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THE ACTIVITIES OF BRAZILIAN FIRMS ABROAD

by

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INTRODUCTION

This paper aims at examining Brazilian firms' activities abroad. These activities cover a wide range, from simple goods exports to direct investment in wholly-controlled subsidiaries, and includes service exports, turn key operations, licencing agreements, production share and risk service contracts, management contracts and joint ventures.

This wide range comprehends, therefore, activities which constitute pure sales, others which correspond to traditional direct investment abroad and still those which are both sale operations and involves at least an element of investment by Brazilian firms. As suggested by Oman (1982), investment implies the acquisition of rights to future income so that the investing firms' profit is derived from the output of (value created by) the investment project. As a result, transactions implying some degree of access to, and control over the value created by an undertaking in a host country involve at least an element of investment by the firm.

This paper is primarily concerned with those undertakings abroad which involve at least an element of investment. This excludes simple manufacturing export operations but may include activities classified under all other categories. Furthermore, this paper is mainly concerned with the actitivites of manufacturing and engineering firms.

It is worth pointing out, however, that, despite its main interest in undertakings which involve some element of investment, this paper focuses also an those which do not exactly fit such a description. Brazilian firms' activities abroad are recent and few. In this context, it is relevant not only to examine the current characteristics of these activities but also to evaluate the possibility of their changing into new forms and to identify the prospects for the movement of Brazilian firms towards the external market.

Part I presents an inventory of Brazilian firms' activities abroad. After a general account of these activities, it focuses on direct investment and technology and service exports by manufacturing and engineering firms. Part II evaluates the inducing factors and the prospects for the movement of such firms towards the external market.

PART I

THE ACTIVITIES OF BRAZILIAN FIRMS ABROAD: AN INVENTORY

The sixties brought a vigorous movement of Brazilian companies towards foreign markets. This movement implied a substantial increase in exports and also significant changes in its composition. The growth of direct overseas investments was also significant, as were technology exports by manufacturing and engineering companies.

Although this study will not dwell on goods exports, it is worth giving some general indicators (Table 1) as background to an understanding of the other overseas activities of Brazilian firms.

The expansion of exports in the seventies is related to a number of fiscal and financial incentives, mainly to the export of manufactured goods, established in the late sixties. These export incentives aimed not only at increasing foreign exchange revenues, but also at the diversification of Brazilian exports, reducing dependency on primary products, and at making exports a stimulus for industrial growth.

In this context, Brazilian exports grew at an annual rate of 16.1% from 1970-1982, from US$ 2.7 billion to US$ 20.2 billion. The expansion of manufacturing exports was even more impressive, up from US$ 0.4 billion in 1970 to US$ 10.2 billion in 1982, at an average annual rate of 21%. This brought a progressive rise in the share of manufactured goods in the total exports from 8% in 1965 to 15% in 1970, leveling off at 30% in the mid-seventies; at the end of the decade, this percentage expanded again, to 50% in 1982.

1. Direct investment abroad

While only partially revealing the magnitude of overseas investments by Brazilian companies, available information shows a significant increase in their volume since the mid-sixties.

There are two sources of data on these investments. The first is the Central Bank's certificates of authorization for the transfer of resources out of the country, which are published in the Diário Oficial da União. The second source is the balance of payments, which gives the amount actually transferred as overseas investments.

The two time series derived from each of these sources (Table 2) reveal major discrepancies, with authorized figures systematically (except in 1971) below actual transfers. One reason for the difference, of course, is the very nature of each source: authorized investments may or may not be carried out, or at least not in the same year as the authorization. This, however, does not explain the magnitude of the deviations. In fact, most of the discrepancies are explained by the overseas investments of Banco do Brasil and by the Brazilian government's investments in the Itaipu Binacional. Both of these are included in the balance of payments, but neither requires authorization by the Central Bank.

Both sources, however, underestimate the volume of overseas risk capital owned by persons or firms located in Brazil as they do not take into account the reinvestment of profits earned abroad. There is no way to calculate the underestimation implicit in available data. Information presented and discussed here should thus be viewed with caution, since it represents only part of Brazilian direct investment abroad.

The time series of authorized investments shows a tendency to growth, despite sharp fluctuations between 1975-1978, when exceptionally high figures in 1975 and 1977 are followed by much lower amounts in 1976 and 1978. If bi-annual figures are used, though, grouping 1975-76 and 1977-78, both series of nominal and real values show continual growth. The real values show that overseas investments, after a first spurt in 1972-73, reach more significant values and begin a clearly ascending tendency after 1974. As we will soon see, however, this growth initially reflects an isolated phenomenon.

The rapid growth of Brazilian overseas investments is also clear in the time series of resources actually transferred abroad, as compared with the flow of foreign investments into Brazil. In fact, the ratio between the two, systematically below 10% through 1974, averaged 17% in the 1975-82 period. It is impossible, however, to identify any defined tendencies during the period, since the percentage fluctuates between 11% and 24%.

Table 3 shows the breakdown of authorized investments for 1977-83, according to the economic sector of the investing firm. For the previous period, the only information is that the oil sector accounted for 85% and 60% of the amounts authorized in 1975 and 1976, respectively. Thus the significant increase observed in the mid-seventies was due to a sudden expansion of Petrobrás' overseas activities, in the wake of the oil crisis. Only in 1978 did the movement towards the external market cease to be a phenomenon restricted to one sector (and one firm). From that year on, most investments come from the financial sector, as a result of the involvement of the Brazilian banking system in attracting resources on international money markets, and its expansion throughout Latin America in liaison with the growth of Brazilian exports to the region. Other sectors also grew throughout the period, both in absolute terms and as a percentage of total investments. It is worth noting, however, that the exceptionally high figures for the manufacturing sector in 1979 and 1981 are the result of investments by a single firm (US$ 35 million and US$ 30 million,respectively). Without these investments, manufacturing industry's share in the period drops to 8.5%.

In relation to the geographic distribution of Brazilian overseas investments, it is noteworthy the changes occurred in the late seventies, with a declinein the share going to developed countries from 82% in the 1965-76 period to 59% in 1977-82 (Table 4). On the other hand, investments in Latin America and in the tax havens rose from 10.5% to 22.5% and from 6% to 17%, respectively. This change, to a great extent, reflects the fall in Petrobrás' share of investments and is also somewhat deceptive with regards to the ultimate location of investment. In fact, Petrobrás has normally

chaneled its entire flow of investments through the United States to the other regions in which it operates. For example, available information on the years 1972-76 indicates that investments sent to the US were subsequently transferred to Iraq (28%), Algeria (19%), Iran (11%), Colombia (11%), Libya (9%), Madagascar, the Philippines and Norway.

Table 5 shows the destination of each sector's investments in the 1977-82 period. For financial institutions, nearly 90% of the investments go to developed countries and to Latin America, reflecting the nature of these firms' overseas expansion described above. The large share of developed economies in the case of the oil sector is also a result of the above-mentioned Petrobrás policies. As for manufacturing industry, the figures are strongly influenced by the investments of a single firm in the Antilles; disregarding this investment, Latin America's share rises to 56% and that of the developed countries to 37%. More than 80% of the engineering companies' investments go to Latin America and the Caribbean tax havens.

1.1. The manufacturing sector

One hundred and twenty three manufacturing firms invested abroad during the period 1977-82. These investments, were higly concentrated: 47% of the US$ 138.3 million invested by such firms was made by one company; the second and third largest investors, together, accounted for 19.2% of the total; the next 18, with investments between US$ 1 to 5 million each, bring the total to 89%; and, finally, the 63 companies with investments of US$ 100 thousand or more account for 98.4% of the total amount (Table 6). The following discussion refers to these 63 companies.

Most of the 63 companies' overseas investments (52 of them) are restricted to only one country; eight have investments in two countries, one in three, one in four and one in six countries. Thirty seven of them operate in Latin American countries (Table 7), with 31 of these in only one Latin American country; 24 have

investment in developed economies, one in Africa and six in tax havens (of the latter, only one also has investments in other regions).

There is a clear predominance of local firms among the 63 Brazilian overseas investors. Only five are foreign subsidiaries established in Brazil, and these respond for 3.6% of the total amount invested by the 63 companies. Among the local firms, there is only one that is State-owned (Embraer), with a million dollars invested in the United States.

As for the branch of activity of the investors, the largest share of total investment (54%) corresponds to the food processing industry. This percentage, though, is basically the result of the presence of a single large investor — a sugar producing company — responsible for a 65-million-dollar investment (48% of the total) in a trading company headquartered in the Caribbean. If this company is excluded, there is a clear predominance of the metal-mechanic segment: 35 firms in this segment account for 35% of total investment (this percentage rises to 67% when we exclude the US$ 65 million invested by the firm mentioned above). Once again, however, this high share reflects the presence of big investors, this time a steel manufacturer with US$ 14.5 million invested in Uruguay and a sound-equipment producer with a US$12.0 million investment in Great Britain.

Excluding these three major investors (responsible for 66% of total investments), we are left with the following order of the industrial branches: food processing (US$ 8.3 million,six companies); electrical equipment (US$ 7.9 million, seven companies); mechanical machines and equipment (US$ 6.7 million, twelve companies) textile and apparel (US$ 5.5 million, five companies); non-metalic minerals (US$ 4.9 million, four companies); transport equipment US$ 3.7 million, seven companies); metallurgy (US$ 2.4 million, seven companies) and plastics US$ 2.3 million, two companies).

Among these branches, the machinery industry stands out not only with the largest number of overseas investors but also with the greatest geographical diversification of the companies'

investments. One firm has investments in six countries (all in Latin America), another in four (two Latin American and two developed countries) and three have investments in two countries (at least one in Latin America). In addition, of the twelve companies in this branch, only three do not have investments in other Latin American countries.

As stated at the beginning, the data obtained from the transfer authorization certificates issued by the Central Bank offer only a partial picture of Brazilian investment abroad, since they refer only to investments made with resources transferred from Brazil. Additional information — obtained from the financial statements and reports of the companies and published in a book which examines the composition of 187 local business groups (Atlas Financeiro) — allows us to identify more precisely the overseas activities of eleven of the companies identified in the Central Bank register.(*) These eleven firms include the three largest investors and account for investments registered with the Central Bank on the order of US$ 100 million, or 72% of all investments carried out by manufacturing firms.

In the case of the three largest investors, this additional data reveals that Central Bank records do not show the full extent of their overseas activities. Thus, the sugar producer (Copersucar), besides the company in the Caribbean already mentioned, has indirect control — through the Caribbean subsidiary — on a North American food-processing company(**). The sound equipment manufacturer (Gradiente) which has taken over the British firm Garrard Engineering Ltd. (registered by the Central Bank) has acquired also Garrard's subsidiaries in the US, Germany and New Zealand. In addition, Gradiente also has a Mexican subsidiary not registered by the Central Bank. Thus, of the three largest investors, the official records are accurate only in the case of the steel manufacturer, Gerdau.

(*) The Atlas also lists three cases of manufacturing companies — an instant coffee producer, a beverage company and a foundry — with overseas investments that are not included among the 123 companies identified in the Central Bank register.

(**) This North American subsidiary was sold out recently, however.

