economic openness";[2/] but the sustainability of the outward thrust depends crucially on providing the kinds of inputs which firms in other DCs want. Essentially there are three (3) possibilities:

i) that Argentinians firms move on to world technological frontiers and become innovators in that absolute sense, thereby creating competitive ability in foreign markets against all comers;

ii) that they manage to continue to act as adaptive filters, transforming foreign technology and thus providing more appropriate technology to neighbours before they can provide it for themselves - in this sense Argentina would have to consolidate its situation as an "intermediate" country both by ensuring that OECD technology reached it sufficiently quickly and by ensuring that enough incentives existed

---

[1/] Wells (35), op. cit., pp. 18-19.

[2/] Consejo Latinoamericano para las Relaciones Internacionales, op. cit., p. 10.

in domestic markets for effective adaptation to occur[1];

iii) that Argentina becomes a very competitive producer and export of final goods based on imports of up to date technology but does not follow any formal strategy which envisions a permanent place as a technology exporter.

The three (3) possibilities could all exist simultaneously but in different industrial branches; even so, the overall macro-economic policies pursued would certainly incline the economy more in one direction than others. At the moment the first option is not on, and the general direction of policy seems to veer towards the third. The evidence being handled in this study pertains to the second phase but the presumption must be that the future continuity of that behaviour is in serious doubt. The subsequent data of this and later chapters bear on the issue.

C. Argentinian Turn-key Plant Exports

It is generally considered that the capability to organize the export of turn-key industrial plants, or of complete civil works, is evidence that the technical, organizational and design skills available in the exporting economy have reached significant levels (even if those abilities are not widespread). Table 8 brings together the information on such exports from Argentina over the period 1973 to mid 1980. The aggregate value of more than US$400 million comprises a mixture of items. First, a handful of major infrastructure transactions, above all the Techint contract in Peru which is some 30% of the global total. Second, a series of exports of industrial processing plant which qualified for special incentives under decrees 2785 and 2786 of 1975, and whose total value was above US$86 million (with almost US$30 million

---

[1] One firm interviewed indicated explicitly that this was its approach.

stemming from the single agreement between the Atomic Energy Commission and the Peruvian Government). Third, some recent transactions which are not all completed and whose total value is small, some US$15 million. There may be some further turn-key sales not covered by the list of Table 8 but, on the basis of information supplied by the Government, it seems reasonable to conclude that these sales would not be of significant magnitude.

The data suggest several comments. First, though in aggregate value the Argentinian sales compare quite favourably with those from the other leading DC turn-key exporters (Brazil, India and Republic of Korea), the value per project tends to be smaller than in the case of the two (2) Asian countries. Second, there are, apart from one or two big items, very few instances of Argentine firms winning civil works contracts - this is in sharp contradiction with the pattern in the other three (3) countries and may account for the lower average project value in the Argentine case[1/]. Third, most of the contracts were won through international tenders, which is a priori evidence that the Argentine enterprises could compete. It may be objected that they did benefit from various kinds of domestic subsidies and incentives so that their "real" competitive ability is in question: but on the other hand the same is true for most firms operating in this market and it is not clear that the relative degree of assistance received by Argentinian firms was greater than that of their competitors[2/]. Fourth, there is one case where Government policy impinged directly on the contracts, namely in the arrangements made with Cuba which followed upon special loan agreements made by the two Governments in 1973[3/]. Fifth, the majority of the turn-key plant exports have been realized by domestic firms. Admittedly some of the transactions of largest value have involved international enterprises with offices

---

1/ For more details on these two points see O'Brien (27).

2/ Some of the instances in which firms took advantage of those credits are given in Chapter III.

3/ For example, the activities of the Projects and Export Policy (PEP)

Continuation of Footnote No. 3:

department of the UK's Department of Trade have recently been described as follows:

"Officially, PEP can help best where -

(a) nationalized industries get involved as consultants, or can be paraded as satisfied domestic customers of the firms trying to export;

(b) credit packages need to be marshalled via the export credit guarantee department and other sources;

(c) customer countries want a quick government-to-government negotiated deal without going to open international tender.

In practice, however, PEP's real role is to push and shove government, industry and finance interests to put together credible British bids. It is a machine for shirt-sleeved indirect intervention to match the disciplined approach to bidding practised by the French and Japanese governments for their business,"

in Argentina yet the range of items covered, some of them relatively sophisticated, comes essentially from local firms. Not all of those firms were capital goods producers: as will be discussed in the next chapter, in several cases engineering firms were involved and in some instances even trading companies which were able to draw on their substantial knowledge of internal and external market conditions to weave together the strands of the turn-key deal. Sixth, the overwhelming majority of the sales were in Latin America with by far the largest value being in Peru, due to a couple of major contracts, but with about a dozen countries involved. Only one contract has been successfully realized in Mexico. Seventh, it seems that the peak of activities, measured in value terms, had certainly passed by end 1978. Since that time the only contracts which have been registered, by private firms (leaving aside the Atomic Energy Commission arrangements in Peru) are of low value and it is in any case doubtful that all of these are being actually implemented. Eighth, the data do not of course say anything about the profitability of the deals or whether they have been accompanied by many tenders which failed - those issues will be considered in some specific cases in the next chapter.

The label turn-key is apt to be misleading insofar as it suggests a monolithic entity supplying technology. This is clearly not the case in Argentina where several of the contracts have had to call upon a few firms to carry them out: in general it seems that the small contracts have been handled by just one or two firms, usually machine producers and engineering firms, while the larger contracts have often required the participation of more entities. In virtually every case, however, the technical inputs made by the Argentinian firms are not ones stemming from significant innovations in Argentina. Rather, they reflect the ability to undertake relatively standard technical activities efficiently, at acceptable prices, qualities and delivery dates, and certainly include the appropriateness of Argentinian work, in the sense of an understanding of the problems faced by producers in neighbouring countries. An important element in the sales thus

seems to be that the contemporary history of, and problems facing, several Argentinian firms come within the same realm of technical discourse as those of firms in other countries of the Latin American region. But by the same token much of the knowledge is still embodied in individuals, technicians and engineers, who have had direct experience of problem solving themselves, rather than in manuals or sets of instructions which can be transmitted from one firm to another in a fairly impersonal way[1/]. This implies both the difficulty of repeating sales easily and the pressure which success in winning tenders is likely to put on firms - when the same small numbers of skilled people have to handle several things simultaneously, the resilience of the firm as a whole to unexpected alterations in conditions is lowered.

All of the foregoing observations hint that the ways in which these turn-key and civil construction deals take place among DCs might involve many different kinds of problems to those experienced in arrangements among DCs and ICs. In the latter case the very word turn-key conjures up a vision of huge integrated operations where the buyer is likely to pay far too high a price for what he receives, and in which the seller is a big, experienced outfit that has fully systematized its handling of the projects. That vision is not applicable, in most instances, to the kinds of arrangements in which Argentine based firms have been engaged. Unexpected problems arise and unexpected advantages can be created: the enterprise level findings in the next chapter consider the matter in greater detail.

D. Licensing Contracts of Argentinian Firms

The imitative nature of the industrialization process, and the consequently limited number of Argentinian patents registered abroad, suggest that the number of licensing contracts to be found will be small. Data could be found only for two (2) Latin American countries

---

[1/] The applicability of this point to many DC exports of technology is noted by Wells (34).

from the official registries. In Peru in 1977 only 4.9% of all such contracts were with Argentinian firms: 1978 figures for Venezuela put the corresponding percentage at 2.5%[1/]. In relation to other Latin American countries the Argentinian performance was good and indeed similar kinds of evidence for other DCs suggest that probably only India has a comparable degree of contractual links[2/]. The difficulty of generating technological improvements of a kind which can lead to domestic and foreign patenting and be put in a form where licensing can be successfully undertaken is manifest in DCs. As noted above, most of the technological improvements do not lend themselves to patenting in the first place; they are either skills embodied in the technicians and engineers or, if the changes do represent significant modifications to existing methods, the terms on which the foreign technology was originally imported may effectively bar the DC firm from patenting the improvement. But to obtain a patent abroad is only half the battle for, as has been repeatedly emphasized in the critical literature on the international patent system, the patent document may be of little use without the complementary data and technical assistance which convert the written specifications into material goods. The fact is that DC firms are not geared to the organization of technical knowledge in this way nor, in the vast majority of cases, do they regard the technical information as a key marketable asset. They are thus rarely in a position to help a would-be licensee in transforming the information into production reality. It is this central fact, which stems from the nature of DC industrialization, that accounts for the paucity of licensing arrangements.

Within the contract data, limited as they are, some further comments

---

1/ Though these proportions are higher than the corresponding figures for DFI, they unfortunately give no clue as to the relative value of the contracts.

2/ See Lall (21) and O'Brien (27).

are in order. First, it is not clear whether many of the firms based in Argentina and concluding licensing arrangements are in fact of Argentinian ownership. There are grounds to suppose that some, and perhaps several, of the cases involve affiliates of foreign firms based in Argentina. Second, the size of royalties generated by the contracts is not known with any precision: even if estimates could be made on the basis of detailed information emanating from the recipient enterprises, it does not follow that the cash involved would be remitted to Argentina. In short the foreign exchange implications of the contracts are unclear (clear figures would of course have to take into account any commodity flows from Argentina to the licensing country consequent on the arrangements). Third, at least in the case of Peru part of the contractual data may come from the close ties of the Argentinian Atomic Energy Commission with that country. Though those ties are not evidenced by patents, they are sometimes formalized in technical assistance contracts which are probably included in the aggregate figure given earlier. Thus the contractual arrangements do not necessarily relate to the operations of private Argentinian entities[1/].

The point just made raises the question of to what extent Argentinian firms have been successful in obtaining general technical assistance contracts e. g. to undertake feasibility studies, offer management support, and so on. Here there is scarcely any solid evidence on which to build, though a recent study has stated: "Although no reliable figures exist, the partial data available suggest that the sale of consultancy services abroad may be estimated as not less than US$10 million for the period 1973-1977. The data do

---

1/ The Atomic Energy Commission has undertaken and continues to undertake training of personnel in other countries of the region. The time periods for co-operation in the nuclear field tend to be much longer than in other sectors due to the gestation periods of these projects. At the same time the results can often be diffused very widely i. e. the nuclear sector is an "industrializing industry". In the case of Argentina the author was told that only 3% of persons qualifying from Bariloche work in the nuclear sector, eloquent testimony to the technological malleability of such training.

not include the value of technical services incorporated in the sale price of industrial plants and civil works"[1/]. Even with that figure, a part may be due to the operations of affiliates of foreign companies located in Argentina. In any case the Argentinian activity here is definitely considerably less than that of Brazil, Mexico and India, the three (3) other DCs which have taken an interest in the market. What is notable in the experience of those three (3) countries, and is largely absent in the Argentinian case, is the role played by public enterprises on the one hand and by associations of private firms on the other.

Public sector involvement comes through strongly in all three (3) countries mentioned above. Data for India covering the period to end 1978 identified nineteen (19) large enterprises involved in supply of consultancy services abroad, (to sixty-seven (67) DCs) and of these ten (10) were public enterprises. Some striking figures relate to the public enterprises: Water and Power Development Consultancy Services (WAPCOS), dealing mainly with electricity generation, obtained more than 80% of its earnings from abroad, and Rail India Technical and Engineering Services (RITES), working chiefly in railway construction and management, obtained about one-third of its earnings from abroad. Some public firms, such as Engineers India Ltd. (EIL), are adopting aggressive strategies of links with international consultancy firms in a bid to collect a share of some of the bigger deals in ICs: this is, of course, a familiar approach within the OECD area itself. For Mexico, PEMEX has, through the Instituto Mexicano de Petroleo, provided technical assistance to at least Costa Rica, Cuba and Ecuador in the region, while in the same sector PETROBRAS has contracts within and outside of Latin America to provide technical assistance, and its subsidiary BRASPETRO signed an important contract with PETROPERU in 1979 for the exploration and exploitation of petroleum in the Peruvian part

---

[1/] Consejo Latinoamericano para las Relaciones Internacionales, op. cit., p. 10.

of the Amazon region. Though the Argentinian public enterprise Yacimientos Petrolíferos Fiscales (YPF) does have arrangements with Ecuador, the degree of its expansion appears to be much less than that of the Mexican and Brazilian public enterprises. When the comparison is extended to include other big sectors, especially iron and steel, the foreign spread of Argentinian public firms is seen to be much less.

At the private level of association among consulting firms the experience of Tecniméxico is revealing. It was formed in 1974 and brought together thirty-two (32) consulting and engineering firms: in the first five (5) years of its operation it obtained more than sixty (60) contracts, the vast majority being in Latin America. The joint operation of these firms allows them both to cover a much wider spectrum of skills and to even out the notorious peaks and troughs of the consultancy market, a point of especial relevance to Argentina where the starts and stops in economic activity have surely compounded the already complex task of providing useful technical services on acceptable conditions.

In all it may be concluded that the foreign expansion of Argentinian consulting operations is relatively less than would be expected from the other foreign activities (exports of goods, DFI and turn-key sales) carried out by Argentinian firms. Though relevant figures for the past couple of years are not available, the likelihood is that the contraction in domestic industrial activity, the considerable pressure on Argentinian prices due to internal inflation and the level of the exchange rate, and the outflow of many skilled persons, have weakened still further Argentinian performance in this area. An important element in future efforts at technology export must be to build sound bases, in terms of market organization, prices, and range of services offered, on which the supply of technical services can be provided. The strong probability is that the main competitors in Latin American

markets will continue to be public and private entities from Brazil and Mexico as well as firms or consortia of firms from the OECD countries: without a determined strategy to meet what promises to be fierce competition, it is unlikely that Argentinian international projection in this realm can expand.

E. The Motives for International Activity: Some Hypotheses

The material presented in this and the first chapter provide the context in which technology and technology related exports from Argentina have taken place. In brief, the growth of industrial capabilities, the openings presented by the spread of co-operation and communication among the Latin American countries, the options for and pressures on the expansion of foreign activity provided by the simultaneous existence of liberal access to (private) international credit and irregular demand conditions at home, and the fact that it becomes ever more difficult to export industrial items unless back-up support, including even the willingness to engage in (minority) joint ventures in the recipient countries, is forthcoming[1/], all paint the backcloth against which individual Argentinian firms have found it easier to move abroad. Yet this enumeration of contextual factors does not explain <u>why</u> firms should have chosen the specific forms that they did.

In all business activities risk and opportunity are fundamental concepts. In the Latin American industrial environment they have been particularly heavily influenced by changes in domestic government policies and in neighbouring government policies, on the one hand, and by the metamorphoses produced through the operations of TNCs on the other. Risk diversification in anticipation of or in response to government policy changes at home and abroad have certainly been one motive for Argentinian DFI. Shifts in the relative profitability of

---

[1/] This argument is stressed by White (37).

production in alternative locations, consequent on demand movements, alterations in tariffs and exchange controls, and the overall growth prospects of new markets, have led not only to expansion of DFI at certain times but also to its contraction at other periods. The risk factor has also affected the kind of DFI, in that the specific activities shifted abroad will be determined according not only to market convenience but also to the prospective losses which would be incurred if the investment had to be terminated.

The search for better protection against increasing risk of market loss, whether at home or abroad, due to the growing transnationalization of powerful competitors, appears to be one possible motive for all types of technology export. Part of a firm's ability to sustain its domestic market position increasingly depends on its total range of experience, including foreign operations. Even where, therefore, a firm is not at present motivated by a desire to establish a permanent rank in foreign markets, it may well find it valuable to develop such transactions so as to consolidate its domestic position.

In terms of opportunities, government policies and TNC behaviour again play major roles. The provision of general and specific incentives to export behaviour has been important in Argentina, as witness the decrees 2785 and 2786 of 1975 promoting the export of turn-key plants and complete civil works, and the credit provided to Cuba in 1975 upon which several turn-key plant exports were based. There is little doubt that significant inputs could be made through much better project oriented industrial and market information but this has played only a limited role so far. The strategic functioning of TNCs indirectly serves to create some opportunities in that such enterprises have so far neglected the possibilities of manufacturing technology exports of an intra-Latin American kind. This does not mean, of course, that their strategies have not worked well on their own terms: rather, it implies that smaller scale activities building on considerable local adaptive work are not where the comparative advantage of TNCs lies. At

the present period, then, this organization of markets gives chances to Argentinian firms - in the longer term, of course, they may want to break out of this "subordinate" situation and at that time, as argued earlier, they would need to be selling a different kind of technological asset to that which they now have.

To summarize: technological capabilities of a "second order" nature have developed over the past two (2) decades and this development has coincided with, and been in part the cause of, a sharp growth of exports of more complex industrial goods. The risks and opportunities for foreign projection building explicitly on these skills have been powerfully moulded by changes in Argentinian government policy and in that of other Latin American countries, as well as by the behaviour of TNCs. The information on individual cases given in the next chapter should be seen in the light of these loose hypotheses.

TABLE 5
AUTHORIZED ARGENTINIAN INVESTMENTS ABROAD
1 January 1967 to 31 March 1980
(By Country of Destination)

Country	US$(000)	Number of Projects
Peru	21,465	5
Brazil	8,501	15
United States of America	5,167	3
Chile	4,741	9
Uruguay	9,454	18
Venezuela	2,933	5
Bolivia	2,290	7
Paraguay	2,541	10
Ecuador	1,565	3
Colombia	1,099	2
Panama	810	1
Federal Republic of Germany	480	2
Spain	390	2
Mexico	380	1
Italy	350	2
Honduras	216	1
Costa Rica	135	1
Belgium	97	1
France	20	1
T O T A L	62,634	89

Source: Ministry of Economy, Subsecretaría de Inversiones Externas

TABLE 6
AUTHORIZED ARGENTINIAN INVESTMENTS ABROAD
1 January 1967 to 31 March 1980
(By Sector)

Sector	US$(000)	Number of Projects
Petroleum	23,030	3
Manufacturing	30,481	47
Construction	4,814	10
Trade	2,565	20
Transport	1,066	6
Agriculture and Animal Husbandry	600	1
Industrial Services	78	2
T O T A L	62,634	89

Source: Ministry of Economy, Secretaría de Inversiones Externas

TABLE 7

INTRA-LATIN AMERICAN INVESTMENTS BASED ON DATA OF RECIPIENT COUNTRIES
(Stocks at End Year Shown)

-11-

Countries Of Origin	RECIPIENT COUNTRIES: Registered: Argentina 1976	Brazil 1979	Colombia 1978	Ecuador 1977	Guatemala 1976	Mexico 1978	Peru 1978	Venezuela 1979	Sub-Total	Approved: Bolivia 72-76	Chile 74-78	Grand Total
Argentina	-	24.425	1.062	10.846	-	992	2.531	2.590	42.446	441	662	43.549
Bolivia	2.605	-	5	-	-	-	886	191	3.687	-	133	3.820
Brazil	16.889	-	2.404	4.752	-	734	3.006	351	28.136	1.301	13.969	43.406
Colombia	22.043	244	-	10.347	-	5	913	1.558	35.110	-	50	35.160
Chile	355	290	195	11.097	-	218	1.776	84	14.015	271	-	14.286
Ecuador	-	152	17.620	-	-	-	1.786	21	19.579	-	100	19.679
México	762	8.236	4.142	4.771	7.037	-	2.073	1.919	28.940	-	2.552	31.492
Perú	8	-	1.719	1.186	-	133	-	200	3.246	594	47	3.887
Uruguay	7.930	39.365	1.111	-	-	-	3.742	3.960	56.108	-	300	56.408
Venezuela	10.090	13.751	26.123	5.525	1.926	1.205	3.833	-	62.453	-	5.697	68.150
Other Latin Americas	-	278	278	-	9.310	-	108	961	10.935	-	82	1.709
T O T A L	60.682 vvvvvv	86.741 vvvvvv	54.659 vvvvvv	48.524 vvvvvv	18.273 vvvvvv	3.287 vvvvv	20.654 vvvvvv	11.835 vvvvvv	304.655 vvvvvvv	2.607 vvvvv	23.592 vvvvvv	330.854 vvvvvvv
% - Investment of Latin American Origin in Total Direct Foreign Investment	1,73	0,60	6,48	6,40	6,8	0,22	2,0	0,78		*/	0,95	

Source: Campos (6)

*/ Not Available

TABLE 8

ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS

Type of Plant	Destination	Value (US$)	Date	Firm
Aniline Processing Plant	Chile	330,000	30/10/77	Anilinas Argentinas
Complete Plant (All dissolvent extraction group)	Chile	720,000	18/07/77	De Smet S. A. I. C.
Complete Plant for the Slaughtering and partial use of cattle and pigs	Chile	163,300	13/01/78	Guillermo Jacinto Santos
Processing Plant for Lamb Meat and Sheep By-Products	Chile	1,190,000	12/79	LB
Bread Making Plant	Chile	114,917	29/10/76	Phoenicia S. A. I. C.
Processing Plant for Meat and Fertilizers	Chile	170,000	/80	LB
Integrated Communications System for Public Services	Chile	2,800,000	/73	Sicom, S. A.
Plant for Processing Candy	Paraguay	370,592	17/01/79	Arcor S. A. I. C.
Chicken Slaughtering and Processing Plant	Paraguay	188,671,800	20/08/76	Caisutti S. A.
Complete Granitic Tiles Processing Plant	Paraguay	665,000	9/03/78	Cerno S. A. I. C.
Complete Plant for the Production of Paper Multifold Industrial Bags	Paraguay	434,317	10/77	Febi S. A.