As for the other eight firms, only in two cases does the information from the company reports indicate greater overseas involvment than what has already been suggested. Yet the new information gives a better picture of the nature of investments abroad. Four of these eight firms participate in joint ventures abroad. The Vilares group, which produces machinery and equipment and has investments in six Latin American countries, fully owns its subsidiaries in Argentina, Chile, Uruguay and Paraguay, but holds 85% of the stock of its Colombian subsidiary and shares with a local investor control of a firm in Mexico (it holds 49% of the capital). Munck, also in machinery and equipment, while controlling a subsidiary in Argentina, holds only 37.5% of the stock of a Mexican company. Bicicletas Caloi owns 49% of the capital of the companies in which it participates in Bolivia and Colombia. Finally, the Ferraz de Andrade group has 38% of the capital of Acepar, a steel works in Paraguay, associated with a local State-owned holding company (60% of the capital) and with Tenenge, a Brazilian engineering company (2%).

1.2 - Engineering firms

Overseas investments by engineering firms from 1977-82 involved 33 companies. They were higly concentrated, with the three largest investors accounting for 68% of the total. Furthermore, only 19 invested more than US$ 100 thousand during the period. The following comments refer to these 19 firms, responsible for 99% of total investment (Table 8).

Most of the 19 firms invested in only one country during the period; only six invested in two different countries. Eight have investments in Latin America and seven in tax havens. In distinction to the manufacturing companies, more firms in this sector invested in Africa (four of them only in Africa) and relatively fewer invested in developed countries. As for the ownership of the Brazilian investors, only two are foreign subsidiaries, with US$ 1.64 million investments (US$ 1.5 million in the Caribbean and the rest in Mexico).

Ten of these 19 investors are construction companies, accounting for US$ 18.7 million (or 60% of total investments), of which 57% in Latin America and 38% in tax havens (Table 9). Five of them are in the building sector, with their investments (US$ 11.6 million) concentrated in tax havens (61%) and developed countries (35%). The consulting, design and assemblying firms account for a small share, both in numbers (four) and in the volume of their investments (4% of the total).

It is worth noting that ten of these 19 companies will reappear in this study as contractors for overseas projects and/or exporters of engineering services. Six of the 14 companies with less than US$100 thousand in investments are also part of this group. Of the 16 firms identified here as both investors and service contractors, seven operate in the construction sector (US$16.7 million) and nine in consulting and assemblying (US$1.4 million). These 16 companies' investments represent 57% of the engineering sector's overseas investments, and have gone mostly to establishment of subsidiaries either in the countries where services are rendered or in tax havens In one case, mentioned above, the investment refers to a steel company (Acepar), in a turn-key operation by a engineering firm (Tenenge) and by a Brazilian steel company (Coferraz).

As was the case in the manufacturing sector, the information from the reports of companies belonging to 187 local business groups offers a more extensive view of the overseas activities of some of the Brazilian engineering companies. For the biggest investor in this sector (Mendes Júnior), this information shows that,besides investments in Uruguay and the Caribbean, this construction company also has subsidiaries in Argentina and Algeria, controlled by the Caribbean subsidiary. Further information onthe third largest investor (Gomes de Almeida) reveals the existence of subsidiaries in the US and in Paraguay that remain unlisted by the Central Bank. Odebrecht, a major construction firm for which the Central Bank reveals only US$5,000 of investments in the Caribbean, appears with 91% of the stock of a subsidiary in Paraguay and 66% of a joint venture in Chile. Finally, Veplan,with no investments registered in the Central Bank, shows up here with wholly-owned subsidiaries in

the US, Paraguay and Chile, as well as 35% of the capital of a second subsidiary in this latter country.

1.3 - Overseas investments by State-owned firms

The register of Brazilian State-owned firms organized by the Secretary of Planning is an additional information source on the activities of Brazilian companies abroad. While it does not reveal the value of the State-owned firms' overseas investments, it does furnish the number and sectors of foreign companies in which these firms participate, as well as the nature of this participation.

This register, which does not include foreign agencies of government banks, reveals that there are 25 companies abroad with direct or indirect investments by Brazilian State-owned firms: 17 commercial companies, four financial companies, two oil companies, two shipping companies and one company involved in Brazil's nuclear program. Of the 25, 17 are established in developed countries, seven in tax havens and one in the Middle East. Nearly all of them are part of the groups led by the Banco do Brasil, by Petrobrás and by Vale do Rio Doce. There are only three cases where the State-owned company does not directly or indirectly wholly own the subsidiary: two commercial companies, each of them held 50% by Petrobrás and 50% by a local private firm, and a shipping company, 50% of which is controlled by Vale do Rio Doce.

This profile of the State-owned firms' subsidiaries reflects the nature of their overseas expansion. Their dynamic is generally tied to export efforts or to initiatives that complement the Brazilian firm's main activity. Only some of Petrobrás' subsidiaries represent an overseas extension of the company's main activity. Petrobrás' activities abroad also include exploration contracts, which will be examined below.

2. Industrial technology and engineering service exports

By Brazilian law, in order to make payments abroad for the import of technology, the contracts under which payment is made must first be approved and registered in the National Institute of Industrial Property and in the Central Bank. These records, along with the exchange operation statistics compiled by the latter agency provide considerable information on the flow of technology transferred into the country. While the data is not elaborated systematically by the agencies that have access to the information, there is at least the possibility of a satisfactory estimation of the magnitude and nature of the inflow of technology.

Unfortunately, the situation regarding technology exports is completely different. The only systematic information available comes from exchange operation statistics compiled in the process of drawing up the balance of payments. Even this source, however, is of limited value and should be viewed with caution. The forms filed for exchange operations and used for the compilation of these statistics are scrutinized much less rigorously than in the case of technology imports, not only because the auditing is looser (since they involve revenue for the country) but also because they do not refer to a previously registered contract. In addition to these operational difficulties, this source obviously does not include the earnings perceived by Brazilian firms abroad and not remitted to the country.

Therefore, there is no systematic information on the Brazilian firms exporting technology, or on the main characteristics of their exports revenue. A more precise study of Brazil's technology exports thus demands a comprehensive survey to indentify the exporters and obtain the necessary information. An alternative is to derive data on these exports from scattered sources of informatic complemented by interviews in a small sampling of companies. Our procedure was the latter one, and the results are presented in the following sections. We indentified 58 manufacturing firms responsibl for 112 overseas operations during the 1976-81 period, 84 engineerin firms accounting for 261 contracts between 1975-83 and 22 constructi n companies that executed 67 contracts during the 1970-83 period.

Furthermore, the above-mentioned shortcomings call for caution in the evaluation of the evolution of technology export revenues reported by the balance of payments (Table 10).

The time series derived from published balance-of-payments information reveals a rising trend from 1970 on, increasing from US$ 9 million in 1969 to US$ 136 million in 1975, and a reaching a peak of US$ 372 million in 1981, followed by a substantial decline to US$ 300 million in 1982. This evolution means annual growth rates of 25.5% from 1969-81, 11.1% from 1970-81 and 8.5% from 1975-81. These figures, however, include revenues for administrative services which, strictly speaking, should not be considered as resulting from the export of technology. Unfortunately, the information available only allows for identification of the magnitude of the administrative service revenue from 1979 on, when it accounted for between 57% and 70% of the total balance-of-payments figures. Therefore, the volume of technology exports alone is thereby reduced to US$ 99 million in 1979, US$ 100 million in 1980, US$ 159 million in 1981 and US$ 88 million in 1982.

We did manage to obtain a breakdown of the balance-of-payment figures for the last ten years, but the criteria for classification was altered in 1979, meaning that the breakdown for the 1973-78 period is not perfectly comparable to the figures for more recent years. The first classification system distinguished revenues derived from: a) trade marks and patents; b) industrial projects, models and designs; c) administrative services and technical assistance. The new system classifies revenues as coming from: a) trade marks and patents; b) specialized technical services; c) technical-industrial cooperation and supply of industrial technology; d) administrative services.

Thus it is only possible to establish a ten-year (1973-82) time series for revenues from trade marks and patents (the values are both very low and quite stable). The other items broken out until 1978 are of limited use not only because technical assistance and administrative services are grouped together but also because the limits between this item and that of industrial projects, models

and designs are very vague. Thus the sharp growth in the values assigned to this latter item in 1977 may simply reflect changes in the classification procedures. The criteria adopted in 1979, however, seem more revealing, showing for example that specialized technical services account for almost the entirety of the revenue, with the exception of administrative service revenues.

2.1 - Manufacturing firms and the export of industrial technology

This section is based on a recent study by Sercovich (1983) which presents the results of a field survey on Brazilian technology exports. It is worth noting that the period covered by this study (1976-81) is not the same as the one used in the inventory of engineering service exports (1975/83) and the overseas activities of construction companies (1970-83), to be presented in the following sections.

The Sercovich study identified 58 companies exporting industrial technology during the period under consideration, in 112 separate operations (Table 11). Of the 58, nearly half (27) produce capital goods, accounting for 69 operations. The capital goods manufacturers are thus more active than other companies exporting industrial technology; the average number of operations per firm is 2.6 in the first group and 1.4 in the second.

As for the nature of technology exported, those relating to the machinery and to the sugar and alcohol sectors each account for 25% of the surveyed operations. In both cases, the exporters are almost exclusively capital goods producers. Following in order of importance are technologies used in the steel industry and in the food processing, beverages and tobacco sector, each accounting for about 15% of all operations. In these cases, however, the technology suppliers are mostly firms active in the same sectors, rather than capital goods producers. This predominance of technology users is even more accentuated in terms of know-how for the chemical industry and for the metallurgical, cement and building materials industries (grouped under the item "others"). Capital goods producers do stand

out, however, in exports of technology for paper and cellulose.

The study also distinguishes between three types of industrial technology exports: engineering, consulting and technical assistance; turn-key plant sales; and licensing. The first group ist the largest in terms of the number of operations (54) and of the number of exporters (35). There are 38 turn-key operations involving 16 firms, and 20 licensing operations involving 15 Brazilian companies.

Most of the turn-key operations refer to installations for the sugar and alcohol industry and were generally carried out by capital goods producers. The picture for licensing operations is different not only in that no particular sector stands out but also in the fact that nearly all the Brazilian firms involved are licensed technology users. The engineering, consulting and technical assistance operations are mainly in the machinery and in the steel industries. In addition, most of these operations were carried out by companies that also use the exported technology. Indeed, if we exclude the technology used in the machinery industry — where the users also produce capital goods — we see that these producers account for only 12 out of a total of 37 operations.

In short, these results show, first of all, the importance of capital goods producers in the number of industrial technology export operations. Their activity mainly involves the transfer of technology within the machinery industry, and to the sugar and alcohol and the paper and cellulose sectors. In the case of sugar and alcohol, the predominant form of operation is the turn-key sale of plants; and, in the other cases, operations mainly involve engineering, consulting and technical assistence. The results also reveal, however, that the capital goods producers are not alone in the export of industrial technology. Actually, in the steel industry, the food, beverage and tobacco sector, the chemical industry and the metallurgical, cement and building materials sectors, most overseas operations involve companies that actually employ the exported technology. Inthese cases, the exports mostly take the form of engineering, consulting and technical assistance and/or licensing contracts.