TABLE 8 - ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS
Page -2-

Type of Plant	Destination	Value (US$)	Date	Firm
Complete Plant for Storing and Processing Cotton oil and seeds	Paraguay	1,286,740	6/11/78	G. P. C. S. A.
Instant Soluble Coffee Complete Plant	Paraguay	1,569,960	13/09/77	Prosex S. A.
Sulphuric Acid and Aluminum Sulphur Plant	Paraguay	1,046,000	08/79	Tool Research Arg. S. A.
Installation of air-conditioning, ventilation and heating for a bank	Paraguay	90,000	/74	Lixklett, S. A.
Airport (turn-key)	Paraguay	52,000,000	/75	B. Roggio e Hijos, S. A.
Complete Plant for the Processing of Chrome Salts	Paraguay	132,400	/80	Tool Research Arg. S. A.
Plant for Production of Candy	Paraguay	57,573	/80	Arcor, S. A. I. C.
Two Grain Storage Plants	Paraguay	700,000	78-79	Kracia, S. A.
Soybean Oil Plant	Paraguay	8,000,000	/80	Kracia, S. A.
Complete Plant for Bread Making	Cuba	2,900,000	11/75	Phoenicia S. A. I. C.
Complete Plant for the Meat Industry	Cuba	12,500,000	26/08/77	S. E. I.
Warehouses of Metal Structure and Lining for a Port	Cuba	6,775,000	/74	Emepa, S. A.
Warehouses, Metal Covering and Silos for Poultry Farms	Cuba	15,940,532	/74	Emepa, S. A.

TABLE 8 - ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS
Page -3-

Type of Plant	Destination	Value (US$)	Date	Firm
Metal Silos with Integrated Transporters	Cuba	2,829,073	/74	Talleres Adabor, S. A.
Preparation Equipment for Soya and Sunflower seed cake. Complete plant of extraction through solvent. Pelletization Plant	Uruguay	746,376	07/76	De Smet S. A. I. C.
"Spray Type" Drier Complete Plant	Uruguay	269,854	02/77	S. E. I.
Complete Plant for Processing Special Tubes for Carding Shaft	Uruguay	81,823	10/77	SIPCESA
Complete Plant for Hydrolyzate, Concentration, and Drying of Fish Protein	Uruguay	360,484	/77	S. E. I.
Industrialized Milk Plant	Uruguay	428,000	09/79	S. E. I.
Plant for Manufacture of Electrical Appliances	Uruguay	678,955	/80	Electro Propulsora, S. A.
Plant for Treatment of Industrial Water Supplies	Uruguay	47,300	/75	Nisalco, S. A.
Plant for Grain Storage and Processing	Uruguay	483,572	/76	Secadoras Tradi, S. A.
Plant for the Manufacture of Sodium and/or Calcium Casein, and Powdered Milk Serum	Uruguay	269,854	/77	S. E. I.

TABLE 8 -ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS
Page -4-

Type of Plant	Destination	Value (US$)	Date	Firm
Plant for gas Fractioning and Bottling	Uruguay	1,400,000	/79	Poligas Luján
Concrete Making Plant	Uruguay	2,000,000	/80	Kracia, S. A.
Complete Plant for the Extraction and Crystalization of an Active Principle Derived from a Honduras Fern	Honduras	461,145	4/77	Laboratorios Bagó
Complete Plant for Processing Pharmaceuticals	Honduras	940,000	6/79	Laboratorios Bagó
Equipment for the Production of Pharmaceuticals	Honduras	240,033	/80	Laboratorios Bagó
Plant for Extraction of Active Principles from Plants	Honduras	450,000	/76	Laboratorios Bagó
Complete Plant for Dehydrating Coffee Plant	Costa Rica	913,889	6/79	Meitar Aparatos S. A.
Plant for the Production of Hypodermic Syringes in Plastic	El Salvador	295,698	6/77	Phoenicia S. A. I. C.
Plant for Dehydrating Crustaceae	El Salvador	220,640	/80	Meitar Aparatos S. A.
Complete Plant for the Production of Iron Parts for Electric Works	Bolivia	149,466	10/76	Semati S. A. I. C.

TABLE 8 - ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS
Page -5-

Type of Plant	Destination	Value (US$)	Date	Firm
Complete Plant for Oil Production	Bolivia	5,524,873	2/76	De Smet S. A. I. C.
Processing Plant for Powder Balanced Foods	Bolivia	239,173	2/76	Giuliani Hnos. S. A.
Glass Containers Production Plant	Bolivia	2,139,428	8/79	Kracia S. A.
Plant for the Production of Medicinal Specialties	Bolivia	234,533,580	8/77	Laboratorios Bagó
Complete Industrial Plant for Processing Citric Fruits, Pineapple and Cassava	Bolivia	8,810,000	1/76	Meitar Aparatos S. A.
Plant for Extraction of Vegetable Oils Derived from Cotton Seeds	Bolivia	4,000,000	/75	Eximparg S. A.
Plant for Production of Anti-Biotics	Bolivia	220,000	/75	Laboratorios Bagó
Plant for Manufacture of Pesticides	Bolivia	45,000,000	/77	Tecnimontsade (Italian-Argentinian Consortium)
Complete Plant for Production of Glass Microspheres	Venezuela	298,220	10/78	Cleansol Arg. SACFI
Lead Oxide Production Plant	Venezuela	146,800	8/76	Harial S. A.

TABLE 8 - ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS
Page -6-

Type of Plant	Destination	Value (US$)	Date	Firm
Lead Founding and Reproduction Plant	Venezuela	105,700	8/76	Harial S. A.
Plant for the Manufacture of Plastisols, Sealers and Gloves	Venezuela	563,023	/80	Plastilit S. A.
Two Complete Plants for Honey Processing	Cuba	1,490,000	1/76	Dosicenter Saic y Financiera
Spice Processing and Packaging Plant	Cuba	1,440,000	4/76	Gele S. R. L.
Complete Plant for Processing Citric Fruits	Cuba	6,200,000	12/75	Meitar Aparatos S. A.
Complete Plant for Drying Resins of the Used Type	Peru	540,000	6/77	S. E. I.
Processing Plant for Sliced Pineapples and Simple Juice	Peru	261,625	8/78	Superarg SACIFI
Complete Plant for the Production of Formaldehyde Urea and Melanium Molding Powders	Peru	250,000	4/77	Vinisa S. A.
Radioisotope Processing Plant	Peru	20,018,476	12/79	Comision Atómica
Oil Pipeline and Filling Stations	Peru	120,000,000	/75	Techint S. A.

TABLE 8 - ARGENTINIAN EXPORTS OF TURN-KEY PLANTS AND CIVIL WORKS
Page -7-

Type of Plant	Destination	Value (US$)	Date	Firm
Complete Plant for Processing Jellies, Jams and Marmalades	Ecuador	121,950	1/79	Superarg SACIFI
Automatic Telephone Exchange and External Communications Plant	Ecuador	678,857	/73	Standard Electric S. A.
Supply and Distribution Terminals for Liquified Gas	Ecuador	1,998,300	/75	S. A. Lito Gonella e Hijos
Pressed Coffee Licquor Processing Plant	Costa Rica	585,	/80	Meitar Aparatos S. A.
Hydraulic Turbines and Regulators	Colombia	14,801,800	/80	Industrias Metalúrgicas Pescarmona S. A.
Plant to Produce Glycerine	Mexico	90,000	/74	Nisalco S. A.
Technology Transfer and Technical Assistance for the Production of Alcohol, Grape Oil and Tartaric Acid	Mexico	1,500,000	/80	Tarcal S. R. L.
Hospital	Ivory Coast	46,000,000	/77	Latinoconsult S. A.
G R A N D T O T A L		416,463,508		

SOURCE: Official Data

CHAPTER III - Case Studies of Exports of Industrial Technology from Argentina

A. Introduction

The purpose of this chapter is to provide further insight into Argentinian experience of industrial technology exports on the basis of interview evidence obtained during the first half of September 1980 from a series of enterprises, officials of the administration, industry associations, and researchers who have particular knowledge of this field. Subsequent to the interviews a questionnaire was circulated to forty-five (45) individual firms, four (4) industry associations, and a public entity with experience in technology export. The questionnaire is given as Annex 1 to the present draft: material from replies to the questionnaire is drawn on in this chapter but the draft does not include statistical tables based on responses since, at the time of writing, insufficient complete answers had been received. The difficulties of generating an adequate sample of enterprises in this area are well known in the Argentinian context where the lack of sufficiently precise official data on issues relating to the external projection of enterprises, along with the reticence of firms to provide detailed replies, make the assessment of such information problematic. A recent study[1/], for example, attempted to begin with the broader and in principle more manageable and readily identifiable set of enterprises which were significant exporters of industrial goods. Confronted with the lack of a satisfactory list of this type, an alternative was prepared on the basis of data obtained from the Compañía de Seguros de Crédito a la Exportación. The written questionnaire was sent to ninehundred-twenty-seven (927) firms of whom eighty-four (84) (some 9%) eventually replied, and of these interviews were eventually conducted with eighteen (18) which seemed particularly

---

[1/] Consejo Latinoamericano para las Relaciones Internacionales, op. cit.

relevant. The eighteen (18) firms in question had industrial exports in 1978 of US$8 million; most of them were small or medium size though four (4) alone did account for 90% of the domestic sales of the group of eighteen (18). In that instance a substantial time was necessary for the whole survey to be undertaken.

Before turning to the specific material obtained in the UNIDO enquiry it is useful to give a brief summary of the main findings of what appears to be the only detailed analysis of technology exports undertaken at the firm level in Argentina[2/]. A study published by the Organization of American States in 1976 focused on the potential supply of technology by small and medium firms in twelve (12) continuous processing industries. Though the sample of 72 enterprises included some which had already exported technology, the majority of firms in the sample were ones in which there were strong reasons to believe that local generation of technology had occurred and that a definite capacity to export technology existed. A classification of the sample according to their technological level indicated that some 60% had a relatively high technological capacity, while another 30% had a good level.

The survey showed:

1. Sixty-six (66) of the seventy-two (72) firm had various kinds of technological capacities potentially or in practice commercialisable. Of the six (6) remaining, 4 were included from exporting due to licensing restrictions imposed by the original foreign supplier, one firm did not wish to compete in foreign markets with its own product exports, while one firm stated that it had sold technology abroad but refused to provide further information.
2. Using a detailed classification of technology the following results were found with regard

---

[1/] Roulet, op. cit.

to the export capacities of the firms. Process technology, 67% able to export; consultancy, 53%; basic engineering, 66%; detailed engineering, 50%; partial supply of equipment, 53%; supply of all equipment, 46%; turn-key plants or complete works, 67%; project management, 60%; training of personnel in the plant of the supplier, 70%; training in the plant of the buyer, 74%; technical assistance, 74%. One third of the firms were able to supply technology under all headings. Approximately 61% of the firms actually offering technology abroad claimed to be in a position to supply turn-key plants.

3. Of the firms actually offering technology, more than 70% had undertaken some of their own development of technology though the skills revealed were more of an organizational type and were mostly not in areas where items were under license.
4. About 82% of the firms in the market claimed they had good to excellent capabilities of a technical nature to prepare the offers.
5. A sub-sample (twenty-four (24) firms) showed that one fifth of them were able to handle exports for more than US$1 million (1975 prices).

The OAS study concluded with a series of recommendations to which we will return later. For the moment it is important to stress that the enquiry focused on export potential and was conducted at a time when there was a certain euphoria about prospects. The information gleaned from the UNIDO interviews and questionnaire was obtained five (5) years later when the mood was quite different and when, indeed, the available evidence suggested that the potential existing earlier had, in many instances, not been realized.

B. Information from Enterprises

The firms engaged in technology export from Argentina have diverse histories and present activities. They include capital goods producers, engineering firms, enterprises whose main sales are of final goods, trading firms and even financial entities. Most but not all are nationally owned and many are relatively small, though with a turnover and staff liable to sudden, dramatic changes with the signature of new contracts. As will be seen, the importance of export market to the firms varies considerably depending on both the conditions in Argentina and those abroad. The following paragraphs summarize the experience of a series of firms which, it is believed, provide a reasonable cross-section of the current population.

Enterprise 1

The enterprise was founded in 1965 and devoted to the design, production, installation and placing in operation of equipment for the food processing industry. The facilities and resources of the firm include its own workshop, a pilot plant for testing of new processes and techniques and a staff (at the time of interview) of more than twenty (20) experienced engineers and technicians. The firm has the capability to organize turn-key projects in which it manufactures the items of food processing technology in which it is specialized and buys in the rest, taking responsibility for the whole operation. The foreign operations of diverse kinds, including equipment sale, turn-keys, and preparation of projects, have been entirely in Latin America, the countries being Bolivia, Brazil, Colombia, Cuba, Chile, Ecuador, Paraguay, Peru and Uruguay.

The firm regards its greatest asset as the engineering team, built up over several years though recently falling in number due to rising costs, insufficient demand for equipment and projects, and the increasing difficulty of project financing. The firm estimates that during 1979 the costs of hiring professionals roughly doubled while fixed costs rose by around 90%: at the moment the preparation

of a pre-feasibility study costs some three (3) times more than it did in 1976 and the firm regards its prospects for the sale of turn-key plants abroad as virtually nil. In this it believes the situation of other engineering firms with specialization in the agro-industrial area to be no different. The issue of creating confidence among would-be buyers is regarded as of great importance in technology export and the firm argued that confidence creation is a continuous process, reinforced by repeated external sales. In this sense it was felt that the current absence from the market for cost reasons would have longer term effects. On the one hand the preparation of experienced and competent professionals in this area of engineering takes time, and on the other the "re-entry" into the Latin American market could also be a lengthy process. The firm estimated that, on the assumption of a marked change in the relative cost situation of Argentina compared to its competitors (and in this kind of service activity the exchange rate level and the pace of domestic as compared to external inflation were crucial) it could be some four to five (4-5) years before the external market position was regained.

Throughout its life the firm has treated exports and domestic market sales as complements rather than substitutes. A strong internal market enhances the rate of technical improvement, encourages expansion of the enterprise, and provides the necessary solid foundation on which the riskier foreign market can be explored. The impact of turn-key activities on the risk situation could be readily judged from the firm's experience in eight (8) Latin American countries where the relationships between attempted sales (i. e. projects were submitted) and contracts actually obtained during the period 1974-1980 were as follows: Bolivia, 2/0; Cuba, 7/3; Chile, 5/2; Ecuador, 1/0; Paraguay, 1/1; Peru, 4/1; Uruguay, 3/2; Venezuela, 5/0. At today's costs, preliminary studies for such operations could reach some US$50,000 per project, which implies that the profit rates on jobs actually undertaken would have to be fairly high just to make the net returns from technology exports (failures as well as successes) acceptable. The

difficulty of obtaining, and the price of, credit indicated that the firm would, for the most part, only consider it useful to undertake fairly small turn-key jobs, with a value of the order of US$0.5 million. The breakdown of such a project could be handled by about four (4) good engineers who would concentrate on design activities, sub-contracting and buying most of the equipment.

To analyze in greater depth the experience of the enterprise, information was obtained on two (2) specific turn-key plant operations, one in Cuba and the other in Bolivia.

In August 1973 the Argentinian government concluded an economic agreement with the government of Cuba. Part of the agreement involved the grant of a credit by the Argentinian government to Cuba, thereby eliminating at a single stroke one of the major obstacles to many technology export operations. To utilize the credit the Argentinian government sent a large delegation of technical persons to Cuba to discuss the initiation of possible projects, and Enterprise 1 was part of that delegation in view of its experience in the food industry. After preparation of a preliminary project consistent with Cuban standards discussions were held in Cuba during a two-month period and then a full agreement was signed.

The agreement implied a massive extension of the activities of the enterprise and indeed it was estimated that about 5% only of the equipment was produced in the workshop of the enterprise. The size of the operation was certainly considerable but the firm did have prior experience in designing similar types of equipment for the Argentinian market where its specialization in the technology of evaporation and drying of raw food inputs had given it a strong position. The division of work under the agreement involved Argentinian responsibility in the first phase of project preparation, design of equipment and financial and legal arrangements, Cuban responsibility in a second phase of construction of the plant (with consultancy advice from the enterprise), and once again Argentinian responsibility for the third phase in which

the equipment was installed, tested and brought up to rated capacity. When that was completed the turn-key plant could be handed over.

The enterprise judged that it was competitive in price with other countries as far as the Cuban contract was concerned, that the similarity of language played a significant role in the arrangements, and that a decisive advantage did come from the economic arrangements made by the governments. The problems were essentially those of the internal organization of the firm bearing in mind that, as mentioned above, the project was some two or three times larger than the usual and that at one point some sixty (60) engineers were working on this project alone. The firm felt that it would be difficult to expand operations in this market, partly because the Cuban market was not sufficiently large to permit many installations of this type.

A quite different experience, in which countless problems connected with organizing technology exports among DCs arose, was that of an attempted turn-key operation in Bolivia. The firm does not know how the Bolivian partner came to hear of its expertise in this industry but recounts that it received a proposal from an agricultural cooperative in Bolivia for the installation of a plant to produce concentrated orange juice. The cooperative apparently wished to replace the cultivation of coca leaves and introduce citric fruits. The firm considered that for various reasons, including the absence of adequate refrigeration and packaging facilities as well as the very high output level requested, the initial project of the Bolivians was much too ambitious. Accordingly it modified the whole scheme and in the process reduced the cost estimates by about 50%. It then offered to construct a turn-key plant for the new project and invited some of the Bolivian personnel to visit its own installations and form its own assessment of the reliability of the Argentinian enterprise. The enterprise believes that this creation of confidence is fundamental to such operations among DCs. The strong bias which buyers have towards technologies from ICs, coupled with the fact that DC technology suppliers do not have, in most

cases, a long experience on which to draw, underlines the need to create such confidence.

When the project had been designed it became clear that new land would have to be purchased and that various problems in transporting equipment to the site would have to be resolved. Furthermore on this occasion there were no inter-governmental arrangements to ensure the supply of credit. To obtain funds the Bolivian cooperative had to present a project proposal, fully itemized, to the National Institute of Investment, a proposal which would also serve to guarantee that no tariffs would be charged on imported equipment. Once more the Argentinian enterprise had to prepare the relevant documentation, which it agreed to do for a payment of US$50,000 - the enterprise says that it never received more than US$15,000 for that work. The financing itself turned out to be much more complex than had been expected, since under Bolivian law the property of a cooperative (which would normally have served as the guarantee against the loan) cannot be seized. Consequently a guarantee of 125% of the required loan was sought and this was eventually obtained after a delay of almost a year through the collateral of another co-operative working in the cement industry. It was agreed that the project should involve the maximum participation of Bolivian materials and labour and that the costs of the local construction work should be financed by credits in Bolivia.

Even after these difficulties had been met a series of political problems arose whose final impact was to block the project altogether. Despite efforts by the Argentinian firm which even reached the Bolivian presidency, the problems were not resolved and the necessary letters of credit were never officially opened. According to the enterprise this project did not fail because of outside competition, lack of confidence, or even because of technical obstacles. Rather, the failure was attributable to insufficient clarity in the policies of certain public entities in the recipient country along with certain pressures from the private sector in that country which was unhappy with the prospect

of competition in the fruit juice market. It was not, therefore, that the Argentinian firm lost a contract to another technology supplier: it was simply that the project was never realized.

These cases, along with the other observations made by the firm, suggest a series of points affecting technology exports from Argentina. First, the advantages of a local supplier appear to reside in his technical flexibility, the possibility that purchasing firms in neighbouring countries can visit the Argentinian firm and thereby assure themselves that it is a sound operation, the common language and to some extent history of industry, and (until recently) competitive price levels. Second, at least in agro-industry, the pattern of market development appears to have been the national market, then neighbouring countries, and finally more distant countries. Third, the issues in establishing technology arrangements of course extend far beyond technological matters. Problems of legislation, marketing, structure of demand in the purchasing countries, and credit facilities are all of considerable importance. Fourth, the ratio of successful offers to total offers is not that high and the costs of unsuccessful attempts can be appreciable. In fact Enterprise 1 indicated that in the end it was the Cuban arrangements which financed the losses elsewhere. Fifth, there must be a genuine dialogue between DC enterprises if such arrangements are to succeed. The present circumstances somewhat resemble a marriage where both partners are virgins and the lack of experience leads to a high divorce rate.

Enterprise 2

This firm was founded at the turn of the century and initially was concerned with distribution alone. In the late 1950s it started its activities in the petroleum sector where it continues to concentrate its efforts, above all in drilling and oil exploration work both on sea and on land. At the present time it is also engaged in activities linked with petroleum, including purchase and sale of machinery, of crude oil, and in the insurance field. In certain other industrial

branches, such as petro-chemicals, pulp and paper, and fishing, it is a majority shareholder in enterprises which manufacture end products. In still other fields it is a minority shareholder. All in all the holding company employs directly a staff of some 3,000 people, and indirectly roughly another 2,000.