2.2 - Engineering firms and the export of services

The following discussion on the nature and extent of the overseas activities of Brazilian engineering firms is based on our own survey of periodicals and, especially, of specialized magazines. While our survey probably offers an incomplete picture of these activities, it does permit an overall evaluation of the movement of engineering companies towards the external market during the late seventies.

The survey identified 93 engineering firms with overseas activities between 1975-83. They were responsible for 297 contracts in 40 different countries.(*)

Most of these contracts were in Latin American countries (192 contracts, 65% of the total), the most important of which were Paraguay (58 contracts), Uruguay (36), Chile (22), Peru (19), Bolivia (17) and Ecuador (15), which together account for 87% of the contracts in this region. In Africa and the Middle East (with 17% and 8%, respectively, of all contracts), the most important countries were Nigeria (25 contracts), Mozambique (11), Algeria (11) and Iraq (8).

The activities of the engineering firms were grouped into three categories: consulting, design and technical assistance activities; assembling services; and auxiliary engineering services. Table 12 presents the activities of the 93 firms mentioned above in each of these categories: 57 of them are active in consulting abroad, with 192 contracts in 34 differente countries; 23 companies were contracted for 63 assembling jobs in 16 countries; and 18 carried out 42 auxiliary engineering service contracts in 18 countries.

The presence of State-owned and of foreign subsidiaries among the 93 engineering firms is not expressive: among the consulti firms, there are two foreign subsidiaries with eleven contracts and

(*) We did not include architecture and urban design projects. The 93 companies were responsible for 14 of thee projects. During the survey we also identified eleven companies whose overseas activities were strictly limited to this type of project (35 contracts).

one State-owned firm with three contracts ; among the assembling companies, there are four foreign-owned (15 contracts) and one State-owned (4 contracts) companies; as for special engineering services, there is one foreign firm with two contracts and two State-owned companies with seven contracts. Of the total, foreign subsidiaries and State-owned firms account, respectively, for only 9.4% and 4.7% of the contracts.

Table 13 presents the evolution of the overseas activities of engineering firms, revealing an expansion throughout the 1975-83 period.(*) This trend seems to have been reversed, however, from 1981 on in the case of consulting, design and technical assistance contracts. Since the overseas activities of the engineering companies involve mainly developing countries, this set-back may be attributed to increasing economic difficulties (especially in terms of the balance of payments) experienced by these countries in the early eighties.

The following discussion looks separately at each of the categories we have mentioned.

Consulting,design and technical assistance contracts

The overseas consulting, design and technical assistance activities by Brazilian engineering firms between 1975-83 involved 57 firms, 192 contracts and 34 differente countries.

These contracts are highly concentrated. In fact, the 15 firms most active abroad account for 121 contracts (63% of the total), of which 41 contracts were carried out by the top two (Hidroservice and Promon). The other 42 firms had an average of only 1.7 contracts (Table 14).

(*) The results may be somewhat imprecise, since it was not always possible to determine the exact moment when the overseas activity began. In any case, whatever errors there are restricted to a one-year interval.

There is a clear predominance of the Brazilian largest consulting firms in the export of services during this period. In fact, Hidroservice and Promon are precisely the two largest firms in the sector, with sales of approximately US$ 117 million and US$ 102 million, respectively, in 1982. In addition, all of the ten largest Brazilian consulting firms (with 1982 sales within the range US$ 28-117 million) had overseas activities during the period 1975-83, and among them carried out a total of 63 contracts. Of the firms classified from 11th to 20th place in 1982 sales, seven were contracted for overseas services (25 contracts).

As for the geographic spread of the consulting activities, most of the firms (40) restricted their overseas operations to one or two countries (Table 15). Of the six most widely spread companies (in five or more countries), five are among the 20 largest in the sector, with the largest one — Hidroservice — being involved in the largest number of countries (12).

Nearly all the exports of consulting, design and technical assistance services go to developing countries (Table 16). Most go to Latin America, with 67% of the total, followed by Africa (20%) and the Middle East (8%). Within each of these regions, the contracts are concentrated in certain countries. Thus, within Latin America, five countries — Paraguay (33 contracts), Uruguay (19), Chile (17), Bolivia and Peru — are responsible for 72% of the services contracted in the region; in Africa, 87% of the contracts go to Nigeria (21 contracts), Mozambique and Tanzania; and in the Middle East nearly all services are exported to Algeria and Iraq.

The five Latin American countries mentioned are also the ones where the largest number of Brazilian consulting firms are present. We thus find 16 different Brazilian companies in Paraguay, 13 in Uruguay, 12 in Chile, 8 in Peru and 7 in Bolivia. Nigeira stands out in the other regions, hosting 9 Brazilian companies.

Consulting, design and technical assistance activities carried out abroad by Brazilian firms cover a broad range of services, as shown by Table 17. Most relate to highways and railroad

(37 contracts in 16 countries, involving 17 Brazilian firms), construction of dams and hydroelectric plants (38 contracts, 14 countries and 15 companies), manufacturing and processing plants (39 contracts, 16 countries and 20 companies) and water systems (26 contracts, 11 countries and 13 companies). These services account for 73% of the contracts.

Industrial technology contracts are concentrated in the paper and pulp sector (10 contracts) and in steel (9). Of the steel contracts, though, eight are part of a single project in Paraguay — a joint venture between private Brazilian capital and a Paraguayan government holding company. While the paper and pulp contracts are spread around seven countries, nine of the ten were carried out by a single company, actually a subsidiary of a Finnish firm. The other industrial technology exports involved six contracts in food processing and agroindustry, three contracts in coal mining and processing and two in chemical plants, as well as contracts for a foundry, two cement plants and a ceramic factory.

Assembling services

Twenty-three Brazilian engineering firms carried out 63 assembling service contracts in 16 differente countries during the 1975-83 period. As was the case in consulting activities, the two most active firms in overseas jobs (SADE, a foreign company, with eleven contracts, and Tenenge with six, are among the largest in the sector, occupying respectively third and first places in sales and second and first in net assets (the two had sales of approximately US$ 289 million and US$ 180 million in 1982, covering both assembling and construction services in each case). In addition, the sector's six largest firms had overseas activities during the period under consideration, and were responsible for 44% of the contracts. Ten of the sixteen companies exporting services are among the twenty largest in the sector.

Twenty of the assembling service exporters limited their activities abroad to one or two countries; the most diversified firm — SADE — had contracts in nine countries (Table 15). Nearly

all the services were carried out in Latin America (57 contracts), the main countries here being Uruguay (15 contracts) and Paraguay (13). These are also the countries where the largest number of Brazilian firms were present (11 and 7, respectively) (Table 16).

A breakdown of the assembling service contracts shows that most were for electricity distribution systems (24 contracts in 11 countries, involving 7 Brazilian companies), manufacturing andprocessing plants (15 contracts, 6 companies and 7 countries) and hydroelectric plants (8 contracts, 7 countries and 4 companies) (Table 18). Industrial assembling jobs were mostly in the steel (5 contracts) and in the paper and pulp industries (two contracts). As in consulting activities, all steel industry assembling services were for a single project in Paraguay.

Auxiliary engineering services

The remaining engineering services carried out by Brazilian firms between 1975-83 (involving 18 companies and 42 contracts) included mainly aerial surveys (15 contracts) and soil and foundation engineering (18 contracts).

Fourteen of these 18 service exporters carried out only one or two overseas contracts during this period. The most active one — Geotécnica — had seven contracts for soil and foundation engineering in six different countries; its overseas activities actually included five consulting and design contracts in two countries as well.

Latin American countries accounted for 25 of the auxiliary engineering service contracts, twelve of which were carried out in Paraguay. Africa and the Middle East received significantly fewer contracts (eleven and six, respectively).

2.3 - Overseas activities of the construction firms

As in the preceeding section, the description of Brazilian construction firms' activities abroad is based on our own survey of

specialized magazines, the press in general and interviews. It probably gives an incomplete picture of these companies' activities abroad. Note that, contrary to the preceeding section, our results here include the construction of buildings and cover a longer period (1970-83).

The survey found 27 firms, responsible for 74 contracts in 22 differente countries during the period. The progression of these companies' overseas activities (Table 23) shows a significant increase in the number of contracts in 1977, after which there is no defined tendency over time.

Mendes Júnior stands out as the most active firm abroad, with 15 contracts; eleven firms carried out between three and five overseas contracts and the other fifteen,only one or two jobs outside Brazil. Mendes Júnior is also the most wide-spread of the companies geographically,operating in six differente countries. Andrade Gutierrez is second, active in four countries. Among the others, twenty were restricted to a single country, three had contracts in two countries and three others in three differente countries.

All the five largest firms of the sector in sales (from US$ 233 million to US$ 1.210 billion in 1982) and six of the seven largest in net assets (from US$ 158 to 617 million in 1982) carried out overseas contracts between 1970-83. In this ranking, Mendes Júnior is third in net assets (US$ 560 million) and fourth in sales (US$ 654 million).

Table 20, however, shows that not only the big companies took to the overseas markets during this period. Three of the 27 firms with overseas activities are between 11th and 20th places in the net assets ranking; six fall between 21st and 30th places, three between 31st and 50th places and two between 51 st and 100th. Finally, the two smallest firms are numbers 103 and 108, with approximately US$ 4,5 million each in net assets. In addition, the average number of contracts per firm does not vary significantly from one stratum to another. In fact, if we exclude Mendes Júnior from the first group, the average (2.2) is actually lower than the

average figure for the 27 firms as a whole (2.9).

The picture changes radically, however, if we consider the value of the contracts. While we were unable to gather these figures for engineering services, here it was possible to obtain information on the value of 57 of the contracts involving construction firms, among them all the contracts signed by the six largest companies in the sector.

The two largest contracts, according to available information (both worth US$ 1.2 billion for construction of a dam in Venezuala and a railway in Iraq), involve, respectively, a consortium of Camargo Correia and Cetenco (the largest and the fifth largest in the sector, by net assets) and Mendes Júnior. Of the next seven largest contracts — from US$ 200 to 400 million — two were undertaken by Mendes Júnior, one by Andrade Gutierrez and another by Odebrecht (respectively the second and seventh largest by net assets), two by Rabello (a company that, while located above 40th place in the net assets ranking, was a pioneer in the movement into foreign markets) and one by Paranapanema (located in the second stratum).

The six largest firms active overseas had contracts worth a total of US$ 4.7 billion (Table 20). Moreover, the average value of these companies' contracts (US$ 181 million) is significantly higher than the figures for the other size groups, except for Rabello's. (*)

The geographical spread of the construction firms shows that Latin America (45 contracts), the Middle East (16 contracts) and Africa (12 contracts) account for nearly all services rendered (Table 21). In Latin America, Paraguay stands out with both the largest number of contracts (15) and the presence of the largest number of Brazilian firms (8). In the Middle East, most of the contracts went to Algeria and Iraq (8 and 5). In Africa, a third of the contracts were in Mauritania.

(*) Note, however, that information is available on only two of Rabello's five contracts.