This firm shows clear evidence of having followed a systematic strategy for the incorporation of technology mainly coming from USA. In 1965 it formed a joint enterprise, on a 50/50 basis, with an American firm specializing in drilling for petroleum. Through this association it greatly improved the professional development of its staff, and indeed the human resources available are regarded by the enterprise as crucial to its whole operation. As the firm's experience increased, and consistent with its continuous analysis of its market situation, it concluded that within Argentina it was, along with a public enterprise engaged in petroleum extraction and refining, an important entity. The association with the American firm continued until the beginning of the 1970s at which point that enterprise decided, because of anticipated changes in the political climate, to sell its shares in the joint enterprise. These were purchased by the Argentinian firm and it continues with its strategy of technological incorporation. Thus, as an example, it won a tender to operate a semi-submergible platform in 1976. It had little experience in this field and linked up with one French firm in order to learn the technology for marine transportation of such platforms, while it associated with a different French company to absorb the technology for operation of such platforms.

The expansion into international markets of Enterprise 2 was closely associated with its assessment of possible political development and their consequences for its operations in the domestic market. By 1973 the firm held about 50% of the Argentinian market for petroleum exploration and drilling, a state of affairs which rendered it liable to be considered as a monopolist. Furthermore there were signs that the market might come under greater control of the government through the operation of the public sector, a circumstance which

was also undesirable for the firm. Among the alternatives available was the geographical diversification of its activities i. e. the sale of technical services in its field. Studies were undertaken, again a reflection of the firm's systematic approach to problems, and whilst these were in progress decisions were precipitated by an unexpected event. The firm was offered the opportunity of engaging in a joint project with a US firm to undertake petroleum drilling in Saudi Arabia. This project, however, had certain disadvantages and in considering them Enterprise 2 decided that it should follow a strategy of regional concentration in its technology exports. Hence the offer was rejected and the firm focussed its attention on the Latin American market, relying on its knowledge of that environment. Subsequently it has undertaken work in several Latin American countries including Brazil, Chile, Guatemala and Peru (where it is also engaged in petroleum production). It appears to have adopted a philosophy that "it is at home everywhere in Latin America".

The firm nevertheless has had considerable difficulties in finding acceptable local partners with whom to undertake ventures. In Brazil support was received from the construction sector rather than the petroleum area, while in Peru the partner was a US enterprise in the petroleum field. The firm has also been concerned with establishing these foreign ventures as joint operations because it wishes to diversify risks within projects. By the same token it seeks to provide rapid, intensive training for local staff in other Latin American countries where it operates. The reason is, as before, that it wishes its own staff to be mobile and thereby maximize the return it obtains from their time. In this sense the firm has indicated that, in its field of activity, such training should be regarded as a notional tax which is part of the cost of operations. In the longer term the enterprise would like about half of its income to stem from activities outside Argentina - at present the proportion is roughly one third. It appears that the strategic concentration will remain on Latin America, at least in the medium term. The

enterprise has considered initiating activities in Africa but feels that the infrastructural obstacles to its work still imply too high a risk.

This firm is an example of an enterprise which is combining its long term strategy of technological incorporation with a carefully formulated regional strategy for the export of technological services. It is not engaged in an activity where access to credit is of crucial significance, nor does it face the market problems seen by Enterprise 1. The petroleum exploration business is expanding in Argentina itself (the country expects to be self-sufficient in petroleum production by 1983) and in any case the industry has long been known as an international one. It is possible that the kind of operation followed by Enterprise 2 i. e. the development of technical skills to international levels, could be followed in some other fields in the future where Argentina has significant natural resources. It is also important to remember, however, that the production of equipment for the industry is not yet an area where Enterprise 2 has entered international markets. To achieve that would certainly involve some of the issues raised by Enterprise 1.

Enterprise 3

This trading enterprise was founded in 1963 and was oriented entirely towards the export of equipment manufactured in Argentina. The company began with a minimal capital (US$10,000) and with a very small staff, which placed a premium on a rapid turnover. From the beginning activities were concentrated in Latin America and the principal line of machinery export was in bottling equipment for soft drinks and alcoholic beverages.

Already in 1965-66 the firm won a tender to provide bottling plant to Peru in which the design, equipment supply, installation and training of local personnel were all the responsibility of the Argentinian firm. According to the enterprise, even US firms were

not so advanced in this area at that time. It appears that the Peruvians had heard about Enterprise 3 through a trade fair held in the Federal Republic of Germany in 1964, only one year after the establishment of the enterprise. This fact alone is eloquent testimony to the effort which the firm made in the early years to project its image. Given that the enterprise has always been concerned entirely with exports, that effort was regarded as vital to the existence of the firm.

The enterprise expanded its operations rapidly both in terms of the equipment and services it provided and the countries it served. Within a decade of establishment it had undertaken operations in most of the larger Latin American countries and in many of them it had repeated its exports of turn-key plant and of equipment. Throughout the period attention was devoted to market expansion and contracts were obtained via continuous screening of markets on the one hand, and encouragement to local investors on the other. The market expansion required significant efforts in the organization of suppliers credit and in fact the lobbying of this firm was instrumental in persuading, in the early 1970s, the Argentinian government to alter its financing facilities. Up at that time the Central Bank financed up to 80% of the FOB value of the sale for a maximum duration of five (5) years with re-payments at six (6) monthly intervals. Those conditions were noticeably inferior to the export financing given by OECD countries at the time; through the efforts of the enterprise, the central bank changed its policy to one of providing credits for 8-1/2 years with the same frequency of re-payment.

This enterprise was also one of those which took advantage of the credits given to Cuba in 1973, and on this occasion the Cuban authorities bought a technology for production of food which was on a scale larger than any similar plant in the world at that time. The technology capable of providing this plant in fact existed in

Argentina as it had been developed by another enterprise which was a capital goods producer. Enterprise 3, an exporting firm, and the capital goods producer thus signed a turn-key plant arrangement with the Cuban authorities in which the firm had the responsibility to organize the whole operation. Indeed it appears that the Cuban authorities did wish to purchase five (5) plants in total but that Enterprise 3 considered it more prudent to tackle this one large project first. Within the year or so of the signing of the contract re-negotiation was already necessary due to the weakness of the Peso against the Dollar and this, in turn, meant that re-negotiation with the participating Argentinian companies was also necessary. Fortunately the original contract with the Cubans did contain provision for such eventuality. The firm noted that in practice there was little competition for the contract since the Spanish and Italian firms which had been invited to tender were not technically able to produce a plant with the required capacity, while it was known that prior to its dealings with the Argentinian firm Cuba had purchased a plant for similar purposes from Czechoslovakia but that plant was not functioning well.

Though the Cuban example was one with a large scale plant, Enterprise 3 considered that the advantages of Argentinian industry in general were to provide the package of facilities for plants of intermediate scale. In the agro-industrial sector such technologies were fairly well developed in Argentina, and even though the firm believes that the internal market for such capital goods production is too fragmented, this problem does not affect its exports where it always chooses the best Argentinian technology available. The machinery appears to be particularly useful for operation by relatively unskilled staff, a point which can be of considerable practical value in countries where industrial culture is less widespread. Nevertheless this firm also emphasized that its operation had decreased substantially in recent years. The reasons adduced were the sharp rise in internal costs which were gravely

weakening the position of domestic capital goods producers and engineering firms, the cutback in provision of credits for exports (especially the removal of post-financing in 1976), and the growing competition from elsewhere in Latin America, particularly Brazil. The enterprise considered that the main problem in reconstructing the business was the absence of sufficient local firms. It is clear that for an exporting company of this type there is a strong complementarity between a buoyant internal market and success in foreign markets. It may be expected that the professional expertise of such a firm could be of considerable value when and if the present phase of industrial restructuring in Argentina has resulted in the creation of competitive machine producers.

The experience of Enterprise 3 underlines several aspects of the technology export panorama. First, the role which can be played in DCs by a local firm which combines technical and commercial skills to specialize in the export of domestic capital goods. In the Republic of Korea, for example, these trading companies have acquired massive strength and it is widely believed that their activities have been instrumental in the promotion of Korean exports of industrial goods and technology. Second, the catalytic influence on the domestic market of the existence of such firms. Local capital goods producers may often be unable individually to reap economies of scale regarding information about foreign markets and the trading firm can thus help to stimulate production domestically as it increases the collection of information from abroad. Third, the comparative advantage of Argentina has certainly been closely connected with intermediate scale machinery industries originally built up around domestic demand for agro-industrial items. Fourth, that comparative advantage is clearly one which shows up in relation to other Latin American countries. The information at the firm level underlines the down-stream nature of the technology trade from Argentina and in that respect suggests that the phrase "semi-industrialized" is well chosen.

Enterprise 4

This firm was established some sixty (60) years ago by an immigrant family and continues to be run by the family. It specializes in the production of household fittings and in 1979 had total sales in excess of US$34 million, of which 18% were from exports, and employed more than 1,500 people. Its export activity was started some fifteen (15) years ago in neighbouring countries and has remained 100% concentrated on Latin America though there appears to be a recent interest (as yet not formalized) in markets in Africa. The profitability of the firm has been adequate to good through most of the 1970s though at present profit rates are lower than at any time in the recent past. The technology employed by the firm has been developed by it and it has a small unit (some twenty (20) persons) fully engaged in R and D. Given that the industrial branch in which it is operating is not one where high technology, or rapid changes in technology, prevail, the firm only registers industrial designs and trade marks, though these are registered throughout Latin America.

The firm has followed an explicit strategy for obtaining a foothold in Latin American Markets, especially those of greater strategic importance, and is thus initiating DFI as a follow-up to its exports. That investment utilizes the same technology as in Argentina and focuses on the creation of joint ventures with local partners both private and public. The enterprise considers that its main advantages are product quality (the firm is one of the largest in Latin America in its branch), scale of production, and the cultural links through language and similar industrial environments. At the moment it has plants established in Ecuador and Brazil but has a five-year horizon in which it envisages expansion in Chile, Uruguay and possibly some other countries of the region. The specific operations stem from the frequent visits and market analysis made by representatives of the firm. It is

emphasized, however, that regional arrangements for trade complementarity and industrial organization play a significant role in the decision-making of the enterprise. For its investment in Ecuador the possibility of creating a foothold in the Andean market was certainly important, while the enterprise emphasized that its products come under the new regional trade organization ALADI (which has replaced LAFTA).

In the investments of this firm the relationships with governments have been noteworthy. The plant in Ecuador is in fact a joint venture involving public capital from that country and the assistance from the Argentinian Secretariat for Foreign Trade was of great value in the negotiations. The Foreign Trade Department was instrumental, through its office in Ecuador, in finding the appropriate local partnership and was familiar with the market conditions, in particular the fact that Ecuador had been assigned this industrial branch under the sectoral arrangements of the Andean Pact (in the opinion of a person from the Argentinian administration, the investment might have gone ahead even without the sectoral assignation but it was likely that it would have been on a smaller scale). Furthermore Enterprise 4 has drawn upon the facilities of the state organizations for export financing. Curiously enough, however, the investment in Ecuador was only officially declared some time after the start up and the enterprise has emphasized that for both foreign exchange and tax reasons the organization of these investments requires considerable care.

It appears that the operations abroad have been quite successful. Part of the foreign production is being used to supply third markets in Latin America, the technical level of the local staff has improved considerably, and the enterprise is now considering the more formal division of labour among its plants in such a way that not insignificant flows of intra firm trade could be generated. In fact some products are now being made abroad for export to the Argentinian market itself, in view of the rapid rise in costs in

Argentina. It is not known to what extent the profits of the enterprise come from its foreign operations though in interviews it was clear that the profit rates earned abroad are, at least at present, superior to those in Argentina.

When questioned about the ways in which the national administration could assist the expansion of these external operations, the enterprise stressed that fiscal and financial support was essential. It believed that quite good support was forthcoming as regards market information and the search for suitable local partners, but that more positive stimuli were needed if the external projection of Argentinian firms was to be consolidated. Under present circumstances the enterprise had always employed the services of lawyers to handle the contractual and financial arrangements, yet it believed that more appropriate administrative regulations and practices could obviate the need to make complex deals.

The experience of this firm is a good case of export led DFI in which use is made of local technologies that are quite acceptable in a field where the overall rate of technical change does not seem to be great. The company is certainly optimistic with regard to future continuation of its current strategy and likewise underlines the importance of building joint ventures with local partners where the Argentinian firm would usually provide minority share of the capital and pay for some of that by the provision of its technology. This industrial branch is one where there tend to be a few local producers operating with tariff protection and only a limited presence of TNCs. To the extent that Enterprise 4 can manage to expand its network, therefore, it could become one of the more important producers in several Latin American countries. The gradual creation of such a network is leading to possibilities of intra firm trade; in this respect it is a rare example. Given the close relationship between exports and DFI this firm is one which has made use of government facilities for providing market information abroad.

It is interesting to note that even in this case the firm underlines the need for more active assistance in the financial area.

Enterprise 5

This enterprise is the market leader (measured by sales) in its field where there are a large number of firms operating in Argentina and both local firms and affiliates of TNCs share the market. The enterprise continues to be run by the founding family, with a marked strategy of seeking high technical standards and involvement in international markets. At present the firm has some 2,500 employees of which roughly 150 are engaged in R and D. As an offshoot of its technical and geographical expansion the enterprise created, in 1978, an affiliate dedicated to the commercialization of technology.

The firm has now sold several fairly small scale turn-key operations and is also promoting some basic research to put itself closer to the technological frontier in its field; it has now obtained a patent in U. S. A. The philosophy behind the turn-key sales is the straightforward one that what must be supplied is production capacity and a permanent service to the client. The idea for the project could come from the client itself or be generated by the enterprise in the light of its knowledge of external market conditions. It seems that the affiliate firm is capable of undertaking feasibility studies, basic and detailed engineering for certain projects, staff training and the supervision of the civil works necessary for the construction of an industrial plant. At the same time the parent company can, through its research activities, ensure that the project itself relates to a promising product line. This is particularly relevant given the nature of technical advance and competition in the industrial branch concerned.

Thus far the size of foreign projects undertaken has been fairly small and they have been concentrated in Latin America. It seems that a large number of projects are currently being studied

and that some of these involve possible sales in Africa and Asia. The project size considered by the firm as a suitable one at present is around US$5 million but the firm does comment that on occasion it advises the client to reduce the size of its original proposal. On some occasions Enterprise 5 does put its own capital into the projects though it is not clear that this would become a regular practice. The financing of the projects does not seem to have created any special problems with guarantees being given by Argentinian banks and sometimes advantage being taken of lines of credit available from the administration. The enterprise is particularly concerned with its image abroad and emphasizes, as have other firms interviewed, the importance of creating confidence among would-be clients.

At present the scale of foreign operations of this enterprise is not commensurate with its place in the Argentinian market and it may be conjectured that this is because the industrial branch where it operates is one in which technology backbed by patents and trade marks is of considerable significance. In this respect the structure of sales may be just as important as their total value and until the overall technological level of the enterprise approaches that of TNC competitors foreign expansion will be somewhat limited. All the same the sales of small to medium size industrial plants can continue; by combining its engineering expertise with knowledge of final product markets, Enterprise 5 can build a useful export business.

Enterprise 6

This firm is also a family firm, founded some thirty-five (35) years ago as a machinery importer and subsequently converted into a machinery producer with some 200 employees directly engaged and a considerable number of small workshops linked with Enterprise 6 on a sub-contracted basis. Exports started about sixteen (16) years ago, beginning in the neighbouring countries and later extending elsewhere in Latin America. The exports now account for 95% of production, and were developed via an explicit strategy of making the product accept-

able to TNCs such that they would be prepared to give what were effectively quality guarantees to the firm. The product standards were made to match US specifications and in fact the equipment produced was similar to that sold in US but rather simpler. In short, the firm created a quality image through its links with the US but adapted the machinery to Latin American conditions, thus having the best of both worlds.

The machinery sales have flourished due to the thorough support services given by the firm, covering not only the willingness to make modifications to the original machine but also the training of local staff and good supplies of spare parts. On the basis of its successful record as a machinery exporter the enterprise gradually moved in to licensing of technology for manufacture of components and turn-key exports. This firm was also one of those involved with sales to Cuba where, in fact, it was at one point virtually monopolizing the market. The firm stressed that competition was severe for the Cuban tenders since even those firms which were formally forbidden from tendering (for political reasons) in fact did so through their affiliates in other countries, including in one instance the Argentinian affiliate. Though the economic arrangement between the Argentinian and Cuban governments was of course important, the firm nevertheless won the tender through its fully competitive prices and quality. Moreover, the firm argued that its operations were fully turn-key and more, in that the back-up assistance provided was much more than that of OECD suppliers who remained in reality machinery producers.

This enterprise is one of the scarce examples of a firm which appears to be at international levels in its field yet has attained these without losing any of the advantages which can come from the knowledge of Latin American conditions and the capacity to adjust the equipment to local circumstances. At the same time it has created an extensive network of workshops within Argentina itself which must have contributed to the diffusion of skills within the

country and to the flexibility of the firm in meeting international tenders and the ups and downs of the market. The range of services provided by the firm undoubtedly give it a stronger position in bidding for international contracts and it seems reasonable to suppose that these services are there because the firm is well aware of the things really needed in the Latin American context. It was not possible to obtain solid information on how the firm views its market prospects but the suggestion was that it would be ready to compete in countries outside Latin America, always following the line of equipment exports as image creation with turn-keys and other technical services coming later.

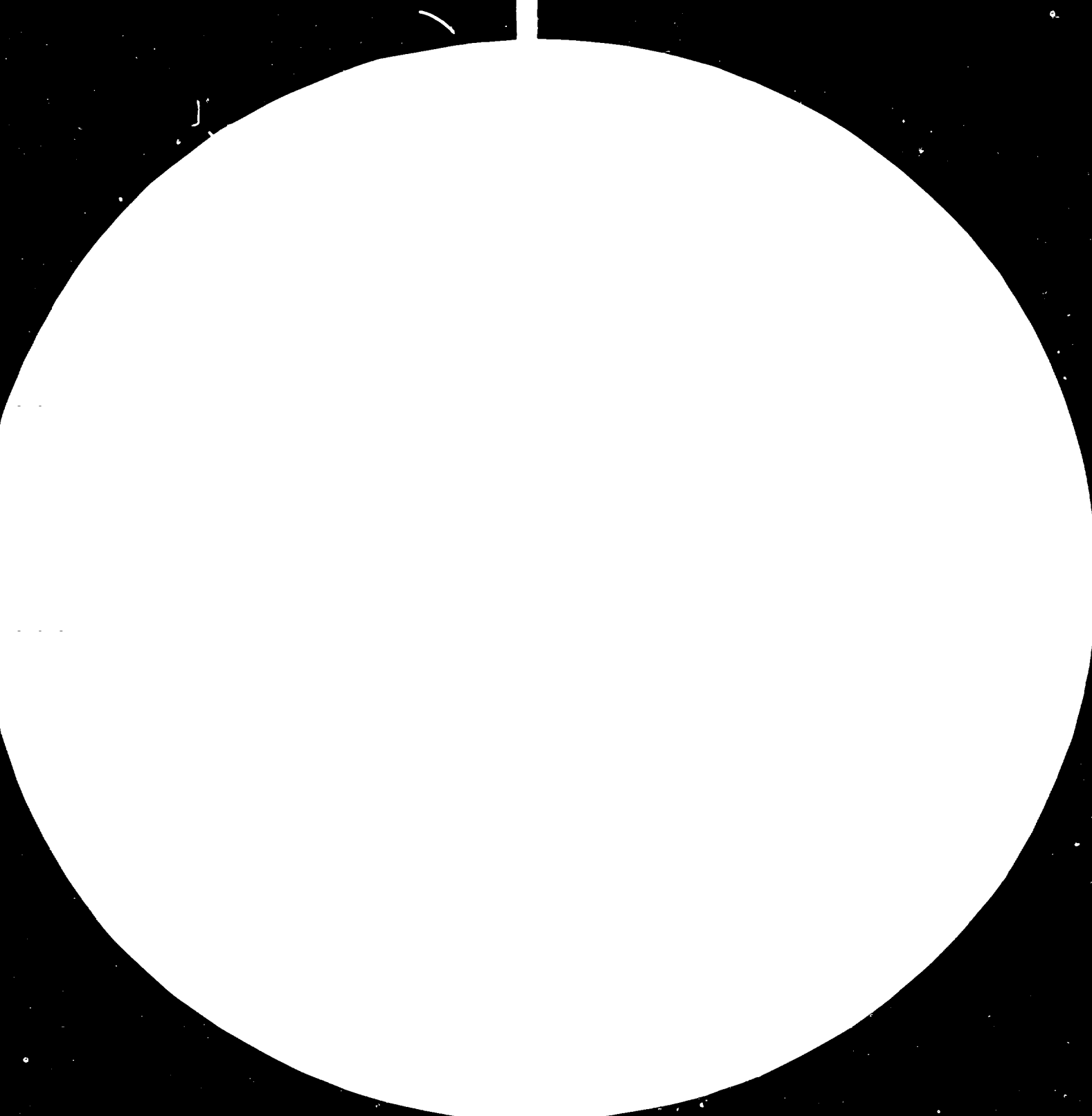
C. Information from Industrial Associations

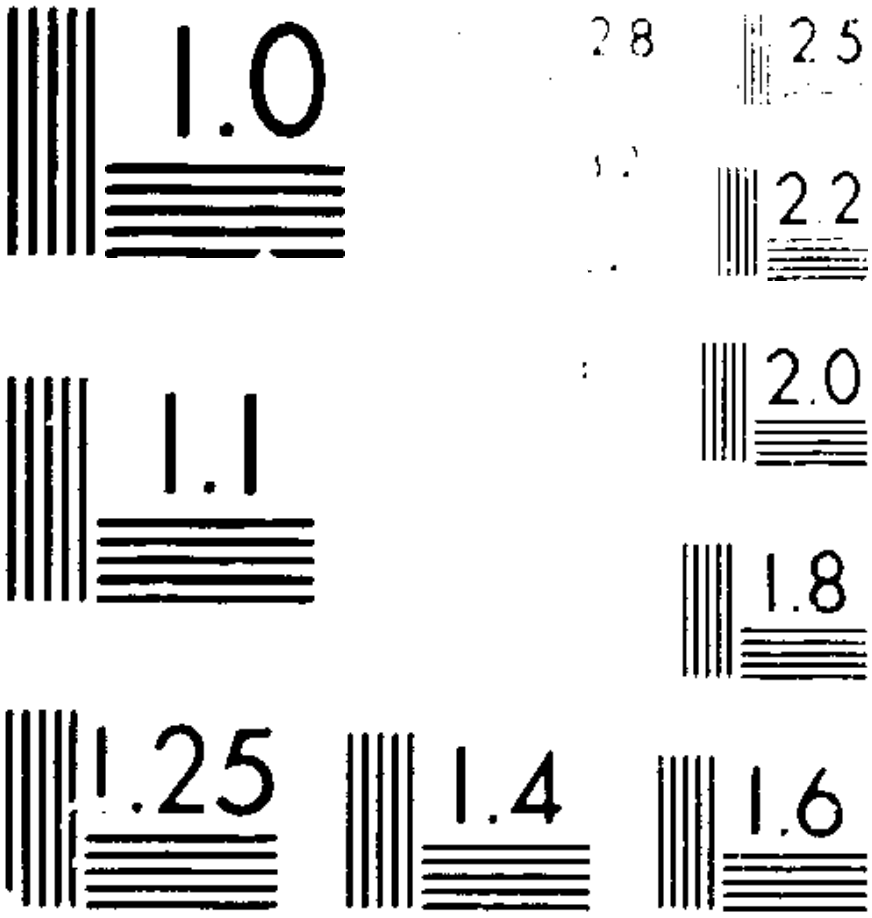
Discussions were held with some industry associations to discover the extent to which firms in the same activity had come together to promote exports, the kinds of assistance which could be provided by such associations in the Argentinian context, and the identification of possible firms and opportunities which might have been overlooked in the other phases of the UNIDO enquiry.