The dollar figures on this spread show a different picture. However, they give a distorted image since the percentage of the contracts for which information on value is available varied from one country to another. The highest rate of unknown values fell to Paraguay and Algeria.

Among the 57 contracts whose values are known, the total value is about evenly distributed between the Middle East (37.0%), Latin America (33.5%) and Africa (29.5%). Contracts in the first two regions, however, are very highly concentrated in a single country: 57% of the total value of known Latin American contracts refer to one project in Venezuela, while 71% of the value of the Middle East contracts is concentrated in Iraq. In Africa, Nigeria and Angola account, respectively, for 31% and 27% of the total value of the region's contracts. It is worth emphasizing also that six oil-exporting countries contracted construction services worth a total of US$ 4,724 billion, 74% of the total.

Distortions caused by unknown figures, however, tend to diminish in importance when we consider the average value per contract. In this regard, the Middle East (US$ 262.1 million) and Africa (US$ 156.7 million) stand head and shoulders over Latin America (US$ 59.3 million). Here, though, the real distinction seems to be between the six oil-exporters and the other 21 countries, with the first group displaying an average value nine times higher than the second (US$337 million and US$ 38 million, respectively).

Looking at the types of overseas projects, we find that highway and railroad construction involve the largest number of jobs (123 contracts), countries (10) and Brazilian firms (11) (Table 22). Next in importance are water systems (13 contracts, 6 firms and 7 countries) and dams and hydroelectric plants (11 contracts, 5 firms and 9 countries). Interestingly, the types of contracts vary significangly between Latin America, on the one hand, and Africa and the Middle East,on the other. Thus, almost all the projects involving dams and hydroelectric plants, ports and airports and water systems were carried out in Latin America. On the other hand, construction of industrial installations and buildings were

overwhelmingly concentrated in the Middle East and Africa. Highway and railroad contracts were the only ones which were about evenly distributed between Latin American countries and those in Africa and the Middle East.

Considering the values of each type of contract, the most expensive jobs on the average were industrial construction projects; but only one project was identified here. Next come dams and hydroelectric plants and highways and railroads, whose average costs were, respectively, US$ 211 million and US$ 167 million. When, in both cases, we exclude the 1.2-billion-dollar contracts, the average values both drop to about US$105 million, still significantly above the figures for construction jobs involving ports and airports, water systems and buildings.

3 - Petrobras' Activities Abroad

Petrobras, the state-owned oil enterprise, is among the Brazilian firms one of the most active abroad. Its activities have been carried on by a special subsidiary — Braspetro — incorporated in 1972 and responsible for the development, outside of Brazil, of exploration, production, industrialization, commerce, transportation and stocking of oil and its products, as well as for the execution of technical and administrative services related to these activities

Braspetro's activities has included fourteen countries so far. Exploration contracts have already been accomplished in Madagascar, Egypt, Iran, Iraq, Philippines, Colombia, Algeria and Lybia; currently, Braspetro is engaged in exploration contracts in Algeria, Lybia, Guatemala, Angola, Congo and People's Democratic Republic of Yemen. These contracts were frequently undertaken in association with other companies — mostly, with local state-owned enterprises (as in Iran, Egypt, Colombia, Algeria, Iraq, Angola and Congo)-but also with large multinational oil producers (as Texaco, Mobil Oil, Cities Services, British Petroleum, Elf Aquitaine and Total). In seven of its exploration contracts, Braspetro was the operator.

In addition, Braspetro has participated, as an early participant, in the Geophysical Prospection Agreement in seven offshore blocks in China, as well as submitting proposals to a bidding opened by China National Offshore Oil Company, in association with British Petroleum, Brokel Hill Proprietary, Petrocanada and Ranger Oil.

Braspetro has established two joint ventures abroad: one in Colombia, in which it holds 50% of capital, and a second one in Angola, in association with the State-owned company (Sonangol) and Petrofino, to act as the operator in a new exploration area in which Braspetro will hold interests.

Furthermore, Braspetro has technical assistance agreements with State-owned oil firms in Iraq and Trinidad-Tobago (rendering services in the fields of geology, geophysical processing and drilling, and production and instalation engineering), as well as a service contract with the Italian company Agip to carry out drilling work in Lybia.

As a result of these activities, Braspetro shipped 806 thousand barrels of oil from Angola (86%), Algeria and Guatemala, in 1982.

TABLE 1

BRAZILIAN EXPORTS - 1965/1982

US$ million

	Total exports	Manufactured goods exports	Total exports (a)	Manufactured good exports (a)
1965	1 595	130	5 043	411
1968	1 881	203	5 496	593
1970	2 739	416	7 428	1 128
1971	2 904	573	7 624	1 504
1972	3 991	989	10 031	2 257
1973	6 199	1 434	13 780	3 188
1974	7 951	2 263	14 871	4 233
1975	8 670	2 584	14 844	4 424
1976	10 128	2 776	16 566	4 541
1977	12 120	3 840	18 676	5 917
1978	12 659	5 083	18 098	7 269
1979	15244	6 645	19 364	8 441
1980	20 132	9 041	22 422	10 072
1981	23 293	11 884	23 784	12 135
1982	20 175	10 225	20 175	10 225
Annual growth rate				
1965-1970	11.4	26.8	8.1	22.4
1970-1975	25.9	44.0	14.8	31.4
1975-1980	18.4	28.4	8.6	17.9
1970-1982	18.1	30.6	8.7	20.2

Source: Banco Central do Brasil - Relatório, several issues.

(a) Deflated by the U.S. wholesale price index (1982 = 100).

TABLE 2

BRAZIL: DIRECT INVESTMENT ABROAD - 1965/1982

US$ million

	Authorized (a)		Effective (b)		Direct investment in Brazil (d)
	Nominal	Real (c)	Nominal	Real (c)	
1965	0.1	0.3			
1966	0.2	0.6			
1967	0.5	1.5			
1968	0.4	1.2	2	5.8	66
1969	2.1	5.9	12	33.7	81
1970	5.4	14.6	14	38.0	146
1971	2.8	7.4	1	2.6	169
1972	18.1	45.5	19	48	337
1973	19.5	43.3	37	82	977
1974	58.3	109.0	61	114	945
1975	92.1	157.7	128	219	1106
1976	50.2	82.1	196	321	1145
1977	148.3	228.5	164	253	935
1978	51.6	73.8	135	193	1196
1979	108.9	138.3	200	254	1685
1980	165.3	184.1	366	408	1512
1981	195.5	199.6	211	215	1905
1982	193.3	193.3	382	382	1511
1965/1976	259.7	469.1			
1977/1982	862.9	1017.6	1458	1705	8744
1965/1982	1112.6	1486.7			

Source: Boletim do Banco Central, several issues and Diario Oficial, several issues.

(a) Authorization certificates issued by the Central Bank.

(b) Balance of payment data.

(c) Deflated by the U.S. wholesale price index (1982 = 100)

(d) Reinvestment not included.

TABLE 3

BRAZILIAN DIRECT INVESTMENT ABROAD BY INVESTING SECTOR - 1977-1982 (a)

US$ million (percentage)

	Financial Institutions	Oil Firms	Manufacturing Firms	Engineering Firms	Commerce	Others
1977	31.9	106.0	3.0	0.3	2.6	4.6
	(21.5)	(71.4)	(2.0)	(0.2)	(1.7)	(3.1)
1978	45.2	-	4.3	1.5	0.5	-
	(87.7)	-	(8.4)	(2.9)	(0.9)	-
1979	42.1	10.0	42.3 (b)	1.0	10.6	2.5
	(38.8)	(9.2)	(39,0)	(0.9)	(9.8)	(2.3)
1980	78.5	60.0	16.4	0.7	1.4	8.3
	(47.5)	(36.3)	(8.9)	(0.4)	(0.9)	(5.0)
1981	96.4	20.0	53.0 (b)	12.1	6.0	8.1
	(49.3)	(10.2)	(27.1)	(6.2)	(3.1)	(4.1)
1982	96.1	42.0	19.2	16.4	9.1	10.6
	(49.7)	(21.7)	(9.9)	(8.5)	(4.7)	(5.5)
Total	390.2	238.0	138.3	31.9	30.2	33.9
	(45.3)	(27.6)	(16.0)	(3.5)	(3.5)	(3.9)

SOURCE: Diário Oficial, several issues.

(a) According to authorization certificates issued by the Central Bank.

(b) US$35 million in 1979 and US$30 million in 1981 were invested by a single firm.

TABLE 4

PERCENTAGE DISTRIBUTION OF BRAZILIAN DIRECT INVESTMENT ABROAD BY RECEIVING COUNTRIES - 1965/76 and 1977/82[a]

	1965/1976	1977/82	TOTAL
Developed Countries	82.3	58.8	64.0
Latin America	10.5	22.6	19.9
Tax Havens	6,1	17.2	14.7
Others	1.1	1.4	1.4
Total	100.0	100.0	100.0

SOURCE: Diário Oficial, several issues and unpublished data.

(a) According to authorization certificates issued by the Central Bank.

TABLE 5

BRAZILIAN DIRECT INVESTMENT ABROAD BY INVESTING SECTOR AND RECEIVING COUNTRIES - 1977/1982 (a)

US$ million (percentage)

	Developed Countries	Latin America	Tax Havens	Others	Total
Financial institutions	221.4 (56.7)	123.9 (31,7)	37.2 (9.5)	7.7 (2.0)	390.3 (100.0)
Oil firms	228.0 (95.8)	- -	10.0 (4.2)	- -	238.0 (100.0)
Manufacturing firms	26.9 (19.5)	41.1 (29.7)	68.7 (49.7)	1.5 (1.1)	138.3 (100.0)
Engineering firms	4.1 (12.9)	11.0 (34.5)	15.5 (48.6)	1.3 (4.1)	31.9 (100.0)
Commerce	11.8 (39.1)	12.5 (41.4)	3.9 (12.9)	2.0 (6.6)	30.2 (100.0)
Others	14.9 (44.0)	6.0 (17.7)	13.0 (38.3)	- -	33.9 (100.0)
Total	507.2 (58.8)	194.5 (22.6)	148.3 (17,2)	12.5 (1.4)	862.5 (100.0)

SOURCE: Diário Oficial, several issues

(a) According to authorization certificates issued by the Central Bank.

TABLE 6

FREQUENCY DISTRIBUTION OF DIRECT INVESTMENT ABROAD PER MANUFACTURING FIRM - 1977/1982[a]

Direct Investment per firm (US$1000)	Frequency	Accumulated frequency	Investment		
			US$1000	Percentage	Accumulated Percentage
15000 ≤ ×	1	1	65,000	47.0	47.0
5000 ≤ × < 15000	2	3	26,536	19.2	66.2
1000 ≤ × < 5000	18	21	31,837	23.0	89.2
500 ≤ × < 1000	6	27	3,689	2.7	91.9
250 ≤ × < 500	15	42	6,045	4.4	96.3
100 ≤ × < 250	21	63	2,950	2.1	98.4
50 ≤ × < 100	19	82	1,207	0.9	99.3
× < 50	41	123	1,015	0.7	100.0
TOTAL	123		138,284	100.0	

SOURCE: Diário Oficial, several issues.

(a) According to authorization certificates issued by the Central Bank.