In the food processing sector, where both actual experience and conventional wisdom concur in Argentina's comparative advantage, it was found that the overall coordinating organism, COPAL, paid relatively little attention to technological issues. The body did not collect any information on technology exports nor was there any mechanism by which the industry organization as such could support them. Though a sub-committee on science and technology had been established it was felt that this was more a question of fashion than substance and that in reality the sub-committee achieved little. It was noted that TNC affiliates in Argentina were much more interested in developing their activities in the internal market rather than elsewhere, and that consequently the most promising future options would be from national firms which had been performing well. Some interesting firms were mentioned in this respect. A national firm producing milk products

had now obtained 80% of the market in the capital city and the province of Buenos Aires and was increasing its market share at the expense of TNC affiliates. The product range was currently being expanded and the firm was known to be taking an interest in international contacts, building on its internal staff which included agronomic engineers. In fact, during mid-1980 the firm had been visited by a Colombian enterprise which was investigating the possible purchase of a turn-key plant and wished to examine the facilities which could be provided by the Argentinian firm. At the time of writing it is not known whether any more specific steps have been realized. Technical investigations were also being made by the small group of five (5) enterprises which belonged to the Promotional Organization for Hierba Mate, a well-known beverage made in Argentina. The Organization was seeking to improve production methods, had introduced quality control and set up a pilot plant with a grant from the Inter-American Development Bank. The international possibilities may not be great but some equipment exports to Brazil and Uruguay were under consideration.

The industry association for producers of automobile parts (CIFARA) indicated that there had been technology exports from the sector, particularly to countries of the Andean region. Those exports, which had been chiefly in the form of know-how and technical assistance, were concentrated in the first part of the 1970s when, despite the industry's rapid growth of internal production, it had been possible to draw on the skills being developed by local producers to help in the expansion of the industry elsewhere in Latin America. With the re-organization of the domestic industry, which had involved a sharp rise in imports and brusque year-to-year fluctuations in output levels and domestic sales, the chances of technology exports had fallen off and it was felt that it would be quite some time before they could be resumed. The experience of producers in this sector showed that the industry would emerge with a different composition after the present wave of changes and it might be that in the new conditions the substantial accumulation of skills in Argentina could again lead to exports: yet that could not take place quickly.




2.8
2.5
1.0
2.2
1.1
2.0
1.8
1.25
1.4
1.6

These observations were supported by the Argentinian Industrial Union (UIA) which noted that in most sectors the current cost situation, taking into account prevailing exchange rates, made it difficult to compete in technology export markets. By and large most firms which had been successful in those markets, whether through DFI, turn-key and equipment sales, or some contractual licensing, had launched their foreign operations at periods when the domestic market was running well. This was to be expected in an activity which was new, still required much learning, and was thus subject to several risks. The fact that marked changes had taken place in the domestic industrial environment relatively soon after technology exports had begun to grow meant that exporters had been unable to consolidate their markets. Until the cost situation altered and the pattern of the industrial sector became clearer, there was not likely to be a renewal of the export growth.

D. Administrative Experience

Along with most DCs the bulk of Argentina's administrative actions concerned with technology have been on the side of imports. Those actions, in so far as they influence the nature and speed of technological incorporation by domestic enterprises, sooner or later influence the prospects for exports even if only in the permissive sense that they help local firms to maintain control over their own innovations and reduce the chances that they will be affected by export restriction clauses. Steps to encourage exports of technology have only been taken in a limited way so far and there is probably a need for extensive trial and error before appropriate mechanisms can be determined.

In terms of information provision the Secretariat of State for Trade and International Economic Negotiations has a service that now maintains more than sixty (60) offices (attached to the Embassies) in nearly fifty (50) countries. That service assists to provide market

information, facilitate contacts and in general encourage the external sales of Argentinian products. It is not explicitly concerned with technology export yet, given the fact that those exports frequently follow original sales of goods, the information so provided can be valuable. At the moment the information goes directly to the Trade Ministry in Argentina so its use depends partly on the links between the Ministry and exporting firms within Argentina itself. Improvement of this service could be achieved following the well-known principle that 'information' as an abstract entity has no value - it is information to the right people, at the right time, in the right place, and in the right form, which is worth possessing. To this end it could be useful encouraging direct links between the field offices and exporting firms as well as strengthening the ties between the Ministry and firms at home.

In terms of information registration there are two (2) voluntary lists kept, one of DFI held within the Ministry of Economy and the other of turn-key plant sales and held by the same Ministry. The former offers few advantages to the enterprises which register and is being simplified to request rather less material. The latter was created by Decree 2785 of 1975 and gave firms a substantial incentive to register since it offered them a reimbursement calculated on the value of the contract: the original percentage was 40 and this was subsequently reduced to 25. These incentives were given on the grounds that the government wanted to stimulate the export of items with high value added and a significant content of local technology, and to do so wished to provide them with conditions which would make them competitive on the international market. The figures given in Chapter II in fact represent an important part of the aggregate data currently available on technology exports and could provide the basis for further efforts by the administration to encourage firms which have entered foreign markets.

Credit Incentives are widely recognized to be an element of an aggressive export policy since so many sales depend on being able to

provide suppliers credits. In this respect the administration has given some help, with pre-financing at 1% and denominated in dollars, though post-financing was discontinued in 1976. Much of the problem here is not to give would-be exporters advantages which they would not obtain in any other country but rather to put them on an equal footing with foreign enterprises who compete in third markets. For a long time all the major OECD countries (the dominant technology exporters) have strongly supported their firms through financial methods covering credits, insurance and indeed direct subsidies. Since those firms already possess considerable power in the market it seems doubtful that relative new-comers could make significant headway unless they received at least comparable encouragement. The conditions of international business are such that the conclusion of most agreements depends on much more than technical matters and market knowledge alone. A strategy of international expansion would have to recognize the vital role to be played by the Administration.

E. Concluding Comment

The material presented in this chapter, in conjunction with the data and analysis in the first two (2) chapters, suggest a series of tentative conclusions and recommendations on the export of industrial technology from Argentina. They are the content of the following fourth and final chapter.

CHAPTER IV - Technology Exports and Economic Policy

A. The State of Technology Exports from Argentina

The information presented in this study shows that exports of industrial technology grew rapidly in the early and middle 1970s, that they have been highly concentrated within Latin America, that they nevertheless remain small in relation to both exports of industrial goods and total inflows of technology to the recipient countries, and that information remains relatively unsystematic and impressionistic. Within the past two to three years these exports seem to have fallen off markedly though DFI from Argentina has been more consistent than contractual arrangements and exports of turn-key plants and civil works. The shift in export behaviour has been powerfully influenced by the change in economic policy. The central features of recent policies as they affect technology exports can be summarized as follows:

(1) A drastic reduction in the degree of protection accorded to all industrial sectors aimed at restructuring them in accordance with international prices.

(2) Emphasis on the monetary approach to the balance of payments with the elimination of controls on capital movements.

(3) Positive real rates of interest; in conjunction with (1) and (2), this has brought about great pressure on the solvency of many industrial enterprises and has severely reduced their sales prospect in both domestic and foreign markets.

(4) The sharp reduction in the relative costs of imports has meant that the interest in local technological development, and the returns from undertaking it, is minimal with the exception of the activities of some firms in rather special situations.

(5) Industrial policy at the moment is focused on determining those sectors which have a future in terms of comparative advantage rather than on elaborating specific instruments of support.

(6) Decision making is thus very uncertain in the short term and it is accordingly difficult to say what kind of future technology exports from Argentina may have[1/].

The current experience is thus a powerful demonstration of the impact of overall economic policy on technology behaviour, internally and externally. From the new economic policy as compared with the previous situation several questions suggest themselves. To what extent have technology exporting firms been eliminated altogether? Of those that remain, how many retain the competitiveness, capability and readiness to engage in exports? How adaptable are the skills which were developed, or in other words, even if they no longer serve to promote exports can they be used elsewhere in the economy and are they being so used? Under what conditions would technology exports exhibit renaissance? What is now and is likely to be in the future the impact of the recent policies on the import of new technologies, their absorption and the possibilities for eventual exports? The evidence presented in this study, drawing as it does on the recent past, can only provide some clues to possible answers to these questions. The impression obtained is that the patterns which dominated recent exports are unlikely to reassert themselves in the short to medium term. Some sectors, such as pharmaceuticals and metal working, may continue to promote certain activities abroad and the skills developed nationally have been retained or may be recouped.

[1/] On the influence of macro economic instability on project decision making with particular reference to technological issues see Canitrot (7).

In general, however, the branches which would appear to be the most promising as things currently stand are food processing, some branches of the chemical industry, exploration and exploitation of some non-renewable resources e. g. petroleum, some parts of the civil construction industry, and perhaps certain activities connected with defense production. On the whole these are related mainly with the development of Argentina's natural resources and only to a lesser extent with a continuation of processes of technological change which had taken place in earlier years.

Yet, as noted earlier in the study, the development and subsequent export of national capabilities in any branch will require strategic choices both by the government and by the enterprises concerned. Even though protection of industry is reduced to a low level and is harmonized across the different branches, competitiveness in international markets still needs active government support simply to ensure that local firms are not penalized in their endeavours to win contracts. The provision of adequate information backed up by financial support not only through credits but also through guarantees, is a vital part of an export promotion strategy. Since, however, the interests of other countries are inevitably affected by international activities, the government must also devote attention to the negotiation of adequate bilateral and multilateral agreements, especially in Latin America, whereby the export process can be encouraged. At the firm level the present phase in which new equipment can be imported relatively cheaply cannot be used as the excuse for a long term strategy in which the firm relies on complete replacement of its capital stock from time to time. To seek long term competitiveness in that way has its own risks and dangers associated with the nature and speed of technical change abroad and the firm's ability at least to monitor if not to participate in them. Consequently it is hard to see how even producers of final goods in a market the size of Argentina could avoid developing technical capabilities of their own. To put this point rather differently. When the major reorganization of

industry which is the objective of present policy has been accomplished, firms will still have to develop some means of supplying certain technological needs from local sources, either within the firm or in associated enterprises. Hence the new structure will also undergo processes of evolution which are likely to lead to the emergence of some kinds of technical service activities. Domestic firms will thus have to formulate and implement strategies for ensuring the supply of such skills.

The figures used and cases described in the study indicate that medium and sometimes small size enterprises have been important agents in the export of technology[1/]. Some of the advantages which they possess, such as operating with shorter production runs, more flexible and durable equipment, willingness to accept minority participation in DFI, and the direct involvement in the foreign operation of persons who have solved similar problems in Argentina itself, have been of considerable utility to businessmen in other parts of Latin America. Unlike the foreign expansion of TNCs, which has frequently contributed more to the destruction of local skills and the suppression of local entrepreneurship than to their creation and encouragement, the activities of the Argentinian medium and small size firms have tended to help develop those capabilities abroad. Yet the further continuation of these activities is also closely dependent on domestic economic policy in Argentina. Very few of these firms can thrive abroad without the existence of a fairly strong demand for their services at home, so the mere restriction of the internal market has its direct effects on success in the external. The greater the bias towards capital intensive methods of production encouraged by the cheapening of the price of foreign equipment relative to that of domestic labour, the less likely it is that these firms will continue to develop technical modifications and improvements.

1/ For a detailed recent analysis of the behaviour of small and medium size firms in the Latin American context see White and Feldman (40).

In the past few years the diverse cases of technology export can be classified into four groups. First, those instances where things have functioned smoothly and all parties seem to have benefited. Second, cases where some things worked well and others poorly. Third, situations where the projects were carried through but failed. Fourth, those cases, many of which probably have gone undetected by this and earlier studies, in which the projects never reached an operating stage. In this mixture of positive and negative experiences, one lesson stands out viz. that technical cooperation among DCs is a tricky process whose success depends on factors much wider than the technical one alone[1/]. Part of the responsibility for trying to create more opportunities with greater probabilities of success for each one, must lie with the governments involved. They can be supported by international organizations, particularly through assistance in the elaboration of adequate multilateral legal frameworks, the provision of analytic studies and market information in which the organizations can act as brokers, and the supply of specialized technical personnel who can help prepare some of the projects. Nevertheless changes in national policies will certainly act as the most decisive signals to local firms[2/]. The concluding subsection offers some brief suggestions for Argentinian policy in this regard.

B. The Encouragement of Technology Exports

The principal ways in which explicit steps to encourage technology exports could be taken are the following:

(1) Financial. The provision of long term credit, the supply of risk capital, and the availability

---

1/ An analysis of the benefits and economic determinants for Latin America is contained in Fidel and Lucángeli (15).

2/ The instruments of fiscal and financial promotion which have been employed by Latin American governments to encourage technological development are studied in Correa (11).

of insurance for foreign investment, are all vital to equilibrating the situation of Argentinian firms with foreign ones in international markets.

(2) Promotional. Fiscal treatment of profits from foreign operations, the extension of export promotion measures to cover transactions directly and indirectly affecting technology exports, the provision of risk coverage for situations where contracts cannot be fulfilled.

(3) Intergovernmental negotiations. The elaboration of agreements to avoid double taxation, the introduction in economic cooperation accords of measures to encourage links between Argentinian and foreign firms, the creation of preferential arrangements to facilitate intra Latin American ventures.

(4) Informational. The intensification of the support services provided through commercial offices abroad and an extension of them to pay greater attention to possibilities in Africa.

(5) Organizational. The formation of a group combining entrepreneurs as well as government officials to elaborate and monitor policies for supporting technology exports.

The usefulness of these instruments of encouragement will of course depend on the elaboration and implementation of a macroeconomic policy which is favourable to an expansion of technology exports. The Argentinian experience shows that possibilities exist but that the learning process is arduous. Research and practice in the 1970s highlighted the difficulties DCs face when they import technology; the present decade may teach us more of the difficulties confronting them when they export it.

B I B L I O G R A P H Y

(1) AFAMAC, "El Costo de la Maquinaria Agrícola Argentina", mimeo, Córdoba, July 1977.

(2) Balakrisnnan, K. "MNCs from LDCs: The Case of Indian Joint Ventures Abroad", mimeo, Ahmedabad, March 1980.

(3) Berlinski, J. La Protección Efectiva de Actividades Seleccionadas de la Industria Manufacturera - Argentina, Buenos Aires 1977.

(4) Botzman, M., Lifschitz, E., and Renzi, María R. "Argentina: Autoritarismo, 'Librecambio' y Crisis en el Proceso Actual", Economía de América Latina, México, March 1979.

(5) Campos, Jaime La Actuación Internacional de la Pequeña y Mediana Empresa, INTAL, Serie Estudios Básicos No. 2, Buenos Aires 1977.

(6) Campos, Jaime - "Intercambio Empresarial de Recursos Productivos en América Latina", mimeo, BID/INTAL, Buenos Aires, September 1980.

(7) Canitrot, Adolfo - "Un Esquema para Evaluar la Significación de las Variables Macroeconómicas en el Análisis de Decisión de Incorporación de Tecnologías", Programa BID/CEPAL de Investigaciones en Temas de Ciencia y Tecnología, Buenos Aires 1977.

(8) Canitrot, Adolfo - "Discipline as the Central Objective of Economic Policy: An Essay on the Economic Programme of the Argentine Government since 1976", World Development, November 1980.

BIBLIOGRAPHY - continued . . .

(9) Chenery, Hollis B., and Keesing, Donald B. - "The Changing Composition of Developing Country Exports", World Development Report 1978, Background Paper No. 5, Washington, September 1978.

(10) Consejo Argentino Para las Relaciones Internacionales - Proyección Externa de la Empresa Argentina, mimeo, Buenos Aires, August 1980.

(11) Correa, Carlos María - "Promoción del Desarrollo Tecnológico en América Latina. Instrumentos Tributarios y Financieros", Estudios en Homenaje a Isaac Halperin, Buenos Aires 1978.

(12) Díaz-Alejandro, Carlos - Essays on the Economic History of the Argentine Republic, 1970.

(13) Díaz-Alejandro, Carlos - "Foreign Direct Investment by Latin Americans", in T. Agmon and C. P. Kindelberger (eds.), Multinationals from Small Countries, Cambridge, MIT Press, 1977.

(14) Ferrer, Aldo - "El Monetarismo en la Argentina y Chile", supplement to Ámbito Financiero, Buenos Aires, 22 August 1980.

(15) Fidel, Julio and Lucángeli, Jorge - "Beneficios y Condicionantes Económicos de la Cooperación Tecnológica entre Países Latinoamericanos", Integración Latinoamericana, April 1979.

BIBLIOGRAPHY - continued . . .

(16) Financial Times - "Survey on Argentina", December 1, 1980

(17) Katz, Jorge - "Cambio Tecnológico, Desarrollo Económico y las Relaciones Intra y Extra Regionales de América Latina", Programa BID/CEPAL de Investigaciones en Temas de Ciencia y Tecnología, Buenos Aires 1978.

(18) Katz, Jorge and
Ablin, Eduardo - "Tecnología y Exportaciones Industriales, un Análisis Microeconómico de la Experiencia Argentina Reciente", Programa BID/CEPAL de Investigaciones en Temas de Ciencia y Tecnología, Buenos Aires, December 1976.

(19) Katz, Jorge and
Ablin, Eduardo - "De la Industria Incipiente a la Exportación de Tecnología: La Experiencia Argentina en la Venta Internacional de Plantas Industriales y Obra de Ingeniería", Programa BID/CEPAL de Investigaciones en Temas de Ciencia y Tecnología, Buenos Aires, 1978.

(20) Lall, Sanjaya - "Developing Countries as Exporters of Technology and Capital Goods: The Indian Experience", mimeo, Oxford, June 1979.

(21) Lall, Sanjaya - "Exports of Manufactures by Newly Industrializing Countries: A survey of Recent Trends", Economic and Political Weekly, December 6 and 13, 1980.

BIBLIOGRAPHY - continued . . .

(22) Mercado - Buenos Aires, December 18, 1980.

(23) Mercado - Buenos Aires, January 1, 1981.

(24) O'Brien, Peter - "The New Multinationals: Developing Country Firms in International Markets", Futures, August 1980.

(25) O'Brien, Peter - "Third World Industrial Enterprises: Export of Technology and Investment", Economic and Political Weekly, Special Number, October 1980.

(26) O'Brien, Peter - "The Internationalization of Third World Industrial Firms", Multinational Business, December 1980.

(27) O'Brien, Peter - "Has Knowledge Trickled Down? The Nature and Implications of the International Projection of Developing Country Firms", forthcoming in a special issue on "Trends in International Transfer of Technology" of the journal Vierteljahresberichte der Entwicklungsländerforschung, March 1981.

(28) O'Brien, Peter; Hasnain, Asif and Lechuga, Eduardo - "Direct Foreign Investment and Exports of Technology among Developing Countries: An Empirical Analysis of the Prospects for Third World Cooperation", in Vol. 3 of Background Papers to Industry 2000, New Perspectives, Vienna, December 1979.

(29) O'Donell, Guillermo - "State and Alliances in Argentina, 1956-1976", Journal of Development Studies, July 1978.

BIBLIOGRAPHY - continued . . .