TABLE 7

FOREIGN DIRECT INVESTMENT OF BRAZILIAN MANUFACTURING FIRMS BY INVESTING INDUSTRY AND RECEIVING COUNTRIES 1977-1982 (a)

US$ thousand

	Developed Countries	Latin America	Tax Havens	Others	Total	Number of Investing Firms
Non Metalic Minerals		4.476		1.465	4.941	4
Metallurgy	1.530	15.330			16.860	8
Machinery	2.883	2.862	1.000		6.745 (b)	12 (b)
Electrical Equipment	12.692	7.189			19.881 (c)	8 (c)
Transport Equipment	1.902	1.345	500		3.747 (d)	7 (d)
Timber and Furniture		284	210		494	2
Plastic Material		1.223	1.100		2.323	2
Textile and apparel	4.889	328	250		5.467	5
Leather	618				618	2
Food Processing	2.159	5.165	65.100		73.424	7
Others	300	698	100		1.098	6
Total	26.973	38.900	68.260	1.465	135.598 (e)	63 (e)
Number of Investing Firms	24	37	6	1	-	-

SOURCE: Diario Oficial, several issues.

(a) According to authorization certificates issued by the Central Bank. Includes manufacturing firms which invested more than US$100 thousand during the period 1977/1982.

(b) Includes two foreign firms which invested US$697 thousand (US$672 thousand in Latin America)

(c) Includes one foreign firm which invested US$2,362 thousand in Latin America.

(d) Includes two foreign firms which invested US$706 thousand in Latin America and one State enterprise which invested one million dollars.

(e) Include five foreign firms which invested US$3,765 thousand (3.6% of the total).

TABLE 8

FREQUENCY DISTRIBUTION OF DIRECT INVESTMENT ABROAD PER ENGINEERING FIRM - 1977/1982 (a)

Direct Investment per Firm (US$1000)	Frequency	Accumulated Frequency	Investment		
			US$1000	Percentage	Accumulated Percentage
5000 ≤ ×	3	3	21,602	67.7	67.7
1000 ≤ × < 5000	3	6	6,500	20.4	88.1
250 ≤ × < 1000	5	11	2,349	7.3	95.4
100 ≤ × < 250	8	19	1,141	3.6	99.0
× < 100	14	33	313	1.0	100.0
Total	33		31,905	100.0	

SOURCE: Diário Oficial, several issues.

(a) According to authorization certificates issued by the Central Bank.

TABLE 9

FOREIGN DIRECT INVESTMENT OF BRAZILIAN ENGINEERING FIRMS BY RECEIVING COUNTRIES - 1977/1982 (a)

US$. thousand

	Developed Countries	Latin America	Tax Havens	Others	Total	Number of Investing Firms
Building Construction	4,000	313	7,000	247	11,560	5 (b)
Large Construction	266	10,560	7,112	730	18,668	10
Assembling		974			974	2 (c)
Consulting and Design			250	140	390	2
Total	4,266	11,847	14,362	1,117	31,592	19
Number of Investing Firms		8	7	4		

SOURCE: Diário Oficial, several issues.

(a) According to authorization certificates issued by the Central Bank. Include: Brazilian firms which invested more than US$100 thousand during the period 1977/1982.

(b) Includes one foreign firm which invested US$1,500 thousand in Caribe.

(c) Includes one foreign firm which invested US$140 thousand in Latin America.

TABLE 10

BRAZILIAN TECHNOLOGY EXPORTS - 1965/1982

	Patents and trade-marks	Design	Specialized engineering services	Industrial technology supply	Administrative services and technical assistance	Administrative services	Total	Total (a)
1966							5	15
1967							13	39
1968							9	26
1969							9	25
1970							44	119
1971							40	105
1972							53	133
1973	6	3			77		86	191
1974	6	1			103		110	208
1975	8	1			127		136	233
1976	8	1			123		132	216
1977	6	58			121		185	285
1978	6	63			153		222	317
1979	7		90	2		154	253	321
1980	8		89	3		194	294	355
1981	9		141	9		213	372	380
1982	6		81	1		212	300	300

Source: Central Bank -(unpublished data).

(a) Deflated by the U.S. wholesale price index (1982 = 100)

TABLE 11

INDUSTRIAL TECHNOLOGY EXPORTS BY MANUFACTURING FIRMS - 1976/1981[a]

	Engineering, Consulting and technical assistance		Turn-key plants		Licensing		Total	
	Suppliers	Operations	Suppliers	Operations	Suppliers	Operations	Suppliers	Operations
Machinery, equipment and components	13 (12)	17 (16)	5 (5)	6 (6)	5 (5)	5 (5)	23 (22)	28 (27)
Sugar and alcohol	5 (3)	7 (5)	4 (4)	20 (20)	-	-	6 (5)	27 (25)
Steel	6 (1)	10 (1)	2 (2)	3 (3)	2 (0)	3 (0)	9 (3)	16 (4)
Food, beverage and tobacco	4 (1)	6 (2)	3 (3)	5 (5)	3 (0)	6 (0)	9 (3)	17 (7)
Chemicals	4 (0)	4 (0)	1 (0)	1 (0)	3 (0)	3 (0)	8 (0)	8 (0)
Paper and pulp	2 (1)	5 (4)	-	-	1 (1)	1 (1)	3 (2)	6 (5)
Others	5 (0)	5 (0)	3 (1)	3(0)	1 (0)	2 (0)	9 (1)	10 (1)
Total	35 (16)	54 (28)	16 (13)	38 (35)	15 (6)	20 (6)	58 (27)	112 (69)

Source: Sercovich (1983).

(a) Figures between brackets allude to suppliers which are capital good manufacturers.

TABLE 12

BRAZIL: ENGINEERING SERVICE EXPORTS - 1975/1983 (a)

	Supplier	Contracts	Countries
Consulting and design engineering firms (b)	52	192	34
Assembling firms	23 (19)	63	16 (3)
Other engineering services	18 (17)	42	16 (3)
Total	93	297	40

(a) Numbers between brackets indicate suppliers or countries which were not included in the classes above.

(b) The 57 suppliers are also responsible for 14 architectural projects, which were not computed. Eleven other firms are responsible for 35 architectural projects.

TABLE 13

EVOLUTION OF BRAZILIAN ENGINEERING SERVICE EXPORTS
1975/1983 (a)

	Total			Latin America		
	I	II	III	I	II	III
1975	17	-	1	12	-	1
1976	19	3	-	9	3	-
1977	12	7	2	12	7	1
1978	18	4	4	12	4	3
1979	29	4	2	24	4	-
1980	29	10	4	16	7	2
1981	36	11	8	22	9	5
1982	12	8	11	9	8	7
1983	13	13	7	7	12	5
Unknown	7	3	3	6	3	1
Total	192	63	42	129	57	25

(a) Number of contracts.

I - Consulting and design engineering firms

II - Assembling firms.

III - Other engineering services.

TABLE 14

DISTRIBUTION OF CONTRACTS BY SERVICE EXPORTING FIRMS

Consulting and design, engineering firms			Assembling firms			Other engineering services		
Suppliers	Contracts	Average	Suppliers	Contracts	Average	Suppliers	Contracts	Average
Two largest exporters	41	20.5	Two largest exporters	17	8.5	Two largest exporters	13	6.5
3rd to 8th	46	7.7	3th to 7th	22	4.4	3th to 7th	17	3.4
9th to 15th	34	4.9	8th to 23th	24	1.3	8th to 18th	12	1.1
16th to 57th	71	1.7						
Total	192	3.4	Total	63	2.7	Total	42	2.3

TABLE 15

FREQUENCY DISTRIBUTION OF THE NUMBER OF COUNTRIES IN WHICH ENGINEERING FIRMS HAVE OPERATED

Number of Countries	Consulting and design engineering firms	Assembling firms	Other engineering services	Total
1	29	11	11	48
2	11	9	3	20
3	9	2	2	14
4	2	-	-	2
5	4	1	-	6
6	-	-	2	1
7	-	-	-	1
8	1	-	-	-
9	-	1	-	-
12	1	-	-	1
Total	57	23	18	93

TABLE 16

DISTRIBUTION OF ENGINEERING SERVICE EXPORTS BY RECEIVING COUNTRIES - 1975/1983

	Consulting and design engineering firms		Assembling firms		Other Engineering services		Total
	Suppliers	Con-tracts	Suppliers	Con-tracts	Suppliers	Con tracts	
Paraguay	16	33	7	13	7	12	58
Uruguay	13	19	11	15	2	2	36
Chile	12	17	2	5			22
Peru	8	11	3	5	3	3	19
Bolivia	7	13	4	4			17
Colombia	5	5	1	1			6
Argentina	2	3	4	4	2	3	10
Ecuador	4	7	3	5	2	3	15
Venezuela	2	5	3	3	1	1	9
Salvador	2	2					2
Guatemala	3	4					4
Panama	2	2					2
Mexico	1	1					1
Dominican Rep.	1	1	1	1			3
Costa Rica	1	1					1
Nicaragua					1	1	1
Trinidad Tobago	1	1					1
Honduras	1	1					1
Latin America		129		57		25	211
Mauritania	1	1			1	1	2
Nigeria	9	21	1	1	3	3	25
Mozambique	6	9			2	2	11
Tanzania	3	3			1	1	4
Others	4	4	2	2	4	4	10
Africa		38		3		11	52
Algeria	5	9	1	1	1	1	11
Iraq	5	6	1	1	1	1	8
Libya	-	-			3	3	3
Others	2	2			1	1	3
Middle East		15		2		6	25
Others	7	8	1	1			9
TOTAL	57	192	23	63	18	42	297

TABLE 17

SERVICE EXPORTS BY CONSULTING AND DESIGN ENGINEERING FIRMS BY TYPE OF WORK

	Suppliers	Contracts	Countries	Countries with more than one supplier and/or contract
Dams and hydroelectric plants	15	38	14	Algeria (3-4), Uruguai (5-8) Mozambique (2-3), Paraguay (2-3), Chile (5), Bolivia (2), Tanzania (2), Peru (2), Venezuela (2), Ecuador (1-2)
Higways and rail roads	17	37	16	Bolivia (4-8), Iraq (3-4), Paraguay (2-4), Venezuela (1-3), Algeria (1-2), Chile (1-2), Ecuador (3)
Ports	5	7	4	Uruguay (3-4)
Airports	4	7	6	Bolivia (2-2)
Manufacturing and processing plants	20	39	16	Paraguay (6-9), Chile (3-4), Nigéria (4), Peru (2), Colombia (2), Mozambique (4), Trinidad (3), Uruguay (2).
Water systems	13	26	11	Paraguay (4-7), Peru (2-4), Nigeria (2-4), Chile (2-3), Panamá (2), Colombia (2).
Telecommunication	2	8	2	Nigeria (2-8)
Electric systems	9	17	8	Paraguay (3-8), Uruguay (2), Nigeria (2)
Others	10	13	9	Nigeria (3), Chile (2), Ecuador (2)
Total	57	192	34	

TABLE 18

SERVICE EXPORTS BY ASSEMBLING FIRMS BY TYPE OF WORK

	Suppliers	Contracts	Countries	Countries with more than one supplier or contract
Dams and hydroelectric Plants	7	8	4	Uruguay (4-5)
Highways and railroads	4	4	4	-
Manufacturing and processing plants	6	15	7	Paraguay (3-6), Argentina (2), Uruguay (1-2)
Telecommunication	2	3	3	-
Electric systems	7	24	11	Paraguay (4), Uruguay (2-4), Chile (2-2), Peru (1-3), Ecuador (1-3) Venezuela (2)
Building	6	7	6	Uruguay (2)
Others	1	2	1	Chile (1-2)
Total	23	63	16	

TABLE 19

OTHER ENGINEERING SERVICE EXPORTS BY TYPE OF WORK

	Suppliers	Contracts	Countries	Countries with more than one supplier and/or contract
Soil and foundations	8	18	12	Paraguay (2), Peru (2), Argentina (1-2), Ecuador (2-3), Uruguay (2)
Surveying	5	15	8	Paraguay (3-5), Libya (2), Nigeria (2)
Others	5	9	5	Paraguay (2-5).
Total	18	42	18	

TABLE 20

BRAZIL: CONSTRUCTION ACTIVITIES ABROAD - 1970/1983

Net assets range of construction firms	Number of contractors	Number of contracts	Contracts by Contractor	Value of contracts		
				Number of contracts (a)	Total (b)	Average (b)
Largest 10	6	26	4.3	26	4,703.1	180.9
From 11 to 20	3	10	3.3	5	137.2	27.4
From 21 to 30	6	15	2.5	13	661.3	50.9
From 31 to 50	3	9	3.0	3	630.0	210.0
From 51 to 100	2	7	3.5	7	62.3	8.9
From 101 to 110	2	8 (c)	4.0	6 (c)	63.0 (c)	12.5
No information available	5	5	1.0	4	132.1	33.0
Total	27	74	2.9	57	6,374.0	111.8

(a) Number of contracts for which information is available

(b) Values in US$ million.

(c) US$ 15 million and 5 contracts have already be computed.

TABLE 21

DISTRIBUTION OF CONSTRUCTION ACTIVITIES ABROAD
BY COUNTRIES - 1970/1983

	Contractors	Contracts	Value of contracts		
			Number of contracts (a)	Total (b)	Average (b)
Paraguay	8	15	10	198.1	19.8
Bolivia	4	8	8	123.7	15.5
Uruguay	3	6	5	263.0	52.6
Costa Rica	2	4	3	20.0	6.7
Colombia	1	4	4	123.1	30.8
Venezuela	3	3	2	1,267.0	633.5
Chile	3	3	3	39.6	13.2
Peru	1	1	1	100.0	100.0
Argentina	1	1	-	-	-
Latin America	-	45	36	2,134.5	59.3
Mauritania	1	4	4	268.5	67.1
Nigeria	1	1	1	588.0	588.0
Tanzania	1	1	1	90.0	90.0
Angola	2	2	2	510.0	255.0
Congo	1	1	1	105.0	105.0
Somalia	1	1	1	300.0	300.0
Mozambique	1	1	1	2.0	2.0
Ivory Coast	1	1	1	17.0	17.0
Africa	-	12	12	1,880.5	156.7
Algeria	2	8	2	550.0	275.0
Iraq	2	5	5	1,681.0	336.2
Libya	1	2	1	48.0	-
Saudi Arabia	1	1	1	80.0	-
Middle East	-	16	9	2,359.0	262.1
Portugal	1	1	-	-	-
Others	1	1	-	-	-
Total	27	74	57	6,374.0	111.8

(a) Number of contracts for which information is available.

(b) Values in US$ million.

TABLE 22

CONSTRUCTION ACTIVITIES ABROAD BY TYPE OF WORK - 1970/1983

Type of Work	Con-tractors	Con-tracts	Countries	Countries with more than one contractor or contract	Value of contracts		
					Number of con-tracts (a)	Total (b)	Average (b)
Dams and hydroeletric plants	5	11	9	Paraguay (1-2), Colombia (1-2)	11	2,316.1	210.6
Highways and railroads	11	23	10	Paraguay (5-8), Iraq (1-4), Mauritania (1-3), Bolivia (2-2), Colombia (1-2)	18	3,001.4	166.7
Ports	3	5	2	Uruguay (2-4)	5	16.2	3.2
Airports	3	4	3	Bolivia (1-2)	4	95.9	24.0
Manufacturing and processing plants	1	1	1		1	300.0	300.0
Water systems	6	13	7	Costa Rica (2-4), Paraguay (1-3), Bolivia (1-2)	9	122.3	13.6
Buildings	8	15	7	Algeria (2-7), Iraq (1-2)	9	522.1	58.0
Others	1	2	2				
Total	22	74	22		57	6,374.0	111.8

(a) Number of contracts for which information is available.

(b) Values in US$ million.

TABLE 23

EVOLUTION OF CONSTRUCTION ACTIVITIES ABROAD - 1975/1983 (a)

	Number of Contracts		Value of contracts (US$million) (b)								
	Latin America	Total	Latin America					Africa and Middle East			Total
			Venezuela	Bolivia	Paraguay	Uruguay	Total	Iraq	Algeria	Total	
Before 1975	6	10		5.5	58.7	-	64.2		350 (3)	350 (3)	414.2 (3)
1975	-	1		-	-	-	-	-	-	112	112
1976	2	2			17		21.1			-	21.1
1977	6	7			(2)	248	268 (2)			8.5	276.5 (2)
1978	5	9	1267		11 (1)	4.2	1282.2 (1)	1239		1247.1	2529.3 (1)
1979	1	6					30		(3)	190 (3)	220 (3)
1980	12	14	(1)	27.8	20 (1)	6.6	171.2 (3)			140	311.2 (4)
1981	4	7		7.1		4.2 (1)	81.3 (1)	442		532	613.3 (1)
1982	3	7		1.2	70		77.7			1036 (1)	1113.7 (1)
1983	3	5		82.0	21.4		135.6			405	540.6
Unknown	3	6			(1)		3.1 (2)		200	219	222.1 (2)
Total	45	74	1267 (1)	123.7	198.1 (3)	263.0 (1)	2134.5 (9)	1681	550 (6)	4239.6 (7)	6374.0 (17)

(a) Numbers between brackets indicate number of contracts whose value is not available.

(b) Refers to 57 contracts for which information is available.

TABLE 24

PETROBRAS' ACTIVITIES ABROAD

Country	Period		
Madagascar	1972/74	Exploration contract	
Iran	1972/77	Exploration rights covering an offshore area in the Hormuz Strait. Exploration activities suspended in 1976.	Braspetro (25%), National Iranian Oil Company (50%), Mobil Oil (25%) Operator: Hormuz Petroleum
Iraq	1972/79	Service contract with Iraq National Oil Company for exploration in three areas. Exploration conclude in Majnoon and Nahr Umr in 1978.	Operator: Braspetro
	From 1980	Agreement for technical cooperation between Braspetro and INOC	
	From 1982	Technical agreement concerning the development of the Nahr Umr Oilfields.	
Egypt	1972/76	Exploration activities in the Western Desert Exploration suspended in 1976.	Braspetro, Egyptian General Petroleum Corp. Operator: Braspetro
Colombia	1972/78	Joint venture: Petroleos Colombo Brasileiros S/A.-Colbras	Braspetro (50%)
	1976/78	Association contract with Ecopetrol	Colbras, Ecopetrol
Algeria	1972/78	Exploration activities in Chott Melrhir area	Braspetro, Sonatrach Operator: Braspetro
	From 1978	Explortation of Ras Toumb field	
	From 1980	Exploration activities in Block 422 (Zelfana)	Braspetro, Sonatrach Operator: Braspetro
Lybia	1974/79	Exploration activities in Sirte Basin and Murzuk Basin	Braspetro, National Oil Corp. (NOC) Operator: Braspetro
	From 1980	New contract for exploration in the Murzuk Basin	Braspetro, NOC Operator: Braspetro
	From 1982	Drilling work in the Sirte Basin for Agip, under an agreement with NOC.	

Country	Period		
Philippines	1975/76	Contract for petroleum exploration	Braspetro (24%), Texaco Pacific Philippines Inc. (71%), Pacific Basins (5%) Operator: Texaco
Guatemala	From 1978	Exploration of Block AA in the Peten Basin	Braspetro (1/3), Hispanica de Petroleo - Hispanoil (1/3), Elf Aquitaine (1/3) Operator: Hispanoil
	From 1980	Exploration of Block E	Braspetro (1/3), Hispanoil (1/3) Elf (1/3) Operator: Hispanoil
	From 1982	Exploration of Block L	Braspetro (1/3), Hispanoil (1/3) Texaco (1/3) Operator: Texaco
Angola	From 1980	Production sharing to Contract to Block 2	Braspetro (17,5%), Sonangol (25%), Texaco (40%), Total Cap (17,5%) Operator: Texaco
	From 1982	Joint venture to act as operator in Block 4	Braspetro, Sonangol, Petrofina
Trinidad and Tobago	From 1980	Assistance and Technical Cooperation Contract with Trinidad and Tobago Oil.	
People's Rep. of Congo	From 1981	Exploration activities in Marine - 1 Block	Braspetro (12,5%), Hydro Congo, Cities Service, IEDC Operator: Cities Service
People's Dem. Ref.of Yemen	From 1982	Exploration activity in Howarin Gheida area	Braspetro (80%), Hispanoil(20%) Operator: Braspetro
China	1979/1980	Participation in the Geo-physical Prospection Agreement in seven offshore blocks	
	1982	Proposal to bidding opened by China National Offshore Oil Comp.	Braspetro, British Petroleum, Broken Hill Prop., Petrocanada, Ranger Oil.

Source: BRASPETRO, Relatório Anual, several issues.

PART II

THE ACTIVITIES OF BRAZILIAN FIRMS ABROAD: AN EVALUATION

The empirical evidence presented in Part I points out the movement of Brazilian firms towards the external market during the seventies. This trend began in the late seventies and was characterized mainly by a substantial increase in exports, particularly in manufactured goods exports. Such an increase can be associated with successive government incentives which were introduced from the mid-sixties and succeeded in increasing the competitiveness of Brazilian producers.

The rise in manufaturing exports was followed, from the mid-seventies, by the increasing participation of Brazilian firms in new forms of undertakings abroad; in fact, both direct investment and service exports have expanded significantly during recent years. Nevertheless, the empirical evidence suggests that the importance and the significance of each of these forms of undertakings differ. In addition, a further distinction should be made as to the participation of firms of different sectors in such undertakings.

Despite the increase in Brazilian direct investment abroad from the mid-seventies, it is doubtful whether these investments can be characterized as a process. This is particularly true in relation to the manufacturing firms; in this case, investments are not very significant and the few investors are generally not among the largest and most important firms of their industries. In fact, only foreign investment by Brazilian financial institutions and by the State-owned oil firms can be focused on as a more definite and meaningful trend. The expansion of Brazilian banks abroad has reflected both their effort to borrow on the international finance market during the period, and their support in increasing Brazilian exports to Latin America countries. As to Petrobras' investments and activities abroad, they were the result of a definite policy undertaking from 1974 in response to the oil crisis.