(30) Rhee, Yung W. and
Westphal, Larry W. - "A Note on Exports of Technology from the Republics of China and Korea", mimeo, Washington, November 1978.

(31) Roulet, Elva - "Oferta Potencial de Tecnología Nacional Comercializable", Organization of American States, Washington 1976.

(32) UNCTAD - Dynamic Products in the Exports of Manufactured Goods from Developing Countries to Developed Market Economy Countries, 1970 to 1976, Geneva, 30 March 1978.

(33) UNIDO - World Industry Since 1960: Progress and Prospects, New York 1979.

(34) Wells, Louis T. - "Third World Multinationals", Multinational Business, March 1980.

(35) Wells, Louis T. - "Multinationals from Latin American and Asian Developing Countries: How they Differ", mimeo, Harvard University, November 10, 1980.

(36) Wells, Louis T. and
V'Ella, Warren - "Developing Country Investors in Indonesia", Bulletin of Indonesian Economic Studies, March 1979.

(37) White, Eduardo - "La Internacionalización de las Empresas Argentinas" Informe Industrial, Buenos Aires, January 1979.

BIBLIOGRAPHY - continued . . .

(38) White, Eduardo - "The International Projection of Latin American Firms", mimeo, East-West Center, Hawaii, September 1979.

(39) White, Eduardo; Campos, Jaime and Ondarts, Guillermo - Las Empresas Conjuntas Latino-americanas, INTAL, Serie de Estudios Básicos, No. 1, Buenos Aires, 1977.

(40) White, Eduardo and Feldman, Silvio - La Cooperación Productiva de las Pequeñas y Medianas Empresas Europeas en América Latina, mimeo, Buenos Aires, August 1980.

(41) World Bank - World Development Report 1979, Washington, August 1979.

ANNEX

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
VIENNA INTERNATIONAL CENTRE
P.O. BOX 300, A-1400 VIENNA, AUSTRIA
TELEPHONE: 26 310 · TELEGRAPHIC ADDRESS: UNIDO VIENNA · TELEX: 135612

CUESTIONARIO

LA EXPORTACION DE TECNOLOGIA POR EMPRESAS ARGENTINAS

1973 - 1980

PRIMERA PARTE: INFORMACION GENERAL

1. Nombre de la Organización

   _____

   _____

2. Dirección Postal

   _____

   _____

3. Dirección Telegráfica

   _____

   Telex _____

   Teléfono _____

4. Nombre y Cargo del Jefe de la Organización

   _____

   _____

5. Nombre y Cargo de las personas que sirven de contacto a los efectos del presente cuestionario

   _____

   _____

   _____

SEGUNDA PARTE: PRINCIPALES CARACTERISTICAS DE LA ORGANIZACION

6. Fecha de establecimiento

_____

7. Tipo de Organización:

Empresa privada ( )

Empresa pública ( )

Entidad de investigación y desarrollo ( )

Otros (especifique) ( )

_____

_____

_____

8. Si se trate de una empresa, distribución de las acciones:

Propiedad estatal ( )

Propiedad privada nacional ( )

Propiedad privada extranjera ( )

9. Productos y/o servicios que vende la organización

_____

_____

_____

10. Valor de Ventas (en $ de los EEUU) y Empleo (Número de empleados) 1973-1980. (Cifras anuales)

_____

_____

11. Puesto que ocupa la empresa en su sector, en el mercado argentino

_____

12. Importancia relativa de las exportaciones en el total de ventas de la empresa, 1973-1980.

_____

_____

13. Importancia relativa de los distintos mercados en el total de las exportaciones, 1973-1980.

Destino	1973	1974	1975	1976	1977	1978	1979	1980
América Latina								
EEUU/Canadá								
Europa Occidantal								
Europa Oriental								
Oriente Medio								
Africa								
Australia, Nueva - Zelandia, Japón								
Resto de Asia								

14. Rentabilidad

Baja ( )

Adecuada ( )

Buena ( )

Excelente ( )

TERCERA PARTE: TECNOLOGIA Y EVOLUCION DE LA ORGANIZACION

15. Fuentes de tecnología que utiliza la organización

16. En cuanto a la tecnología importada, indique si su Organización ha introducido modificaciones (en caso afirmativo señale si han sido de menor o mayor importancia y describa brevemente en qué han consisitido)

17. ¿Cuales fueron los motivos de las modificaciones?

Sustitución de materias primas	( )
Adaptación del producto a las necesidades del mercado	( )
Escala de producción	( )
Agudización de la competencia	( )
Dificultades en la obtención de insumos o de piezas de recambio	( )
Trabajo de investigación realizado por técnicos de la empresa	( )

Para cada modificación importante señale el o los motivos

18. Tiene su Organización una estrategia explícita respecto a la modificación de tecnología importada? Indique los objetivos de tal estrategia.

19. Actividad innovativa de su Organización: Personal empleado en Investigación y Desarrollo; Gastos incurridos; Resultados (patentes etc.) Indique si su Organización tiene patentes y/o marcas registradas en el exterior.

_____

_____

_____

_____

_____

CUARTA PARTE: EXPORTACION DE TECNOLOGIA

20. Valor anual de las exportaciones de tecnologia, en $ de los EEUU (1) y número anual de contratos (2)

Especificación		1973	1974	1975	1976	1977	1978	1979	1980
Inversión extranjera directa	(1)								
	(2)								
Plantas llave en mano	(1)								
	(2)								
Asistencia técnica	(1)								
	(2)								
Servicios de ingeniería y asesoramiento	(1)								
	(2)								
Acuerdos para el uso del "know-how"	(1)								
	(2)								
Contratos de licencia para las patentes	(1)								
	(2)								
Acuerdos compuestos de licencia (es decir asistencia técnica más patentes más "know-how"	(1)								
	(2)								
Otros (especificar)	(1)								
	(2)								

21. Destino de las exportaciones

Destino	1973	1974	1975	1976	1977	1978	1979	1980
América Latina								
EEUU/Canadá								
Europa Occidental								
Europa Oriental								
Oriente Medio								
Africa								
Australia/Nueva Zelandia Japón								
Resto de Asia								

22. Motivos por los que se empezó la exportación de tecnología

Extrategia explícita de expansión en el exterior ( )

Posibilidades de beneficios más altos en el exterior ( )

Excedente de capacidad en el mercado argentino ( )

Aprovechamiento de políticas de integración entre países extranjeros (por ejemplo el Pacto Andino) ( )

Apoyo del gobierno argentino (subvenciones, reembolsos, garantías, etc.) ( )

Uso de conocimientos especializados propios ( )

Otros (especifique) ( )

Indique los motivos más importantes para cada exportación de tecnología.

_____

_____

_____

_____

23. Nivel de sofisticación de la tecnología exportada en relación con la utilizada y/o vendida en la Argentina

Menos sofisticada ( )

Igual ( )

Más sofisticada ( )

Indique si se requirió mucho esfuerzo técnico para desarrollar la tecnología exportada.

_____

_____

24. Presencia o no de colaboración extranjera en la exportación de tecnología. En caso afirmativo, describa la forma de dicha colaboración.

_____

_____

_____

_____

25. ¿Ha ganado su empresa licitaciones internacionales para la exportación de tecnología? Explique con ejemplos.

_____

_____

_____

_____

_____

26. Naturaleza de las ventajas de su empresa respecto a sus competidores en el mercado internacional.

Costo de la tecnología ( )

Escala de producción ( )

Flexibilidad para el uso de materias locales ( )

Servicios ofrecidos por su empresa (capacitación de técnicos en la empresa receptora etc.) ( )

Calidad del producto fabricado con la tecnología ( )

Vínculos bilaterales entre la Argentina y el país de destino (créditos concedidos por el gobierno argentino etc.) ( )

Vínculos culturales (idioma, conocimiento del ambiente, etc.) ( )

Otros ( )

27. Organización de la actividad exportadora

(a) Exploración del mercado externo: explique como se supo de la posibilidad de exportar.

(b) Información sobre los socios locales y/o la empresa importadora: explique, e indique si el agregado comercial de Argentina en el país ayudó en la búsqueda de esta información.

(c) Elaboración del proyecto en el exterior: ¿Fué necesario reelaborar el proyecto de la empresa receptora antes de concretar la exportación de tecnología?

(d) Licitaciones: explique como su empresa preparó sus ofertas.

(e) Colaboración con otras empresas suministradoras de tecnología: naturaleza de estos acuerdos de colaboración.

27. (Continuación)

(f) Financiación: ¿Cómo se organizó?

(g) Problemas legales: ¿Hubo dificultades en relación con un acuerdo legal entre su empresa y la empresa receptora?

Indique si el régimen jurídico en la Argentina y/o en el país receptor creó dificultades en la organización de la actividad exportadora.

28. Ejemplos de casos concretos. Se agradecería incluyeran documentación sobre un caso representativo de su actividad exportadora, pudiéndose, sí así se desea, suprimir las referencias explícitas a las empresas afectadas.

29. Tentativas de venta de tecnología que no fueron exitosas

(a) Indique el número de casos de proyectos de Inversión Directa en el exterior; Venta de Plantas LLave en Mano; Suministro de Asistencia Técnica o Contratos de Licencia en los cuales su empresa invirtió recursos pero que no resultaron en una exportación.

29. (Continuación)

(b) En la medida en que sea posible, indique el valor total de las exportaciones que no se realizaron y los países de destino de los proyectos.

(c) ¿Porqué no se concretaron esos proyectos?

(i) Desventajas competitivas de su empresa (altos costos, falta de garantías financieras, poca experiencia é imposibilidad de ofrecer referencia técnicas, ausencia de marcas, otras)

(ii) Obstáculos legales en el país receptor (limitaciones sobre inversión extranjera, políticas de "compra nacional", otros)

(iii) Obstáculos legales en la Argentina (limitaciones a la exportación de tecnología y/o de capital, falta de apoyo financiero, otros)

(iv) Otras dificultades: explique

29. (Continuación)

(d) En la medida en que sea posible, indique el monto total de sus gastos en proyectos que no se realizaron.

(e) ¿Ha sido posible recuperar los gastos de preparación de proyectos (por ~~ejemplo~~, por presentarse posteriormente proyectos similares?).

(f) ¿Se ha presentado su empresa a licitaciones organizadas por entidades internacionales (Banco Mundial, Banco Interamericano de Desarrollo, etc.)? Explique.

30. Introducción de la tecnología en el país receptor.

(a) Características de la empresa receptora (empresa pública, empresa privada, entidad de investigación, otras)

(b) ¿Se realizó el proyecto dentro del presupuesto y el plazo originalmente calculados?

(c) ¿Tiene información que demuestre que la empresa receptora estaba satisfecha con la tecnología proporcionada (se pidió otro proyecto, etc.?)

31. Impacto de la exportación de tecnología en la actuación de su empresa.

(a) Contribución directa e indirecta de la exportación de tecnología a los ingresos de su empresa.

(b) Estímulo al desarrollo de tecnología en el mercado doméstico.

(c) Formación de un plantel de técnicos especializados.

32. ¿Cuales son sus perspectivas para la exportación de tecnología en el futuro? Explique los tipos de producto, los posibles destinos y la importancia relativa que la exportación de tecnología pueda tener dentro de la estrategia de su empresa.

33. ¿Quiénes son sus principales competidores (empresas brasileñas, empresas de otros países en desarrollo, empresas de los países de Europa Oriental, empresas de países de la OCDE)?

QUINTA PARTE: SISTEMAS DE PROMOCION DE LA EXPORTACION DE TECNOLOGIA

34. ¿Ha recibido su empresa algún apoyo financiero, legal, o en términos de información por parte de instituciones públicas o privadas? Explique e indique si el valor de este apoyo fue - importante o no en la exportación de tecnología realizada por su empresa.

35. ¿Sabe si la empresa receptora de tecnología obtuvo apoyo de instituciones públicas o privadas en su país?

36. Sí fuera posible mejorar el sistema de promoción, ¿cuáles serían las modificaciones que más beneficiarían a su empresa (mayor información sobre mercados externos, incentivos financieros, garantías legales, otras)?

37. ¿En qué medida podrían contribuir al sistema de promoción las organizaciones regionales y globales de las Naciones Unidas?

38. ¿Conoce su empresa el Banco de Información Industrial y Tecnología de la ONUDI? Estaría dispuesta a participar en sus actividades.

Agradeceremos remitir este cuestionario a la siguiente dirección: Peter O'BRIEN c/o Dr. J.S. GOURI, Sección de Tecnología, Oficina D1962, ONUDI, Vienna International Centre, P.O. Box 300, A-1400 Viena, Austria.

EXPORTS OF TECHNOLOGY FROM PORTUGAL

CHAPTER I - Portuguese Economic Setting in the Seventies

1. Introduction

Portugal enjoyed a remarkable rate of growth during the five (5) years preceding the revolution of April 1974.

GDP increased at an average rate of seven (7%) per cent per annum with industry and construction growing at ten (10%) per cent and 12.5 per cent, respectively. The service sector grew in line with overall GDP growth. But the agricultural sector stagnated and output declined during the period 1968 to 1973 at a rate of one (1) per cent per annum as the Government policies favoured industry. Investment levels were high - about 21 per cent of GNP - on average during the period. Foreign investment was attracted to Portugal by the low labour costs, substantial incentives to industry, a political climate of apparent stability, and the regime's support for the private sector. The rapid growth in Western Europe during the period contributed to an increase of 9 per cent per annum in Portugal's exports (though nearly a fifth of the total went to the colonies), while the balance of payments also benefited from large number of tourists and remittances from the huge migrant labour force of Portuguese in Western Europe. As a result, despite the costs of maintaining a large colonial army, there was a substantial balance of payments surplus. Nevertheless, Portugal remained one of the poorest countries in Europe; its per capital income in 1973 was about one-fourth the level of the Federal Republic of Germany, Sweden and Denmark, and considerably lower than Greece and Spain.

Manufacturing was the leading sector in Portuguese growth, with exports a key factor in this growth. Value added in manufacturing grew at 10-11 per cent and GDP growth averaged 7 per cent per annum over 1963-73, so that manufacturing grew from 30.3 per cent to 35.3 per cent of GDP. Metal products, machinery and transport equipment increased their share in total manufacturing

output while textiles and clothing held their share and other sectors (food, beverages, wood and cork) declined. The share of exports increased from 43.5 per cent to 46.1 per cent of manufacturing value added. Exports were particularly important in textiles, clothing, footwear, metal products, machinery and transport equipment.

Industrial growth has been concentrated in a relatively small number of large and modern enterprises enjoying privileged access to credit and foreign technology, while the vast majority of medium and small enterprises accounting for up to 60 per cent of industrial employment were given little assistance and few incentives to modernize and expand.

Following the revolution of April 974 Portugal's political and economic systems were radically transformed. The colonies obtained their independence which resulted in the return of about 500,000 people and the temporary loss of important markets for Portugal's exports. There was nationalization of the banks, insurance companies, power companies, major transportation agencies and the large industrial groups. Trade union activity was legalized. Minimum wages were established and restraints were put on the highest salary levels. Unemployment and social security benefits were increased. There was a new relationship between management and labor, which at first resulted in indiscipline, absenteeism and reduced productivity. The revolution created expectations of higher real consumption, which the Government initially tried to meet through rapid increases in money wages and Government transfers. As a result domestic savings and private investment, which had sustained a high rate of growth in the 1963-73 period, fell sharply.

The impact of the revolution was compounded by adverse changes in Portugal's international economic environment. The oil price increase of November 1973 brought with it a substantial worsening of the country's terms of trade, while the downturn in Western Europe meant the slackening of demand for Portugal's exports, less earnings from tourism and the levelling off of the demand for Portuguese workers. All of this placed

severe pressures on the balance of payments and turned the current account surplus of US$350 million in 1973 into a growing deficit reaching US$1.5 billion in 1977, and US$0.8 billion in 1978. In 1979, however, current balance account reached already the surplus of US$150 million.

A related consequence of the changed domestic and international environment has been the rise in unemployment. It increased from 2.2% of the total labour force in 1974 up to 8.4% in 1978 then slightly decreasing to 8.1% in 1979. All these changes are characterized by Table 1.

Table 1 - Composition of Domestic Expenditures
(Per cent, Constant 1963 Prices)

	1973	1974	1975	1976	1977	1978
As Per Cent of GDP						
Total Consumption[a]	83.2	91.8	96.3	93.7	90.9	89.7
(Private)	(70.4)	(77.0)	(79.8)	(77.2)	(73.8)	(72.2)
(Public)	(12.8)	(14.8)	(16.5)	(16.5)	(17.1)	(17.5)
Gross Investment[a]	26.2	23.2	13.3	16.1	20.6	18.7
(GFCG)	(20.1)	(18.0)	(16.7)	(15.7)	(16.7)	(16.8)
(Change in Stocks)	(6.1)	(5.2)	(-3.4)	(0.4)	(3.9)	(1.8)
Deficit on Goods + NFS[a]	9.4	15.0	9.6	9.8	11.5	8.4
(Exports GNFS)	(26.2)	(21.7)	(19.1)	(17.9)	(18.0)	(19.9)
(Imports GNFS)	(-35.6)	(-36.7)	(-28.7)	(-27.7)	(-29.5)	(-28.3)
Terms of Trade Loss[b]	-	- 2.8	- 4.6	- 4.8	- 4.5	- 4.8
Factor Service Income, NET	10.2	9.0	5.3	5.2	4.3	5.3
Memorandum Items						
GDP Growth (%)	11.2	1.1	- 4.4	6.9	5.3	3.2
Per Capita Consumption (1973 = 100)	100.0	105.6	101.2	103.4	102.9	103.5
Current Account Deficit (Current Million US$)	348	-823	-817	-1,244	-1,499	-776
Budgetary Balance (% of GDP)	- 1.3	- 3.2	- 7.1	- 7.1	- 7.4	-10.2
Unemployment (% of Labor Force)	3.0	2.2	5.6	6.7	7.9	8.4
Rate of Change of Consumer Price (%)	12.9	25.1	15.3	18.2	27.3	22.1

[a] Excess of total expenditures (consumption plus investment) over 100 per cent equals the deficit in goods and non-factor services.

[b] At 1973 terms of trade on basis of export values.

(Continuation of footnote to Table 1 . . . .)
Source: World Bank Report No. 2883-PO, July 18, 1980; P. 3.

The task that successive Governments in Portugal have faced has been one of reducing at a politically acceptable pace private and public consumption as well as imports while a more favourable climate was restored to encourage savings, investment and exports.

2. The Role of Industry in the Portuguese Economy

The dominant role within the Portuguese industry is played by manufacturing which is the leading sector in the Portuguese economy and, in 1978, accounted for about 36% of GDP, 24% of employment, 37% of total investment, and 70% of exports. Manufacturing output grew at an average annual rate of around 11% between 1963-73, and led the rapid growth of the Portuguese economy during this period. After 1973, the manufacturing industry was directly affected by the fundamental changes in Portugal following the revolution, and to some extent by the worldwide economic slowdown. Output increased only by 3% in 1974, fell by 10% in 1975, before increasing by 4.5% in 1976 and by over 9% in 1977. Growth slowed to 3.3% in 1978 as Portugal adopted stabilization measures recommended by the IMF. In 1979, manufacturing output was only 10% higher than in 1973.

Its performance and structure in comparison to some other countries is given below:

(NOTE: Please turn to Page 5.)

Table 2 - Industrial Indicators - Portugal and the EEC

	Period of Reference	Portugal	Greece	Spain	EEC
Production Growth (Compound annual % change, real terms)					
Industry	1960-78	5.6	9.6	8.7	4.3
	1974-78	1.4	7.8	7.4	1.9
Ind. Export Growth (Compound annual % change, current prices)	1974-78	3.0	15.0	12.0	-
Ind. Structure (% of Value Added	1978				
Food, Beverage, Tobacco		11.7	17.5	10.8	13.6
Textiles and Clothing		17.3	27.3	14.9	8.8
Wood and Cork		5.7	5.5	5.2	4.1
Pulp, Paper and Printing		3.9	4.1	7.1	6.5
Chemicals		13.5	12.2	11.4	14.7
Non-Metallic Minerals		9.4	7.0	5.7	5.2
Base Metals		2.2	5.7	9.6	7.2
Metallic Products		30.7	17.3	31.7	37.4
Miscellaneous Manufactures		5.6	3.1	3.6	2.5

Source: World Bank Report No. 2846 - PO, May 30, 1980; p. 44.

The structure of industrial ownership changed drastically following the revolution of April 1974. Practically all basic and heavy industries are nationalized, i. e., steel, oil refining, petrochemicals, fertilizers, cement, pyrites, pulp and paper, glass and some others such as beer and tobacco. As a result about 12 per cent of Portuguese manufacturing output is now produced by nineteen (19) public sector corporations, most of which have a virtual monopoly in their sectors of operation. The nineteen (19) corporations which officially comprise the public industrial sector are distributed as follows: petroleum, chemicals and petrochemicals (5 companies), iron and steel (1 company), alcoholic beverages (2 companies), tobacco (2 companies), shipbuilding (2 companies), cement (1 company), pulp and paper (1 company), industrial estates (1 company), glass (1 company) and mining (3 companies).

In addition to those private firms nationalized directly, with the nationalization of banks and insurance companies the government acquired a financial interest in over 1,300 enterprises (out of about 15,000 manufacturing enterprises operating in Portugal). Still, however, private firms continue to account for about 85% of value added and 88% of employment in manufacturing and more than 90% of manufactured exports[1/].