In contrast with direct investment abroad, the rise in service exports corresponds to a clear-cut and significant trend. Again a distinction should be made in relation to the importance of such exports for firms of different sectors. In fact, despite the shortcomings of the empirical evidence in this respect, it can be argued that technology exports by manufacturing firms are not a widespread phenomenon. On the other hand, as far as construction and design engineering firms are concerned, the rise in service exports does reflect a definite movement towards the external market which gathers a substantial proportion of the firms of the sector and includes most of the largest and most important ones.

These introductory remarks suggest that the construction and engineering sector is the most relevant case for deeper analysis and evaluation. The following pages will focus on the nature and characteristics of its activities abroad. But the previous comments suggest also other points for further inquiry and discussion. With respect to manufacturing firms' investments abroad, it is arguable whether its small significance reflects a specific stage of Brazilian industrial growth (to be superseded in the future when the establishment of wholly-owned subsidiaries and/or the undertaking of some new form of foreign investment would substitute for manufacturing exports), or whether there are some characteristics in the Brazilian industrial structure which hinder such an evolution. Another question, certainly related to the previous one, refers to the nature of the technology and service exports by Brazilian manufacturing and engineering firms. So far, they have basically been mere export operations and generally do not imply any further link between the Brazilian supplier and the foreign buyer. The possibility of these exports bringing about a new and more permanent relationship between supplier and buyer in the future is an opern question. We will return to these questions later.

1. Civil Engineering Service Exports

Until the first quarter of this century, large constructi n works in Brazil were restricted to the construction of railroads, ports and dams. Except for small dams for irrigation in the Northeast area, these works were demanded by foreign railway and public utility firms and were undertaken by these firms themselves or by foreign contractors. The participation of local entrepreneurs, when it occurred at all, was restricted to the subcontracting of specific and technologically simple$ services.

Changes in Brazilian transportation and energy policies, which originated in the 1930's, brought about a significant change in this picture and prompted the emergence of local construction companies. The first change consisted in the gradual substitution of road transport for railway. This new trend was associated with an increasing role played by state governments (notably from the mid-fourties) and by the federal government (from the mid-fifties) in the financing of road construction. In the same way, the shortage of electric energy, due to a rise in demand and to the decline in the investment by the foreign electricity firms, as well as the concentration of these firms' activities in the large towns induced state governments (from the mid-fourties) and the federal government (fromthe late fifties and early sixties) to plan and promote the expansion of electricity supply. Newly established State-owned firms invested heavily and promoted the construction of a substantial number of new and large dams and hydroelectric plants and the extension of the distribution system.

This government investment in transport and energy accounts for the emergence of the Brazilian construction and design engineering firms. It is worth noting that, at the initial stage, the works to be undertaken were relatively small. This implied that they were unlikely to attract foreign contractors and that they were manageable by the emerging local construction companies. These smaller works, however, enabled these local companies to grow and accumulate the resources and konw-how that would be required later by larger projects. Furthermore, as far as projects were

contracted by government agencies, political links were frequently more important than cost and technical considerations in the choice of contractors. From this viewpoint, these initial years were decisive also in providing the emerging local entrepreneurs with the necessary political alliances at state and federal government levels.

In this context, from the late forties, small construction firms established in the major and most important states benefited from the increasing government investment in infrastructural works, and from the shift from state to federal government initiatives in order to expand their activities and reach a nationwide scale.

The ability of local firms to stand up to the competition of potential foreign contractors was also enhanced by the patterns of operation of the main sources of financing for the large projects — the Brazilian National Bank for Economic Development and international and regional development banks. The support of such institutions implied the gradual supply of resources to the different and successive stages of a project (pre-feasibility studies; preliminary design; detailed design; procurement of equipments; construction; supervision of construction; and testing and starting-up of new facilities). This pattern induced the specialization of Brazilian engineering firms in specific services so that, although they were unable to account for the project as a whole, they could undertake a particular stage of the project. This definitively implied a clear-cut distinction between the construction and the design engineering firms in Brazil.

It is noteworthy that, although the heading of this section refers to civil engineering services, the previous and following remarks apply equally to the mechanical and electric engineering services which are related to the production and distribution of electric energy. In fact, government investment in this area also brought about the mastery of the required technology by Brazilian engineering firms (in relation to equipment, however, this mastery refers to product engineering rather than production engineering; Brazilian production of heavy equipment has

been basically provided by foreign subsidiaries or by local firms under licensing). In the same way, in more recent years, the heavy government investment in telecommunications has fostered the know-how of some Brazilian engineering firms.

The point to emphasize here is that the above described evolution has brought about civil engineering activities in Brazil being almost entirely controlled by local companies. In fact, the shares of foreign subsidiaries in the book value and value added in the construction sector were lower than 4% in 1975. This contrasts sharply with the manufacturing industry in which the shares of those subsidiaries were 36% and 38%, respectively. But the development of civil engineering works in Brazil not only implied the national control over this sector but also gave rise to large and powerful enterprises. There were 4 and 13 construction firms respectively among the 50 and 200 largest non-financial enterprises in Brazil in 1982 (according to their sales). Furthermore, construction and design firms constitute a well organized pressure group, with significant political influence on state and federal governments.

1.1. Internal Determinants of Expansion Abroad

In this context, it is not surprising that, after having moved from regional to national markets during the fifties, the construction and engineering firms would come to move towards external markets. From this point of view, one can inquire, in fact, why these firms did not join the manufacturing industry in the export effort in the early seventies.

Several reasons account for the lag between the moves of the manufacturing sector and of the construction and engineering firms towards the external market. To start with, manufactured good exports were seen, at first, as a way out of the mid-sixties recession; as to the construction sector, recovery could dispense with such a stimulant and come about as a result of the increase in government expenditure. Later on, the growth of manufactured good

exports was promoted by economic policy as a means to improve the Brazilian balance of payments. As to service exports, they were not worth the attention of government policy as their possible impact on balance of payment was unlikely to be significant.

Again, there were several factors which accounted for these less-than-bright prospects for service exports. Firstly, government policy counted on the possibility of inducing foreign subsidiaries' exports, which would provide the access to external markets — such subsidiaries did not exist in the construction and design engineering sector. Secondly, adequate financing support — a requisite for both manufacturing goods and service exports — could be more easily provided to the former, as the latter generally implied a longer amortization period. Furthermore, besides financing support, competitiveness of Brazilian good exports depended basically on competitive costs; government incentives could make up for possible inefficiency of local producers. Given the necessary government support, Brazilian exports of a large number of manufactured goods might then compete in both the developed and developing country markets. On the contrary, competitiveness of service exports depended more clearly on the technological ability of the would-be exporter. In addition, as the demand for engineering services was mostly a government demand, political factors were likely to have a major influence on the success of export efforts. In this context, the Third World countries — particularly, the Latin America countries — provided the potential market for Brazilian service exports. Nevertheless, even in such markets, the prospects for these exports in the early seventies looked dim due to the small size of these markets and to the potential competition of the large contractors and engineering firms from the developed countries. Moreover, Brazilian foreign policy during this period did not help to ingratiate Brazilian firms with the more militant Third World governments.

Under such circumstances, the possibility of expanding service exports was not taken into account by Brazilian foreign trade policy. In fact, while incentives to manufactured good exports were introduced as early as the late sixties, those directed

to service exports were only brought in by the mid-seventies. And, in any case, the latter were never so significant as the former.

Despite the lack of government support, the first attempts to move towards external markets had already begun in the early seventies. These attempts were few, however, and few of them were successful. The only firm which had a more significant stake in the external market during this period (Rabelo) had been excluded from the domestic market for political reasons; contracting abroad was required, therefore, for its very survival. Particular circumstances enabled this company to become rather successful in Algeria. The other attempts were timid and, in hindsight, can be seen at most as a mere rehearsal for future undertakings.

What were then the new conditions that induced Brazilian construction and design engineering enterprises to look more decisively for the external market in the late seventies ? The first point to emphasize is certainly the very expansion of these enterprises as a result of the huge investment program undertaken by the Brazilian government. This expansion was likely to increase the growth potential of such enterprises. It is worth noting that the growth potential of firms in this sector is determined not only by their profit rate and internal accumulation but mainly by the improvement of their technical, managerial and organizational capability which allows the simultaneous undertaking of more numerous and more complex projects. Hence, Brazilian construction and engineering firms were likely to present a high growth potentia during the 1970's. In fact, the average profit rate of this sector has shown a substantial increase in the early seventies, rising to 16-19%, from about 8% in the late xixties. It is also significant that the largest firms in the sector had increased the diversification of their activities and entered new sectors during the decade.

To be sure, government demand for large construction and engineering projects was still high. Despite a mild reduction in government constructron activities in 1975/1976, a new rise came about from 1977. This fact has prompted the argument that the

drive towards external markets cannot be seen as an effort of firms in this sector to realize their growth potential in face of insufficient domestic demand. This reasoning, however, misses the point: from the viewpoint of the need of a firm to move beyond its current market, what is relevant is not the size of the demand, or even its growth rate, but rather the comparison between this rate and the firm's growth potential. Therefore, given the hign growth potential of the construction and design engineering firms in the mid-seventies, "Brazilian market were not large enough for them" as an industry official has it.

Furthermore, as some industry officials state now, perhaps with the benefit of hindsight, many construction and engineering firms had anticipated the inevitable end of the investment boom and consequent decline in the demand for large construction projects. This prospect induced some of them to look for new outlets for their productive capacity in anticipation of the decline to come.

In any case, the drive towards external markets came to the full in the early eighties when construction demand effectively declined as a result of changes in economic policy and the consequent decrease in government expenditure.

It is worth noting that some officials in the sector seem aware that this decline is more than a mere cyclical down-turn, that the golden years are definitively over and that such a large amount of investment as undertaken during the last decade is unlikely to be repeated. From this point of view, for the large companies of the sector, if they were to keep on being large costruction or engineering firms, they should widen their activities in the external market and become multinational enterprises.

The effective move of construction and engineering firms towards the external market brought out government action in support of service exports. The political influence of such firms was sufficient to prompt the new government attitude. Furthermore, the increasingly serious difficulties faced by the Brazilian payment balance from the mid-seventies — mainly as a result of the rise

in oil prices — called for a renewed export effort; in this contex , export opportunities which could be overlooked in the previous years had now to be pursued. In addition, changes in the internatio l scene, which will be referred to later, may have persuaded government authorities that the prospects for service exports were not so gloomy as some years before. Moreover, government authorities and entrepreneurs realized that capital good exports could greatly benefit from the previous export of design engineering. Finally, Brazilian foreign policy was undergoing a major turn during this period, which implied a renewed attention to the developing countries and aimed at stregthening the links with these countries and at assuming a leading position in the Third World. The new foreign policy focused mainly on Latin America and Africa, on the account of geographical, ethnical and cultural reasons, and the Arab oil producer countries, out of economic considerations. The implication of the new policy on service export is twofold. On the one hand, it favoured Brazilian firm's dealings with developing country governments. On the other hand, service exports might be sought out and stimulated by Brazilian government as a means to improve diplomatic relations and Brasilizn presence in specific countries.