Portugal's industrial structure is characterized by a large number of very small enterprises. Of the 14,900 enterprises in manufacturing, in 1974, 90% were small and medium sized firms employing up to 100 workers; 33.1% of all firms employed up to 10 workers and 80.7% up to 50 workers.

Table 3 - Size of Enterprises in the Manufacturing Industry
(Number of Enterprises with Five or More Workers, January 1974)

Number of Workers	5-10	11-20	21-50	51-100	101-500	501-1000	Over 1000	Total
Manufacturing Industry	4,931	3,781	3,314	1,388	1,268	148	70	14,900
% of Total	33.1	25.4	22.2	9.3	8.5	1.0	0.5	100
of which -								
Food	446	364	321	156	199	10	2	1,498
Textiles	250	276	402	217	286	44	25	1,500
Clothing	77	78	40	18	15	1	-	229
Footwear	803	460	425	158	113	6	-	1,965
Metal products	599	386	337	148	103	9	4	1,586
Machinery	257	143	156	86	65	9	8	724
Transport equipment	631	382	224	85	62	7	5	1,396
Miscellaneous mfg	188	107	106	35	31	3	-	470

Source: World Bank Report 1695 a - PO, December 27, 1977; p. 2.

[1/] World Bank Report No. 2312 - PO, April 24, 1979; p. 4.

There were only 218 manufacturing enterprises with more than 500 workers. They were concentrated in food industry, textiles, clothing, chemicals, non-metallic minerals, basic metals, and metal manufacturing industries. Of these only 70 employed more than 1,000 workers.

Manufacturing industry of Portugal is well integrated with world economy.

The import content of manufacturing is relatively high with imports accounting (directly and indirectly) for 35% of export production. Likewise, a relatively high proportion of intermediate inputs is imported, i. e., textiles (50.9%) and non-electrical machinery (54.1%).

Exports expanded rapidly during 1963-1973. It grew by 12% in real terms and some 45% of the manufactured output was exported. The leading export industries were textiles, clothing, machinery, wine, fruits and vegetables (mainly tomato paste), fish, wood and cork, non-metallic minerals and chemicals.

Following the events in 1974 due to the loss of markets in the former African colonies, the unstable situation in Portugal, and the recession in the OECD countries to which Portugal exported 78% of its total exports in 1973 exports declined sharply. Exports in constant dollar terms in 1976 were 35% lower than in 1973. Exports to Angola and Mozambique declined to only 3% of total exports in 1976.

The technological capacity of each industry may be judged to some extent from the analysis of the foreign trade structure of the engineering industries (metal products, non-electric and electric machinery), which constitute a sort of a driving force of technological progress of the given country.

Table 3 - Portuguese Trade in Engineering Goods
(Current Prices: US$ Million)

	1963	1973	1976	1977	1978	Average Annual Growth Rate % 1963-1973	1973-1976	1976-1978
Imports								
Non-Electric Machinery	84	433	480	626	714	17.8	3.5	22.0
Electrical Machinery	38	189	263	260	311	17.4	11.6	8.7
Transport Equipment	54	360	323	415	416	20.9	(3.5)	13.5
T o t a l	176	982	1,066	1,301	1,441	18.8	2.8	16.3
Exports								
Non-Electric Machinery	7	79	57	90	78	27.4	(10.3)	17.0
Electric Machinery	5	122	119	139	163	37.6	(0.8)	17.0
Transport Equipment	2	44	53	71	88	36.2	6.4	28.9
T o t a l	14	245	229	300	329	33.1	(2.2)	19.9

Source: UN International Trade Statistics.

An analysis of the exports and imports shows the Portuguese engineering subsector's dependence on other countries at the upper end of technology. Exports are generally limited to standard machine tools and relatively simple industrial machinery, office machines, electrical switchgear and electro-mechanical telecommunications equipment, components and intermediates such as castings, transport equipment (primarily ships and boats) and some heavy engineering goods such as power-generation equipment components. The technology limitations are further illustrated by the growing dependence on imports of industrial machinery despite numerous incentives for import-substitution.

3. Research and Development in Portugal

Portuguese outlays for R+D purposes are far behind the level attained by some industrialized countries. In 1978 they were around 0.3% of GDP comparing to 2.3% in U. S. A., 2.2% in Federal Republic

of Germany, 2.1% in U. K., 2.0% in Japan and 1.8% in France. The weakness of the Portuguese R and D sphere is well illustrated by the fact that more than 2/3 of all financial means in 1978 were used by the state organizations and about 18% by the institutions of higher education. The companies themselves participated only in about 13% of the funds available for R and D works. Such a situation is in sharp contrast to what is happening in developed countries and suits more the situation observed in developing economies.

Table 4 - The Share of the Companies in the Execution of R and D works (in value terms) %

Country	Year	% Of The Total Funds Available
U. S. A.	1977	70
G. F. R.	1977	64
U. K.	1977	63
France	1977	61
Japan	1977	58
Spain	1978	57
Portugal	1978	13

Source: National Board for Scientific and Technological Research of Portugal.

The share of the companies in the financing of R and D is even still lower coming close to about 4-5% in 1978. As a result only a relatively small fraction of R and D funds is used for operational purposes - that is the solution of current technological questions. This is proved by the low share of development spendings in total R and D outlays. Their share in 1978 was 38% whereas the respective figure for the U. S. was 65%, GFR - 56%, UK - 59% and Japan 59%. As a result the majority of the new technology must be imported. By 1979 there were 912 cases of technology import registered of which 39.5% were acquired by chemical and related industries and 18.3% by engineering industries. They were followed by paper and printing industry (6.6%), textile industry (6.5%) and food industry (5.2%).

These five industries accounted for over 3/4 of the total technological importation. The relative significance of the importation for Portugal and some other countries is presented below (Table 5).

Table 5 - The Sources of Technology Inflow in Selected Countries

Country	Year	X=R+D Outlays / G D P %	Y=Technology Import / G D P %	X/Y
U. S. A.	1963-1964	3.0	0.01	240
	1974	2.4	0.02	144
G. F. R.	1964	1.4	0.24	5.8
	1973	2.1	0.31	6.7
France	1963	1.9	0.22	10
	1975	1.8	0.10	17
Japan	1963	1.5	0.21	6.8
	1976	2.0	0.18	11
Portugal	1978	0.32	0.28	1.16
Argentina	1966	0.33	0.76	0.43
Brazil	1966-1968	0.30	0.27	1.1
Chile	1966-1967	0.18	0.15	1.2

Source: National Board for Scientific and Technological Research.

As could be seen from the data the level of technological dependency attained by Portugal is similar to this of Argentina, Brazil and Chile 10 years ago, and it is about 10 times higher than in the case of Japan.

Research and development effort in Portugal is coordinated by National Board for Scientific and Technological Research (JNICT). The Board set up in 1967 as a dependency of the Prime Minister's Office; it is now part of the recently created Department of State for Science in the Ministry of Culture and Science. In accordance with the legislation under which it was created (Decree-Law n.° 47 791, of 11 July 1967) the function of the JNICT is "to plan, coordinate and further scientific and technological research in

Portugal". This duty has been expanded into a large number of tasks, among which should be singled out of those of "stating its opinion (...) as to the bases on which national scientific policy should be defined" and of "drawing up plans covering one or more years for the development of research activities".

The JNICT thus functions as a Planning Department for the sector of scientific research and technological development, with the task of coordinating and harmonising not only the technological research and development policies of the various sectors of activity, but also the utilisation of the corresponding means to put them into practice.

The duties of the Board are:

- To state its opinion to the Government as to the bases on which national scientific policy should be defined;
- To further the coordination of scientific and technological research;
- To prepare and follow closely the implementation of plans for scientific and technological research activities;
- To prepare an inventory of research centres and keep it up to date;
- To further the implementation of scientific and technological research projects.

As a first step towards stimulating scientific and technological activities with a view to responding to the scientific and technological needs of the various economic and social sectors, the JNICT has launched an "Integrated Programme of Scientific and Technological Department", which has the following concrete aims:

(a) To further national scientific and technological research:

(b) To further intercommunication and coordination between research centres run by the State, by Higher Education bodies and by Companies;

(c) To remove a number of fundamental constraints that have an adverse effect on the Portuguese scientific and technological system;

(d) To orientate the potential of national scientific resources for the pursuance of the objectives and strategy of economic and social development.

The "Integrated Programme of Scientific and Technological Development" includes five (5) projects:

(1) Research and Development Contracts, aiming to dynamise and complement research activities. Through these contracts about 7% of the total government spending for R and D is allocated. Financial support is given to research work falling within the following major categories:

(a) the furtherance of industrial productivity and technology;

(b) the furtherance of productivity and technology in agriculture and fisheries;

(c) the exploration and use of natural resources;

(d) the protection and promotion of human health;

(e) the general diffusion of knowledge;

(f) economic and social organisation and progress;

(g) advanced technologies.

(2) Technological specialization study grants, granted for about twenty (20) persons annually.
(3) Fund for aid to scientific communities.
(4) Development of the national capacity for invention and innovation with the aim to further the technological creativity and innovation in Portugal.
(5) Development of national scientific and technological information system.

The Board is also responsible for the evaluation of all the research proposals coming from the state research bodies.

4. The Role of Foreign Markets

Portugal consistently runs a substantial trade deficit, but this was in the past offset both by a surplus on its own invisible transactions, and by the surplus on visibles and invisibles combined which the overseas provinces earned in dealings outside the escudo area. Large gold and foreign exchange reserves were built up. At the end of 1973 the escudo area's reserves ($2,839mn) covered over eleven months' imports at the 1973 average rate. This made the escudo a very strong currency. In the first months of 1974 pressure on the import side brought some reduction in reserves, and thereafter the decline in emigrants' remittances, and in earnings from tourism, - together with the rapid rise in import prices in 1974, brought a marked decline in holdings of foreign exchange. Both remittances and tourist earnings have returned to pre-coup levels and government austerity measures (devaluation, tight credit and cuts in domestic purchasing power) succeeded in both 1978 and 1979 in bringing down the growth in imports to well below the rate of expansion in exports. In the latter year a surplus was achieved on the current account. International reserves have strengthened, reflecting the improvement on the current account, as well as substantial foreign borrowing.

Table 6 - Foreign Trade of Portugal

	1975	1976	1977	1978	1979
Exports FOB	49.34	54.68	76.67	107.20	170.51
Imports CIF	97.59	127.82	189.69	227.18	320.08
Trade Balance	- 48.25	- 73.14	-113.02	-119.98	-149.57

Source: Boletim Mensal das Estatísticas do Comércio Externo.

On the export side textiles, wood and cork and engineering products are dominating. On the import side crude petroleum and machinery are the most important items.

Table 7 - Main Commodities Traded (mn escudos)

Exports (FOB)	1978	1979
Textiles	30,934	51,916
Wood and Cork	11,382	18,425
Machinery and Appliances	10,609	14,494
Paper and Pulp	5,430	9,948
Chemicals	5,527	9,808
Tomato Concentrate	1,987	2,339
Port	3,712	5,735
Red Wine	2,668	3,348
Tinned Sardines	2,387	2,659
Imports (CIF)	**1978**	**1979**
Crude Petroleum	28,688	52,426
Machinery and Equipment	41,402	51,940
Chemicals	22,271	29,658
Textiles and Products	15,850	24,134
Metals and Products	23,005	26,370
Transport Equipment	21,149	27,417

Source: Boletim Mensal das Estatísticas do Comércio Externo.

Between the end of 1973 and the middle of 1977, the cost of competitiveness of export industries deteriorated by 10% to 20% as a result of a combination of sharp cost increases (only partially offset by the depreciation of the escudo) and a decline in producti-

vity. At the same time an increasing distortion was introduced in the incentive structure in favor of industries producing for the home market and against production for exports; in 1977, taken together, the subsidies received by export producers added up to, at most, 4% of their output value while firms producing import substitutes for the home market received protection sometimes exceeding 100% of value added. This was the result of a generally arbitrary tariff structure inherited from the previous regime, on which import surcharges of 30% to 60% were superimposed in 1975 + 1976.

Since the middle of 1977, the cost competitiveness of Portuguese exports has recovered somewhat following the devaluations of the escudo in August 1977 and May 1978, a decline in real wages of about 9% and some improvement in productivity.

It is interesting to note that Portuguese trade incentive measures are concentrated on production of import-substitutes and not on porduction for exports. Export firms receive subsidies well below those received by firms producing import substitutes. The relevant information is provided by the table below.

Table 8 - Summary of the Portuguese Foreign Trade Incentive System

	Incentive For:	
	Exports	Import Substitutes
	(% of value of output)	
Measure		
1. Tariffs		Average of + 10% or more with wide variation
2. a) Surcharges		+ 30% for 31% of imported goods; + 60% for 2.3% of imported goods
b) Prior Import Deposits		+ 3.5% for 10% of imported goods

	Incentive For:	
	Exports	Import Substitutes
	(% of value of output)	
c) Quantitative import restrictions		strongly positive for 5% of imported goods
3. Drawback	net effect zero (it simply removes disincentives from tariffs, surcharges, etc. on imported inputs)	
4. Exemption of indirect taxes on inputs	(simply equalizes tax treatment with that of foreign firms)	
5. Income taxes	+ 0.5% to + 4% increasing with the rate of profit	
6. Export development fund	small positive	
T o t a l	0.5% to 5%	varies widely from 13% to 30% and higher

Source: World Bank Report 1695a - PO, December 27 1977; pp. 23-24.

Most of the exportation is placed in European Community (ca 60%), followed by U. S. (6.0%) and Sweden (4.9%). Importation is less concentrated. Over 40% comes from European Community, around 12% from U. S. A, nearly 6% from Spain and about 10% from Egypt and Saudi Arabia.

Portugal is a founder-member of EFTA and since 1973 has a trading agreement with the enlarged EEC.

In March 1977, Portugal made formal application for full membership of the EEC, and formal negotiations began in autumn 1978. These are likely to last until late 1981, and entry is scheduled for 1 January 1983, with a transitional period of up to ten (10) years for full integration. France and West Germany have indicated that the entry date might have to be postponed in order to sort out first the present Community's problems.

CHAPTER II - TECHNOLOGY EXPORT FROM PORTUGAL - MACRO ANALYSIS

1. Some Introductory Remarks

Before going into deeper analysis of Portuguese technology exports there is a clear need - in order to avoid possible misunderstandings - to clarify basic notions used in the present report. This relates in the first instance to the definition of technology itself. There is already an abundant literature available on the subject produced by individual researchers, international organizations, and the like. Most of the studies define technology as a special kind of knowledge of an applied character which is used for running techno-economic and social processes. Therefore one could speak of industrial technology comprising the knowledge relating to the operation of industrial activities, civil engineering technology relating to the execution of civil engineering projects, agriculture technology, social engineering technology, etc.

In the present study we cover only industrial and civil engineering technologies as well as technical services leaving aside other groups of technology. Industrial technology covers besides strict manufacturing activity industrial construction, various technical services, power generation and distribution, transportation and communications.

Civil engineering covers construction of roads, airports, dams, etc. as well as provision of related consultancy and engineering services.

Technology may be of either embodied (hardware) or disembodied (software) character. The bulk of technology being transferred among the countries is of embodied character, however, it is difficult to judge what part of the total payments originated from the flows of machinery and equipment may be related to its technological content and what part to its material content (costs of materials, labour force, etc.). In the case of soft technologies the problem is far more simple as most of the payments relate to the technical content and only a minor

part to the physical carriers of such technology as blue prints, samples and the like. The data quoted in the present chapter cover only soft technology which was determined by the lack of information on hard technology exports.

Technology may be transferred internationally by different channels. As to the industrial technology it may be transferred through the sale of capital goods, turn-key plants, patent and know-how licenses, consultancy and engineering services, technical assistance agreements as well as direct foreign investments. Civil engineering technology is supplied usually by the provision of engineering, technical and organizational services as well as by construction works.

Statistical data provided in the present chapter were obtained from two (2) basic sources: Ministry of Industry and Technology - Department of Planning and Studies and from the Bank of Portugal - Departments of Current and Capital Transactions. Figures covering the period prior to 1978 are of tentative character as until then there was no official regulation requiring exporting firms to register the technology export projects. From 1978 onwards all technology sales are registered by the Bank of Portugal - Department of Current Transactions. Of course, the range of information provided by the technology registry is rather limited due to the fact that it is viewed strictly from the financial (according to the interests of Bank of Portugal) and not technological or economic points of view.

A somewhat different situation exists in the case of foreign direct investments (DFI). Registration of capital inflow and outflow goes back to 1960 2h3n a special agency of the Ministry of Finance was created. Since 1970, according to the law 183/70, all capital transactions are controlled and registered by the Bank of Portugal - Department of Capital Transactions.

All technology export cases are registered by the Bank of Portugal according to the following breakdown: assistance to

enterprises, consulting and engineering, erection and construction and manpower. The first item = assistance to enterprises - covers a broad range of activities: licensing, technical assistance agreements consultancy and engineering services supplementing licensing contracts, repair and maintenance services and turn-key deliveries. The second category = consulting and engineering - covers the provision of consulting and engineering services such as feasibility studies, projects, market studies, blue prints, designs, etc. The third item covers erection and construction services which are basically related to civil engineering activities. The fourth category = manpower - covers hiring of Portuguese manpower and technicians for foreign collaborators and is therefore strictly related to technical assistance agreements.

2. Dimensions and Forms of Portuguese Technology Exports

Technology export from Portugal nowadays plays in statistical terms insignificant role in the overall hard currency earnings of the country. In 1974 the total technological receipts (excluding hardware technology) amounted to about US$354 thousand, in 1975 to about US$2.3 million, in 1976 to about US$5 million, in 1977 to about US$7.1 million and in 1978 to about US$9.9 million. At present its value is well above US$11 million. This means a remarkable rate of growth - between 1974 and 1980 the value of soft technology sales increased well over thirty (30) times (see Table 1).

It is interesting to note that the value of technology sales increased rapidly since 1975 - the year when political and economic tensions due to decolonization and revolutionary changes in Portuguese political system were at their peak.

A different situation was observed in the case of Portuguese direct foreign investments. Value of direct capital outflow fell abruptly between 1973 and 1975 as a result of political and economic changes in Portugal. In 1975 the volume of DFI was only about 14% of the respective figure for 1973. The decrease in value was accompanied

by a decrease in the number of concluded cases. From 1976 onwards the situation seems to be back to normal with the value of capital outflow close to that before the revolution.

There is no clear pattern of the forms of technology export except for the fact that pure licensing contracts both patent and know-how are of no significance. The role of consultancy and engineering services, technical agreements and composite agreements are however varied in different years. This proves that by now there is no clear specialization pattern of Portuguese economy regarding exportation of technology and that due to small value of this export any big deal provides for decisive changes in its institutional structure. Thus in 1974 over 50% of this export took the form of technical assistance agreements, in 1975 nearly 100% was in the form of composite agreements, in 1976 over 70% of the export was provided through consulting and engineering services whereas in 1977 the exportation was split nearly equal among consulting and engineering, technical assistance and composite agreements.

A somewhat different picture emerges from the information supplied by the Bank of Portugal for the years 1978-1980 which might be partially explained by the use of a different classification criteria and partially by eventual changes in technology export structures occurred in the last years.

According to this information most of the contracts take the form of technical assistance agreements followed by consulting and engineering services and maintenance and repair services. The rest is split among licenses, erection and construction works and hiring of Portuguese workers and technicians.

Despite the fact that Portuguese technology export is rather low and consists of many small technological shots which is proven by low average value of individual contracts ranging from US$0.5 million in 1976 to US$0.275 million in 1978 there are some indications

that Portuguese companies arealready well prepared to meet much more sophisticated requirements in selected fields. The best example is the recent construction of Arab Shipbuilding and Repair Yard (ASRY) in Bahrain an undertaking coordinated by LISNAVE - the greatest Portuguese shiprepair yard.

The Bahrain Shipyard - which can receive ships up to 500.000 DWT - is by far the largest and most important project ever carried out in Bahrain with the costs totalling US$210 million. The ASRY Company, owned by seven (7) OAPEC countries (Bahrain, Iraq, Kuwait, Libya, Qatar, Saudi Arabia and the United Arab Emirates) spent over four (4) years looking all over the world for a leading shipyard capable of handling the project before finally commencing negotiations with LISNAVE. Lisnave decided to take its chance immediately and within less than six (6) months conceived complete feasibility study on which consequent negotiations were based. Twenty-four (24) months later dredging started in the open sea and thirty-five (35) months later the first VLCC came into drydock.

The implementation of the ASRY rpoject compares favourably with any similar project in the world bearing particularly in mind che climate, poor labour supply as well as poor local infrastructure.

The Portuguese contribution to the successful implementation of ASRY project was very important. The overall value of the equipment and services supplied came close to US$46 million out of the total US$310 million.

Overall responsibility for the undertaking was taken by LISNAVE through its subsidiary company - NAVELINK S. A.. It was also charged with guidance in the management process, detailed drawings, layout of the shipyard, specification of all the equipment as well as training of professional staff. Except for Lisnave, many other Portuguese companies were awarded important orders in connection with the project. It is worth mentioning that Lisnave won a contract

to manage the new shipyard during the first seven (7) years of its operation under which it receives some US$2 million annually. The Bahrain shipyard is by far the greatest industrial complex ever conceived and executed by Portuguese technology abroad. The project is a good example of the meaning of the spill over effect in technology export when one world-wide known company is able to push the exports of technology of the secondary or even tertiary industrial actors which are able afterwards to follow the business in their own capacity.

3. Directions and Principal Actors of Technology Export Business

Portuguese technology export shows a clear concentration in the African countries. During 1974-1980 nearly 70% of all agreements were signed with the African countries. This comes as no surprise in view of the long presence of Portuguese companies in the African market basically due to the possession of the colonies. The technological dependance born at that time seems to still be strong enough to overcome the eventual national prejudices and the politically supported drive of the local enterprises towards technological self-sufficiency. The technological links seem to be far stronger than political ones. The position of Portuguese technology exporters in the African markets may also be to some extent explained in terms of their accumulated knowledge of the land and people, their cultural habits and mentality as well as the desire of the Portuguese companies to exploit these advantages vis-a-vis foreign competitors. The last but not least is the readiness and capacity of Portuguese professional staff to accept sometimes hard climate and living conditions of the African countries.

It is interesting to note that the second main area of Portuguese technology export is Western Europe, which represents ca 15% of all export contracts in 1974-1980 (see Table 6). The new important market for Portuguese technology is the Middle East whose role in the last two (2) years has substantially increased no doubt due to

the successful implementation of the ASRY project. Latin American countries particularly Venezuela and Brazil rank fourth among importers of Portuguese technology.

A different pattern is observed in the destination of Portuguese direct foreign investment (DFI). Taking into account the cummulative value of DFI for the years 1973-79 the first position goes definitely to Latin America with Brazil and Venezuela at the forefront. Altogether, Latin America received ca 45% of the total amount of Portuguese DFI undertaken in these years.

The second place is occupied by Western Europe with ca 35% of the invested capital and third by the Middle East with ca 10% of the exported capital.

Certain important changes however were brought about in recent years in the outflow of DFI. There is, namely; a clear tendency towards decrease of outflow to Latin America with the parallel increase of DFI in African (mainly Morocco, Mauretania and Nigeria) and the Middle East countries. The same is true as regard USA and Canada. This peculiar geographical structure of the capital exportation has its roots in the character of the ventures undertaken by Portuguese companies. According to available information most of the ventures in USA and Western Europe as well as Latin America is related to banking and trading activities as well as telecommunication sectors. Thus, capital flows show little relevance to industrial technologies and are more related to foreign trade and financial operations.

When analyzing technology export an attempt was made to identify the nature of the main actors of the phenomena according to two (2) criteria - their type of ownership and field of main activity.

As regard the first criterion it was found out that the basic part of technology contracts was carried out by private-owned companies with their share amounting to ca 60%. The second place with

ca 25% was occupied by state-owned companies whereas the remaining 15% was split between companies with minor foreign participation and majority-owned foreign subsidiaries (see Table 8).

In the case of DFI the bulk of capital export during 1973-79 was carried out by state companies (71.3%) followed by private companies (25.6%) and individuals (3.0%). The share of majority-owned foreign subsidiaries was close to null (0.05%) (see Table 9).

Regarding the nature of technology suppliers according to their main field of activity the dominant role in the case of Portugal is played by consulting and engineering companies which carried out nearly 50% of all contracts executed by Portugal during 1978-1980. They were followed by manufacturing companies which executed over 30% of the contracts in the period under consideration (see Table 10).

An important role is played by contracting, construction and transportation companies included under the heading: "Others" of Table 10.

4. Technology Export and Promotional System

As it was already pointed out in the first chapter, Portuguese foreign trade promotional system is heavily biased towards the development of import substituting industries. Much less is done for the export promotion. The same situation is reflected in technology transfer area. By far much more was done for regulating and promoting technology importation than technology exportation.

Considering the exportation itself there is again a clear bias towards the promotion of ordinary goods and not the technology. This is well illustrated by the activity of the Export Promotion Board - the central administrative body for export promoting measures. The Board entered the field of technology export only two (2) years ago by establishing within its capital goods department the service and technology section. The section, however, is staffed by one (1)

man only and its interests are concentrated more on ordinary services like repair, maintenance, etc. and turn-key projects than on soft technology exportation.

The Board with its thirty-two (32) representatives abroad is of little importance as an information source for potential technology suppliers as the geographical distribution of these representatives fits to current trade needs and not to potential technological demand for Portuguese know-how. Somewhat more is done in this respect by the Portuguese Industrial Association through a very extensive programme of fairs and exhibitions.

5. Conclusions

The hitherto considerations provide us with some tentative conclusions, which might be formulated as follows:

(1) Industrial and technological development of Portugal has already created favourable conditions as well as certain possibilities for the development of its technology export. It could be claimed that increased eagerness of the Portuguese companies for entering technology export business resulted from instability of local political and economic situation in 1974-76. The desire to survive and maintain proper profits has pushed industrial and related companies into the exportation of goods and services including technology. There must have been also some "pull effect" coming from ex-colonies and generated at the outset by the need to maintain these industrial activities which existed before the liberation.

(2) The structure of the institutional mechanisms for technology export seems to support the view that there is a predominance of the second rate technology in the total amount of export projects. Considering this fact one could easily point out the nature of comparative advantages exploited by Portuguese exporters. As the matter concerns rather standard technology they are not able to use their mono-oroligopolistic position on technological market. Instead their advantages must be related to the prices, better understanding of local needs and priorities and thus better adaptation to local requirements and high efficiency in technology transmission. Majority of the exported technology relates to small industrial projects however there are certain indications that some sectors of Portuguese industry are already capable to plan and run big industrial projects based on most modern technology.

(3) The Portuguese experience in a geographical structure of technology export, gives a good example for the stability of international technological links despite the disruption of political and institutional ones. This is illustrated by the fact that Africa ranks first among the importers of Portuguese technology. The continuation of technological collaboration born by the need to maintain and repair existing productive capacities must have been surely reinforced by language and cultural proximity as well as better understanding of local political and power systems.

(4) The absolute majority of exported technology is generated through nationally controlled companies, among which important role is played by nationalized enterprises. Majority-owned foreign affiliates are practically absent in the business albeit their significant role in Portuguese industry.

TABLE 1 - Annual Total Value (1) and Number of Contracts (2) of Technology Exports (in US$)

Specification		1973	1974	1975	1976	1977	1978	1979	1974-79 Total xx/
1. Patent License	(1)	-	78712	8611	-	-	-	-	87323
	(2)	-	1	1	-	-	-	-	2
2. Know-How License	(1)	-	-	-	-	-	30000	-	30000
	(2)	-	-	-	1	-	1	2	6
3. Consultancy and Engineering Services - x/	(1)	-	37388	-	3505912	2283843	4925033	-	10752176
	(2)	-	1	-	7	10	18	34	70
4. Technical Assistance Agreements	(1)	-	178763	-	-	2826610	1250519	-	4255892
	(2)	-	6	-	-	8	9	29	52
5. Composite Agreements (1+2+4)	(1)	-	59034	2286666	1486666	1988312	3641808	-	9462486
	(2)	-	4	1	2	2	8	4	21
6. Turn-Key Plants	(1)	-	-	-	-	-	-	-	-
	(2)	-	-	-	-	-	-	-	-

Source: Ministry of Industry and Technology

Notes: x/ Including maintenance and repair as well as construction and civil engineering

xx/ In value terms excluding 1979

TABLE 2 - Annual Total Value (1) and Number of Contracts (2) of Direct Foreign Investment in US$ (10^3)

Specification	1973	1974	1975	1976	1977	1978	1979	1973/79
Direct Foreign Investment (1)	59252,6	12590,8	4203,9	43016,2	80389,9	12860,6	39988,6	252302,6
(2)	53	42	20	27	40	39	57	278

Source: Bank of Portugal

TABLE 3 - Value of Technology Export According to Institutional Forms (in %)

I T E M	1974	1975	1976	1977	1978
1. Patent License	22,2	0,3	-	-	-
2. Know-How License	-	-	-	-	0,3
3. Consultancy and Engineering Services	10,5	-	70,2	32,2	50,0
4. Technical Assistance Agreements	50,5	-	-	39,8	12,7
5. Composite Agreements	16,8	99,7	29,8	28,0	37,0

Source: Ministry of Industry and Technology

TABLE 4 - Number of Technology Export Agreements According to Institutional Forms (1978-1980)

I T E M	1978[1/]	1979	1980[2/]
1. Assistance to the Companies	28	43	19
- Licenses	8	6	2
- Technical Assistance	12	29	14
- Maintenance and Repair	8	8	3
2. Consulting and Engineering	10	18	10
3. Erection and Construction	3	8	4
4. Hiring of Portuguese Man-power	5	3	3

Source: Estimations based on information from the Bank of Portugal

Notes: [1/] Second Half of 1978

[2/] First Half of 1980

TABLE 5 - Principal Orders Given to Portuguese Industry in Connection with ASRY Project

TYPE OF ORDER	SUPPLIERS	THOUSANDS of US$
Tugs and Small Launches	S. Jacinto; Foznave	11465
Rail and Floating Cranes	Mague	11185
Management and Preparation of the Project	Lisnave	6200
Project and Supervision of the Undertaking	Profabril	4500
Dewatering of the Dockpit and Land Reclamation	A. Cavaco	3200
Tank Cleaning Station (A Re-converted Ship)	Lisnave	2116
Electric Power Switchboards	Jaime da Costa; Schreder	1209
Dock Gate	Lisnave	1104
Electric Cables	Solidal, Celcat, Avila	1076
Organization Studies and Various Services	Various Firms	800
Machine Tools	Pinheiros; Adira; EFI; Jacinto Ramos; Smol	577
Overhead Traveling Cranes	Tecnil	466
Kitchen and Canteen Equipment	Pujol	420
Metal Furniture	Metalúrgica da Longra	413
Distribution, Starter and Control Switchboards	Jaime da Costa; Schreder	404

Source: Portuguese Industrial Association, Newsletter 1/1978

TABLE 6 - Directions of Technology Exports in 1973-79 (Number of Contracts) with Exclusion of DFI

DESTINATION OF EXPORT	1974-1976	1977-1978	1979	1980 1/	1974-80 TOTAL
USA/Canada	4	-	-	-	4
Western Europe	10	7	13	6	36
Socialist Countries of Europe	-	-	-	-	-
Latin America	8	7	3	2	20
Africa	7	39	48	22	116
Middle East	1	2	7	5	15
Australia/Japan	1	-	-	-	1
Rest of Asia	1	1	1	-	3
T O T A L	32	56	72	35	195

Source: Bank of Portugal and Ministry of Industry and Technology

Note: 1/ First Half of 1980

TABLE 7 - Direction of Portuguese DFI in US$ (10^3) 1973/79

DESTINATION OF EXPORT	1973	1974	1975	1976	1977	1978	1979	1973/79
USA/Canada	1466,3	123,7	1520,3	43,1	866,2	5117,2	2525,9	11665,7
Western Europe	19471,5	11186,3	1885,2	6905,7	40243,0	3050,2	7935,9	90677,8
Socialist Countries of Europe	-	-	-	-	-	-	-	-
Latin America	36896,3	1254,3	439,7	33074,3	36172,0	3022,9	3886,7	114746,2
Africa	17,2	26,5	358,7	2990,1	3108,7	1670,3	1024,1	9195,6
Middle East	-	-	-	-	-	-	24607,3	24607,3
Australia/Japan	-	-	-	-	-	-	8,7	8,7
Rest of Asia	1401,2	-	-	-	-	-	-	1401,3
T O T A L	59252,6	12590,8	4203,9	43016,2	80309,9	12860,6	39988,6	252302,6

Source: Bank of Portugal

TABLE 8 - Nature of Technology Exporters According to the Type of Ownership (Number of Cases)

I T E M	1978[1/]	1979	1980[2/]
Majority Owned Foreign Subsidiary	2	5	2
Minority Foreign Participation	5	9	1
State Companies	11	20	9
Private Companies	28	38	24
T O T A L	46	72	36

Source: Bank of Portugal

Notes: [1/] Second Half of 1978

[2/] First Half of 1980

TABLE 9 - Volume of DFI, by Type of Exporter Ownership and Country of Destination (1973/79), in US$ (10^3)

DESTINATION OF EXPORT	MAJORITY OWNED FO. IGN SUBSI- DIARY	MAJORITY OWNED DOMESTIC COR- PORATION	PUBLIC ENTITY	PRIVATE ENTITY	TOTAL
USA/Canada	2,0	3078,6	8559,4	25,7	11665,7
Western Europe	126,9	11334,7	72007,3	7208,9	90677,8
Socialist Countries of Europe	-	-	-	-	-
Latin America	-	20023,2	94516,4	206,6	114746,2
Africa	-	5639,8	3445,8	110,0	9195,6
Middle East	-	24607,3	-	-	24607,3
Australia/Japan	-	8,7	-	-	8,7
Rest of Asia	-	1,4	1399,9	-	1401,3

Source: Bank of Portugal

TABLE 10 - Nature of Technology Exporters According to their Field of Main Activity (Number of Cases)

I T E M	1978[1/]	1979	1980[2/]
Manufacturing Companies	16	25	9
Consulting and Engineering Companies	21	34	17
Trading Companies	1	3	1
R and D Establishments	-	-	-
Others	9	10	9
T O T A L	46	72	36

Source: Bank of Portugal

Notes: [1/] Second Half of 1978

[2/] First Half of 1980

CHAPTER III - TECHNOLOGY EXPORTS FROM PORTUGAL = EMPIRICAL FINDINGS

The former chapter provided some data and analysis based on facts and figures supplied by Government and Bank of Portugal. The analysis which follows is based on results of the survey carried out by UNIDO in several manufacturing, consulting and research organizations in September 1980. Altogether, nineteen (19) organizations were contacted. First, they were extensively interviewed by UNIDO mission and then asked several questions through elaborated questionnaire. The questionnaire (see Annex 1) was intended to answer four (4) basic questions:

(1) What were the main characteristics of the exporting organizations?
(2) What were the basic characteristics of the technology export process?
(3) What was the relation of technology export to company development?
(4) What was the value of the existing promotion system?

The companies surveyed were selected in close collaboration with the Ministry of Industry and Technology, Bank of Portugal and Export Promotion Board in order to ensure their representative character and thus have sound reasons for generalizing conclusions.

Except for it extensive discussions were held in the Ministry of Industry and Technology, Bank of Portugal, Export Promotion Board, Association of Portuguese Industry and National Board for Scientific and Technological Research.

1. Characteristic of the Sample

Out of nineteen (19) organizations studied, ten (10) belonged to the private sector, five (5) were owned by the state, three (3) were majority owned domestic corporations and one (1) was majority owned foreign subsidiary (see Annex 2). The organizations represented

themselves a wide range of activity. Most of them were involved in a direct manufacturing and the rest in consulting and R and D business.

Table 11 - Field of Activity of the Surveyed Organizations

		Number Of Cases
(1)	Manufacturing Corporations:	12
	- Machine building industry,	4
	- Electrotechnical industry,	3
	- Chemical industry,	1
	- Textile industry,	1
	- Precision industry,	1
	- Foundry,	1
	- Shipbuilding industry,	1
(2)	Consulting and Engineering Companies	5
(3)	R and D Establishments	2
	T O T A L	19

The organizations selected from the respective fields of activity were supposed to be the leading entities in terms of size, age, technological performance, etc. thus constituting the core of the given industries. A good example is a case of shipbuilding industry being represented through LISNAVE - a giant shipbuilding and shiprepair company which in fact controls the whole sector and a good part of the relevant activities through its seven (7) affiliated companies:

ENI - (electrical, electronic and control instruments qualified repairers);

FRINIL - (refrigeration and air conditioning specialists);

GASLIMPO - (tankcleaning receiving slops and dirty ballast, oil separating and bunkering);

LISNICO - (travelling squads specialized in any repairs to engine, pipes and hull on board sailing ships);
REPROPEL - (qualified propeller repairers);
TELEDATA - (data processing services);
ELECTRO-ARCO, S. A. R. L. - (electrode manufacturers and welding specialists).

Another example is the chemical industry represented in the sample by Quimigal, the largest chemical company in Portugal which also holds financial participations in nine (9) other national chemical companies:

FISIPE - (acrylic fibers);
ISOPOR - (M. D. I.);
LUSOFANE - (P. V. C. pipes and fittings);
TINCO - (paints);
SONADEL - (detergents);
UNICLAR - (toilet soaps and cosmetics);
UNISOL - (distribution of consumer goods);
PREVINIL - (P V. C. compounds);
SOVENA - (distribution of edible oils and glycerines).

The same is true in relation to machine building and electro-technical sector representatives.

Out of five (5) consulting and engineering companies covered by the survey four (4) belong to leading industrial consulting organizations and one (1) is a major Portuguese company for civil engineering services.

The two (2) R and D establishments questioned are LNEC - National Laboratory for Civil Engineering - the biggest Portuguese centre for civil engineering studies, and LNETI - National Laboratory for Industrial Technology - the biggest Portuguese organization for industrial research.

The sample was composed of relatively big organizations (according to Portuguese standards - see Chapter 1). Most of them were employing over 1000 employees.

Table 12 - Size of the Companies (in number of employees)

Size of the Company	Up to 200	200-500	501-1000	1001-5000	Over 5000
No. of Cases	1	3	5	8	2

It should also be stressed that most of the companies had relatively long records of their activity in the respective fields. Only few of them might be called newcomers. It was not achieved by a simple coincidence - on the contrary - it was the result of the selection criteria used in the survey. The point was to testify the hypothesis on the importance of the time factor in the technology export phenomena.

Table 13 - Age of the Companies (according to the year of establishment)

Age of the Company	Before 1939	1940-1950	1954-1955	1956-1970	1971-1975	After 1975
No. of Cases	4	3	3	6*	-	3**

Notes:

* - LISNAVE was on formal ground (year of establishment) included in this category, however, its history goes back to 1899 when Lisbon Port Authority was founded which after creation of LISNAVE was incorporated by the latter. The same reasons were used in the case of Profabril formally founded in 1963 but operating as an engineering department of the CUF industrial group well before the Second World War.

** - Quimigal was formally included into this group however its history goes back to the end of the XIXth century.

2. Technological Growth of the Firms

It is interesting to note that most of the organizations relied heavily in their technological growth on foreign technologies. This is particularly true as regard manufacturing companies whereas in case of consulting firms the degree of independency is much higher. The relevant information is provided in table 14.

Table 14 - Sources of Technology Exploited (number of cases)

	Manufacturing Companies	Consulting And Engineering Companies	R and D Establishments	Total
1. Growth based exclusively on internally generated technology	1	3	2	6
2. Growth supported by importation	5	2	-	7
3. Growth based mainly on importation	6	-	-	6
Total	12	5	2	19

The only manufacturer that claimed total technological independence was COTESI - a big synthetic textiles company specialized in a production of simple products - twines, ropes, cables, nets, clothes and tarpulins. It is worth mentioning that nearly 90% of the production is marketed abroad. The company existing since 1967 has no experience in technology export, however, there were few attempts of foreign customers to acquire its technology. About 40% of all organizations claimed that their

technological growth was supported by technology importation. In some cases this support was not very impressive in some others it was decisive for the technological capacity of the company.

The first situation is well illustrated by the case of ADIRA - the oldest metal working machines and machine tools producer in Portugal. ADIRA started its industrial career twenty-five (25) years ago from the manufacture of small lathes designed by its first (and present) proprietor - A. Dias Ramos. Gradually the firm expanded to some other relevant production (presses, gillotines, press breaks, plate shears, etc.) always using its own technology which is rather standard all over the world. The quality of production therefore depends more on the quality of materials and assembly than on design itself. However, in time of invasion of electronic into metal-working machines ADIRA was unable to meet this requirement with local technology and made use of available Swiss technology.

Thus at present mechanical technology is internally generated whereas electronic components and systems are imported.

The second situation is well illustrated by case of EFI, REGULADORA and MAGUE. It is interesting to see how in all three (3) cases the situation developed.

EFI started its industrial career in 1928 from the production of engine's spare parts then gradually expanding to diesel engines, machine tools and textile machines. Out of these three (3) main production lines only machine tools are based on company's own technology. Two (2) others are based on foreign technology. Diesels are manufactured under West German license and testile machines under Swiss license. Local technology embodied in machine tools has a good reputation abroad - about 60% of the production is exported and by far two (2) licenses were granted.

REGULADORA, founded in 1892, was the first manufacturer of watches and clocks in the Iberian peninsula. Up to 1958 production was based

completely on company's own technology and covered simple mechanical watches and clocks. In 1958 the company decided to enter another line of production - water and electric meters for which purposes the relevant license from Belgium "CONTIMETER" was acquired. Further technological development there was consequently based on local resources with some collaboration of the licensor and at present third generation of post-license technology is being exploited. In the seventies, following the strategy of product diversification, REGULADORA decided to buy three (3) other licenses for quartz clocks (F. F. Romanet - France), electrical shaving machines (Riam S. A. - Switzerland) and for switching devices (BACO - France). By far REGULADORA has granted abroad one (1) license for electric meters (1977 - Spain).

MAGUE, established in 1952, started its development from the production of handling equipment mainly for civil engineering purposes. The production in this field was from the beginning based on its own technology. In the late 50s the company decided to open a new production line manufacturing equipment for power stations. The technology was borrowed from world known companies - for steam generators from Foster Wheeler Co. (U. S. A.), for turbo-alternator units and their auxiliaries from B. B. C. (Switzerland) and for water turbines from A. C. M. Vevey (France).

The large group of companies claimed their technological development being based mainly on importation. The two (2) cases, namely of EFACEC and SOREFAME seem to be most illustrative in this category.

EFACEC is the biggest Portuguese firm in the electro-technical field with the majority participation of Ateliers de Constructions Electriques de Charleroi (Belgium). Practically whole production is based on foreign technology. At the outset it was supplied by ACEC itself. Then, the range of technology suppliers was broadened to include among others Westinghouse Electric International Co. (U. S. A.) - power transformers, Delle Alsthom (France) - oil circuit breakers, Usines Balteau (Belgium) - high voltage instrument transformers, ILG

Industries Inc. (U. S. A.) - manufacturing of industrial fans, DUCON International (U. S. A.) - manufacturing of dust control equipment (cyclones, scrubbers, filters, etc.), MIKROPUL Gmbh (Germany) - electrostatic filters, gas absorption towers, etc. and CALLOW ENGINEERING (U. K.) - high pressure pneumatic conveying systems.

The case of SOREFAME is to some extent similar. Just like in the case of EFACEC the starting point was the technology for manufacturing of hydraulic equipment received from French NEYRPIC in 1948 with the subsequent participation of the latter in the company's interests. In each case of launching a new production line SOREFAME called for foreign technical assistance mainly in form of licensing contracts. As a result the company is a licensee of fifteen (15) foreign firms which determine its technological profile. The list of the licensors is given below:

Brockhouse Steel Structures Ltd., Birmingham - (clasp system of integrated and modular construction);
Burness, Corlett and Partners, Ltd., London - (steel hulls "Hydroconic" shape, for vessels (to be built at Lobito shipyard and plant by SOREFAME de Angola));
Compagnie Industrielle de Materiel de Transport, Valenciennes - (railway wagons);
Etablissements Brissonneau + Lotz, Paris - (diesel-electric locomotives);
Etablissements Industriels D. Soule, Bagneres de Bigorre - (mild steel railway rolling stock);
Etablissements Neyrpic, Grenoble - (hydromechanical equipment);

Ferrand and Frantz, Villeurbanne
- (reel overhead travelling cranes);
Henschel Werke AG Kassel
- (motor bogies for electric locomotives);
John Thompson (Wilson Boilers, Ltd.,
Glasgow - (steam boilers);
Linke Hofmann Bush, Salzgitter
- (electric engine cars for the
Lisbon Underground);
Schindler Wagons, S. A. Fratteln
- (bogies for coaches and
motor coaches);
Societe de Constructions Electriques
et Mecaniques Alsthom-Atlantique,
Paris - (motor bogies for electric motor
coaches, generators and motors-generator);
The Budd Company, Philadelphia
- (stainless steel railway rolling stock).

At present the management is contemplating a new license for the manufacture of tramways. Additional light on sources of technology is provided by data referring to R and D works carried out in the organizations in question. Most of the companies (thirteen (13)) stated to have only minor R and D and only two (2) of them to have significant (Both were R and D establishments). In two (2) cases there were no local R and D and in two (2) more cases there was no information available. As a result foreign technology was generally exploited at its "face value" without being seriously upgraded. Only in one case out of ten (10) studied foreign technology was radically improved and in two other cases the changes were significant (see Table 15).

Table 15 - Range of Changes Introduced into Imported Technology

Content	No. of Cases
1. No change	1
2. Minor changes	6
3. Significant changes	2
4. Radical changes	1
T o t a l	10

The motives behind these changes were widely diversified, however, five (5) were dominating. These were cost savings reasons, market needs, improvement of technical performance, consumer reaction and size of the market. Altogether they constituted about 70% of the quoted motives. The others mentioned were product development, non-availability of certain skills, lack of certain materials and new developments in this field.

All these lead us to three (3) tentative conclusions:

(1) The imported technologies are used mostly at their "face values" without serious attempts to make them the driving force of the subsequent technological catching-up.

(2) The technological development of the big Portuguese companies is by far and large based on imported technology. There is a clear relation between the level of sophistication of the given technology and its import dependency.

(3) The R and D capacity of the companies is highly limited and which puts Portugal in an unfavourable position regarding the development of modern technologies. What is left for Portuguese designers is a perfection of standard technologies.

3. Motives for Entering Technology Export Markets

As in case of other developing countries industrial development of Portugal was and still is to much extent (see Chapter 1) import substituting and not export-oriented. This is reinforced by the existing foreign trade policy favouring import limitations to export incentives[1/].

The surveyed companies provide enough evidences to prove this hypothesis. Thus for example most of the industrial engineering companies were conceived in the sixties - the time of rapid industrial development of the country. The start-up of EFACEC and SOREFAME resulted from the need of electrification of the country, the foundation of MAGUE was a response to the country's large civil engineering projects, etc. The same pattern is still preserved at the present time.

As a result industrial and related organizations seem to be very sensitive to the variations of the economic situation of the country. Therefore at times of economic slowdown the eagerness of Portuguese companies of going technologically abroad is increasing which was stressed by most of the interviewed organizations. This had also a clear impact on the hierarchy of the motives behind technology exportation.

As it could be expected most of the companies claimed their wish of going abroad technologically in order to exploit accumulated know-how. It is known that economic value of know-how is determined by the extent it is used in practical operations, coming to the null in case it is not applied at all. Therefore it is obvious for the

---

1/ For a good discussion of the problem, see "World Bank Report" No. 1695a - PO, Dec. 27 1977; pp. 9-25.

companies to try to exploit it as widely as possible thus maximizing their income, particularly in view of their home-oriented production. The need to exploit accumulated know-how as a reason for entering world technological market was followed by two (2) other motives - possible resulting from the present unfavourable economic climate at home - by the need to use excessive capacity and by corporate policy objectives particularly risk diversification.

Table 16 - Basic Motives for Exportation*

Category	No. of Cases
1. Higher profits abroad	3
2. Existence of excessive capacity	6
3. Corporate policy	6
4. Offer of government subsidy	1
5. Need to circumvent tariffs and quotas	1
6. Exploit accumulated know-how	7
7. Threats to existing markets	3
8. Other	2

*The figures can not be added as the companies stated at one time several reasons.

This was mentioned both by manufacturing (SOREFAME, MAGUE, LISNAVE, REGULADORA, etc.) as well as by consulting engineering organizations (Profabril, ACTA, Lusotecna). The situation became critical particularly after the loss of colonial markets in Guinea Bissau, Angola and Mozambique.

4. Characteristics of Technology Export

The most interesting question in characterizing the technology export from newly industrialized country is the nature of exporter's advantage over its foreign competitors, particularly in view of the lack of the former of technological superiority.

It comes as no surprise that in most cases the competitive edge resulted from the lower costs of technology which in soft technology areas are practically determined by the costs of labour force. It might be expected that with the rise of wages in Portugal this factor will be gradually disappearing. The second place was occupied by the quality of production or services offered. It is obvious that potential recipients of technology are hunting not only for cheap but also for good products which means that before entering technology export business the company must achieve a certain degree of mastery over the technologiesin possession. Therefore technology export arrives only at some stage of development of the company which might be called a stage of "technological maturity". This "technological maturity" is by no means related only to the technology in question, it is rather related to the overall industrial know-how coming from many years of activity in the business.

The most outstanding Portuguese technology exporters - LISNAVE, QUIMIGAL and PROFABRIL - have a fairly extensive experience in the business.

LISNAVE - for example - with nearly one-hundred (100) years of experience in shipbuilding and shiprepair and nearly fifty (50) years of experience in shipyard design and construction has become in the seventies one of the biggest world shiprepair companies. Its reputation may be judged from the fact that it is by now an authorized repair firm and approved spare parts supplier of twenty-four (24) foreign companies active in the business such as: Burmeister and Wain; Fiat Grandi Motori; Gotaverken; M. A. N.; Stork; Sulzer; Sent-Pielstick (licensed engine repairs and approved spare parts supplies); Brown Boveri and Co. (licensed turbo-blower repairs and approved spare parts supplies); Hitachi-Shipbuilding and Engineering; Kawasaki Dockyard Co.; Mitsubishi Heavy Ind. (for guarantee drydocking and shiprepairs); Ivaldi and Generale (specialized welding techniques); AB Davy Robertsons Maskin-Fabrik (davos piston rings stock); Butterworth System (tankcleaning equipment); Alfa Laval (licensed oil separator and heat exchanger

repairs and approved spare parts supplies; Stat-Laval (steam turbines). Its worldwide reputation in shipyard business was demonstrated by a receipt of a key position in ASRY project (see Chapter II).

QUIMIGAL too has an experience ranging from over one (1) century in case of extraction and refining of vegetable oils and production of soaps to more than eighteen (18) years of experience in the production of foodstuffs.

The company by now has successfully participated in several industrial projects abroad. Its record includes among others:

- the execution on turn-key basis a large industrial complex including edible oils production, manufacture of bottles, oil bottling and manufacture of soaps in the People's Republic of Angola;
- participation in feasibility studies, erection, start up and operation instructions in:
  1. sulphur sublimation plant in Morocco,
  2. fertilizer granulation plant in Turkey,
  3. groundnut oil refining and pressing plant in the People's Republic of Guinea-Bissau,
- execution of pre-feasibility and feasibility studies in:
  1. palm oil fractionation in the People's Republic of Angola,
  2. storage, treatment and drying of sunflower seeds in the People's Republic of Angola,

3. edible oils and bottling plant in Brazil,
4. compound fertilizers plants in Brazil,
5. fertilizer complex in the People's Republic of Angola,
6. feedstuffs plant in the People's Republic of Angola,
7. feedstuffs plant in Brazil.

- delivery of plant maintenance services in:
  1. Morocco,
  2. People's Republic of Angola,
  3. People's Republic of Guinea-Bissau,
  4. People's Republic of Mozambique,
  5. etc..

Profabril again basing on its industrial knowledge accumulated within CUF group and subsequent execution of many of national consulting engineering services had succeeded to export its services among others to: Angola, Bahrain, Brazil, Cape Verde Islands, Guinea-Bissau, Holland, Macao, Morocco, Mozambique, Roumania, S. Tomé e Príncipe, Saudi Arabia, Spain and Turkey.

Except for costs of technology and quality of production, important role among exporter's advantages was played by existing political, commercial or cultural links. In the case of Portugal this is specially true as regard African and Latin American markets.

Table 17 - The Nature of Exporter's Advantage over Foreign Competition

Item	No. of Cases
1. Cost of technology	8
2. Quality of production	6
3. Scale	2
4. Political, commercial or cultural links	5
5. Experience in dealing with foreign buyers	2
6. Other	2

This was felt to be particularly important at the initial stage of the projects when the most serious problem for the exporter is to find out the coming potentialities. It was important too in the subsequent phases of the projects. Knowledge of language and people, better understanding of their motives and desires as well as good knowledge of existing power and information systems were considered of immense importance in technology export business.

Now what regards the disadvantages of Portuguese exporters vis-a-vis foreign competitors the most important problems were those resulting from the poor development of the industry as a whole and its specific structure and poor development of the national promotional systems.

Table 18 - The Nature of Exporter's Disadvantage vis-a-vis Foreign Competitors*

Item	No. of Cases
1. Lack of relevant national inputs:	6
- equipment	2
- raw materials	1
- inadequate capacity	3
2. Inadequate promotion system	4
3. Late comers "inheritage"	?
T o t a l	18

*The figures can not be added as the companies mentioned sometimes several factors.

The third factor mentioned was the one which might be called "late comers heritage" and which comprises both the disadvantages stemming out from the late access to export markets as well as negative assessment of Portuguese technological capacity by the outside world.

Before finishing with the characteristics of the technology export it is worthwhile to look at the degree of the sophistication of the export work in comparison to domestic projects. Out of ten (10) companies which answered this question, seven (7) saw no difference at all whereas only in one case the export work was considered to be more sophisticated than ordinary homework.

5. Organization of the Export Activity

It is interesting to note that the large proportion of the companies were exporting their technology through direct foreign investments. Out of twelve (12) manufacturing companies six (6) had some sort of capital participation abroad ranging from joint-ventures up to wholly-owned subsidiaries. Particularly active in this respect were QUIMIGAL, TUDOR and SOREFAME. QUIMIGAL holds at present financial participation in ten (10) foreign companies. These are:

INTERGAL - Spain; (commercial activity);
QUIMIBOL A. G. - Switzerland; (trading of sulphuric acid);
INTERCUF Sao Paulo - Brazil; (trading, distribution and tank storage of chemicals);
INTERCUF - U. S. A.; (commercial activity);
INDUVE - People's Republic of Angola; (edible oils, manufacture of plastic bottles, packaging, soaps);
COMFABRIL - People's Republic of Angola; (commercial activity);

COMFATEX - People's Republic of Angola; (textiles);
COMP. TEXTIL DO PUNGUÉ - People's Republic of Mozambique; (fibers, cloths and raffia and jute bags);
SOCAJÚ - People's Republic of Mozambique; (processing of cashew and CNSL);
CICOMO - People's Republic of Mozambique; (sisal cables, ropes and bags).

As it could be seen from the list, five of them are manufacturing entities.

Tudor - batteries and dry cells manufacturer - has presently three (3) subsidiaries - in Angola, Mozambique and the Central African Republic. SOREFAME has presently two (2) manufacturing joint ventures in Brazil.

An interesting case is LISNAVE which, specially, for handling the company's technology export contracts opened in 1975 in Lozanne its subsidiary company.

It is worth mentioning that also one of the consulting engineering company - Hidrotecnica Portuguesa - has its subsidiaries abroad (Brazil and Mozambique).

These facts suggest that inevitably with the rising stream of exported technology Portuguese companies will be transforming themselves more and more into multinational units. Particularly if one considers that fact that technology export is by far the domain of a rather big industrial units.

An important aspect of an export activity is the exploration of foreign markets and the collection of information on potential customers. This is particularly true in relation to soft technology which is generally not visible on the market and demand is to some extent hidden behind the doors of the managing boards or government officials.

When exploring foreign markets Portuguese companies used in most cases the associated companies acting on these markets. This was followed by professional market research and participation in all sorts of international activities (fairs, exhibitions, etc.).

Table 19 - The Way of Exploring Foreign Markets*

Item	No. of Cases
1. Participation in international activities	3
2. Market research	3
3. Local representatives	2
4. Associated companies acting on the market	5
T o t a l	13

*The figures can not be added as the companies were allowed to name more than one way. Some companies did not supply the relevant information.

It is interesting to note that what regards the sources of information on potential customers the picture was different. Out of eleven (11) cases examined in four (4) cases the information was obtained through personal visits, in three (3) cases throuh local representatives and in three (3) cases through jornals and documents. In the remaining one (1) case the information was supplied by main contractor. This gives a clear indication of the nature of the Government assistance for the exporting companies

6. Technology Export and Company Development

The intention of the study was - among others - to identify the impact of technology export operations on the subsequent development of the exporting companies. Most of the surveyed companies placed at the top, a positive feedback of an export activity to domestic technological capacity. It was closely followed by indirect financial earnings

associated with export contracts. Some of the companies mentioned also publicity gained through the execution of export orders as well as increase in their knowledge of international operations.

7. Technology Export and Promotional System

The existing promotional system was heavily criticized by the companies. Out of ten (10) companies which answered the question six (6) claimed to receive no help in their technology deals and of the remaining four (4) only two received some help from the government machinery and two (2) were assisted by other bodies. All the companies stressed that the assistance supplied was of no real importance and had in no case influenced the company's decisions.

When asked for the suggestions regarding the improvement of the existing situation most companies put at the top the extension of financial aid for technology export contracts and better supply of information on existing potential markets.

Table 20 - The Directions of Improvement of the Promotion System

Item	No. of Cases
More Information	5
More Financial Aid	6
More Financial Incentives	2
More Political Support	1
T o t a l	14

The need for more financial assistance was particularly stressed by manufacturing companies whereas informational aspect was undelivered by consulting engineering organizations.

9. Conclusions

The hitherto analysis provides the basis for the following statements and conclusions regarding technology export phenomena which obviously have as general validity as the representative character of the sample surveyed. For reasons of clarity all these findings are arranged according to the questions put forward at the beginning of the chapter.

1. The main characteristics of the exporting organizations

1.1 The vast majority of exporting organizations has a long record of the productive activity both as regards manufacturing companies as well as consulting engineering entities. Their growth was as a rule generated by home market needs with the same market being their "exercise area". Before going abroad the technology and products were first tested and approved by local customers. The state demand was particularly important in new products or services areas. It comes out that at least a period of ten-twenty (10-20) years of productive activity is needed to start to go technologically abroad.

1.2 The exporting entities particularly manufacturing companies rely heavily on imported technologh which gives the basis for the subsequent technology exportation. Imported technology gives as a rule a decisive push for the technological development which follows the supplementary role being played by internally generated know-how. Only in few cases the relative significance of the two (2) sources of technology were of reverse order. The situation seems to perpetuate in the nearest future due to the absence of substantive R and D capacity of the companies. For the same reasons the local upgrading of foreign technology was

rather poor and consisted of minor improvements of some segments of technology in view of changing demand needs or changing supply conditions.

All these should not however discredit the local technological progress and following technology export. There are some cases in which exportation was generated by local and not imported technology, the latter - if used - playing only a supplementary role.

1.3 In consulting and engineering companies imported technology played much smaller role in their development and their exportation resulted rather from locally generated know-how and high level of professional qualifications of the staff.

1.4 The exporting companies belong to the group of a rather large entities according to both local and international criteria and there was a clear positive relationship between the size of the company and its technology export performance.

2. <u>The basic characteristics of the technology export</u>

2.1 On the supply side technology export is generated by the willingness to improve profit performance of the companies. Therefore the drive towards exportation is particularly strong at the time of economic slowdown of the country. From this point of view the years following the revolution of April 1974 played a historical role in generating the growth of technology export and what is more in reshaping of largely locally oriented corporate policy towards the more interna-

tional approach. This "forced export" phenomena when properly supported may turn to the "free choice export" attitude.

2.2 On the demand side the export was generated by cost competitiveness of Portuguese technology suppliers, their high level of technical competence as well as by strongly operating historical factors such as existing political, commercial or cultural links. It comes as no surprise then that by far and large most of the technology export is marketed in former colonies and some Latin American countries with Portuguese background.

2.3 The limitations to technology export stem both from a poor level of the domestic industry which is not in a position to meet in a complex way the demand of importers as well as from its structural weakness reflected in a dominance of the small size enterprises. It is also felt that to a much extent potential technology export is limited due to the poor performance of a national promotion system in comparison to what is done for the foreign competing organizations.

2.4 Technology export from the manufacturing sector is mainly taking the form of technical assistance agreements and turn-key projects in case of developing countries, licensing contracts in case of newly industrialized states and ordinary industrial services in case of developed economies. Important role in case of developing countries is also played by direct foreign investment carrier.

2.5 It is interesting to find out that in the generation of information on potential markets a very important role is played by the associated companies active on the market. It could mean a serious handicap for the companies either from developing or newly industrialized states. It could mean further that a sort of "closed societies" are in a position to control and regulate the market share of the prospective technology exporters. The outsiders might be then easily eliminated or pushed away on the margin of the market.

3. Technology export and company development

There is a weak feedback between technology export and the subsequent development of the exporting companies in terms of indirect earnings. There mustn't be either a strong positive feedback to the exporter's technological capacity as most of them claimed export projects to mount no specific technological requirements. What seems important is that export activity provides the companies with relevant know-how on international bidding, market research techniques, international financing, etc. thus making them better prepared for going international.

4. The value of the existing promotion system

It seems that both the existing institutional as well as financial schemes for promoting technology export are poorly sketched out. They provide neither enough organizational nor financial assistance for the potential technology appliers. It is felt that an improvement

in these schemes might have considerable influence on the performance of the Portuguese technology exporters.

IV. Final Conclusions and Recommendations

(1) It seems justified enough to state that the Portuguese industry as a whole and particularly some traditional sectors of manufacturing industry - have already acquired enough experience and knowledge to provide for the growing technology exportation. The furtherance of this phenomena requires, however, an adequate industrial and foreign trade policy. The government should act to improve the existing institutional structure of the industry by stimulating concentration processes as well as considerably improve its R and D policy and act to increase national R and D outlays. The improvement of the foreign trade policy should cover both its reshaping towards more export-oriented policy as well as improvement of organizational and financial schemes for the prospective technology exporters. By far much more is done for technology import then technology export.

(2) As the Portuguese technology export consists mostly of the second rate or traditional technologies its future development depends much on the behaviour of Portuguese cost competitiveness in comparison to alternative suppliers as well as successful exploitation of existing technological and cultural links with the outside world. These sets for clear priorities in geographical structure of exportation. Former colonies and some Latin American countries seem to be ideal outlets for Portuguese technologies. It could be well argued that the final performance of Portuguese economy in this field depends first of all on its capacity to exploit these natural advantages.

(3) The specific nature of the technology export markets requires much more activity from the state as well as international organizations to ensure for the less developed countries companies an equal starting point. This covers both their internal capacity and know-how related to international technological operations as well as outside factors like information supply, money supply, etc. New exporters must not be left on their own to carry out an unequal fight against the well-placed international giants.

(4) In all these actions important role could be played by international organizations and UNIDO in particular. The courses for the management on handling technology export projects, better exchange of information on existing technological supply and demand as well as more financial support in terms of more independent international financing (World Bank, UNDP, etc.) are only a few examples of the actions that could be taken.