Government promotion of technology and service exports had as a background the government policy to induce the mastery of imported technology and foster the national technological capability. This policy, which dates from the late sixties, was based mainly on the financing of research, development and design activities by research institutes, consulting and design engineering firms and manufacturing enterprises by a special finance agency - FINEP. Nevertheless, as far as exports were concerned, government support aimed basically at ensuring competitiveness of Brazilian potential exporters.

With such an aim, new legislation introduced income tax exemption on profits from technology exports and on insurance commissions related to services rendered abroad, as well tax exemption on capital goods exports on temporary bases. In addition, Banco do Brasil granted bidding, performance and refundment bonds for covering the risks related to bidding and failure in fulfilling

contractual obligations. The emphasis of Brazilian policy, however, aimed at providing financing conditions which were competitive in the international market . Therefore, FINEP was brought in to finance market prospecting and proposals for prospective customers. Moreover, the Foreigh Trade Division (CACEX) of Banco do Brasil financed also, in favourable conditions, up to 85% of the costs of studies, projects and services undertaken abroad, as well as up to 80% of the purchase of domestic equipment to be used in such services. In addition, the Central Bank subsidized Brazilian private banks for borrowing in the international market in order to finance service contracts abroad under favourable conditions; the subsidy corresponded then to the difference between the borrowing costs and the costs which were charged to the service exporter firms. This interest rate equalization scheme was quite effective so far as good liquidity conditions prevailed in the international finance market.

Table 25 shows that CACEX financing support for service exports has amounted to US$946 million until December 1983. This financing fluctuated consideably during the period: US$186.5 million in 1976/77, US$380.7 million in 1978/79, US$87 million in 1980/81 and US$291.3 million in 1982/1983. Most of CACEX support refers to civil engineering works and projects. Manufacturing and processing plants accounted for only 20% of total financing, two-third of which was directed to a single undertaking — a steel plant in Paraguay.

The US$754 million worth of financing to civil engineering projects was mainly directed to construction firms which accounted for 15 financed contracts and for 91% of the total financing. Furthermore, this financing was highly concentrated both in a few contracts and in a few countries — five contracts and five countries (Iraq, Peru, Tanzania, Congo and Uruguay), accounted, respectively, for 67% and 80% of total financing. In addition, 90% of this total amount was related to dams, hydroelectric plants, highways, and railroads projects and works. In relation to the construction firms, the US$684 million worth of financing corresponded to 11% of the total value of 57 contracts for which information on value is available. For the three more important contractors (Mendes

Jr., Andrade Gutierrez and Oderbrecht), this percentage was within the range 11% - 17%. On the other hand, these three firms accounted for 78% of the total financing to construction firms (the percentage relative to Mendes Jr. is 58%).

Government support to service exports was also provided through Interbras — a subsidiary of Petrobras, which was incorporated as a trading-company in order to benefit from Petrobras position as the largest world oil buyer. Its activities, however, have not been restricted tooil exporter countries only, and Interbras is now a trading-company in its own right, which exported US$2.6 billion in 1982. As far as service exports are concerned, Interbras has participated in 30 successful deals which has given rise to contracts of the total value of US$1.65 billion (among them, the US$1.2 billion contract for a railroad in Iraq). Table 26 shows the distribution of such contracts according to the nature of the exported services and the Brazilian exporters. Two-thirds of these contracts refer to civil engineering projects. Nine deals are related to construction firms. It is noteworthy, however, that — if we do not take into account the US$1.2 billion contract, and one for which no information on its value is available — the remaining seven construction contracts amount to US$128 million, that is, less than 2.5% of the total value of 57 contracts for which information is available.

1.2. Brazilian firms abroad: why they have succeeded and how they operate

The rapid growth of the developing country demand for construction works and engineering services during the seventies has certainly been the main precondition for the expansion of Brazilian firms abroad. Several factors account for this fast rise: the continual increase in financing by international and regional development banks and funds; the favourable liquidity conditions in the international finance market; and the investment programs of oil exporter countries. In short, available funding translated the permanent infrastructural need of developing countries for construction and enginering services, into an actual growth in demar...

This expansion of the international market was followed by changes in the supply conditions which allowed the entry of new competitors. To start with, the very high market growth rate made it difficult for the traditional suppliers to keep pace with demand. Furthermore, there are hints that these suppliers were loosing competitiveness in face of potential newcomers, due to their higher labour costs and, in the case, of U.S. firms, as a result of U.S. legislation and the lack of government-sponsered financing in comparison with other countries. In addition, it has already been suggested that the long-run strategy of U.S. and European leading firms includes the retreat from some civil engineering design and construction activities in order to concentrate on more complex specialities such as large-scale process, power and manufacturing process, as well as on construction management. From this point of view, a rough international division of labour appeared be evolving in the construction and design engineering industry, which opened the lower end of the spectrum of technological complexity to the developing country firms. One may argue, however, that this possible retreat of the leading firms of developed countries may also open this market segment up to intermediate firms of such countries.

One may wonder also if this possible strategy of the developed country companies is not the very result of the emergence of a growing number of international consulting, design and construction engineering firms based in developing countries during the last decades. In fact, if the barriers to entry in this industry are being overcome by the latter, the outlook is an increase in competition and a decline in profit margins. These prospects might induce traditional suppliers to retreat to segments of the market which they could keep under more tight control. The question should be then whether the previous retreat of developed country firms made possible the emergence of new competitors from developing countries, of whether the entry of the latter prompted the retreat of the former.

It is worth, hence, focusing on the nature of the barriers toentry in this sector and, then, on the specific characteristics of the Brazilian firms which have allowed them to overcome these barriers and to encroach on external markets. Despite being part

of a general movement of construction and engineering firms from developing countries towards the international market, the success of Brazilian firms abroad presents reasons of its own.

From Bain's traditional sources of barriers to entry, capital requiremente can be discarded as not very important. This is true not only for the design engineering firms but also for construction firms since, although many contractors own their own equipment, such equipment is usually available for lease. Therefore entry will basically depend on the possibility of a newcomer presenting competitive costs and of overcoming a possible customers' preference for the traditional suppliers. Competitive costs depend basically on the technical efficiency of the newcomer but also on its labour costs and on the financing conditions it can offer. As to customers' preference, it is likely to reflect technical reputation and previous experience, as well as political links at firm and government levels.

Technical knowledge of Brazilian construction and design engineering firms has been accumulated during the last four decades through learning-by-doing and the mastery of some specific transferable technologies. This process was favoured by the large investment programs undertaken by the Brazilian government during this period (in particular, during the seventies) and by the oligipolistic structure of this industry which implied a high degree of concentration of government demand on few construction and design engineering firms. Furthermore, the learning-by-doing process has acquainted these firms with the peculiarities and shortcomings of a developing country economy. As a result of this investment boom, the Brazilian large construction companies, for example, have probably built more highways and large dams and hydroelectric plant than any developed country firm during the last ten years. In addition, it is unlikely that any of such developed country firms have the same experience as the Brazilian ones in undertaking large works under very tough environmental conditions.

In short, Brazilian firms combine the mastery of the most modern civil engineering technology and the capability to take into

account the specific conditions of developing countries. As already mentioned, this is also true in relation to the mechanical and electric engineering konw-how associated with the production and distribution of electric energy, as well as to the intermediate telecommunication technology. Therefore, in the case of construction and other engineering services, even if Brazilian firms only match the technical ability of the U.S. and European enterprises, they have a possible advantage from an organizational and managerial viewpoint, due to their skill at bringing together and efficiently managing, under the conditions prevailing in developing countries, the large variety of inputs required by large construction works and due to their skill at rapidly training large number of unskilled people.

In relation to cost competitiveness, labour costs favour Brazilian as well as other developing country firms. This is mostly true for the consulting and design services, in which labour costs pratically determine the contract value, and also for the expendirture on technicians and workers from the home country in the construction works (although, in this latter case, Brazilian firms' costs might not be so low as those of other developing country companies). Moreover, Brazilian firms may have also an advantage over the developed country firms even in relation to the costs associated with local and expatriate workers, due to their previous experience in rapidly training and dealing with unskilled people.

The practice of Brazilian firms concerning their working force abroad depends on the particular country conditions. As a general rule, local workers predominate in the Latin American undertakings and Brazilian and expatriate workers, in the Africa and Middle East ones. Brazilian contractors have been quite successful in putting together and co-ordinating workers of different origin and cultural background. For example, the largest Brazilian undertaking abroad — the construction of railroad in Iraq - brought together at its peak four thousand Brazilian and ten thousand expatriate workers. It is true that labour problems account, to a large extent, for most of the difficulties faced in the least successful of the Brazilian undertakings abroad — the construction

of a US$1.2 billion dam in Venezuela by a consortium of two firms, the largest together with the 16th largest Brazilian construction firms and local companies. Nevertheless, this is certainly an exception. In any case, the failure of the consortium in carrying out the work, which implied part of the contract being transferred to developed country contractors and heavy loss for the Brazilian associates, had as a consequence the resigning of the Brazilian largest construction firm from further undertakings abroad.

As to financing, Brazilian firms have basically faced two different kinds of dealings. The first one refers to projects financed by international and regional development banks and funds, and also by host governments, in which financing precedes the bidding for the project. In such cases, turn key projects are uncommon (and unheard-of as far as some agencies, such as the World Bank, are concerned), as the projects are usually broken up in their successive stages and independent designers and supervisors are generally required. In this context, financing is obviously not a competitive factor. A second possibility corresponds to projects in which a would-be contractor must provide its own financing which becomes, hence, a factor to be taken into account by the customer. This requirement may appear both in a direct deal between a firm and a potential customer and as a bidding condition. On the other hand, this requirement may apply both to a turn key project (in which a bid consists of a package co-ordinated by a would-be main contractor involving the design, execution, and equipment supply and financing) and to the simple undertaking of specific stages of a complex proje

This second scheme predominated during the seventies as the abundant supply of funds in the international finance market allowed potential customers to avoid the delay generally involved in the dealings with development banks, as well as their requirement However, changes occurred in the international finance market during the eighties and, in particular, the increasing foreign debt of developing countries brought this practice to a halt. Furthermore, the simultaneous decline in the revenue of the oil exporting countries implied a decrease in government sponsored projects even in the richer of the Third World countries. In this context,

developing countries are bound to rely more heavily on development banks and aid agencies, which tend to become the main financing source for contracts in these countries.

Brazilian firms have successfully faced both financing schemes. From their point of view, the World Bank-type procedure dispenses with the need for providing financing and hence circumvents one of their possible competitive disadvantage. Furthermore, it is worth recalling that the emergence of engineering firms in Brazil was itself largely conditioned by similar practices and, in particular, by the breaking up of large projects according to their different stages and into several biddings. As already mentioned, this circumstance has induced the specialization of engineering firms in specific services and implied a clear-cut distinction between the construction and the design engineering firms in Brazil. Therefore, insofar as it excludes turn key projects, this kind of procedure may facilitate the participation of Brazilian firms in internacional biddings and, in particular, benefits design and highly specialized engineering firms which may enter an undertaking on their own.

It is worth emphasizing, however, that the relative specialization of Brazilian firms does not prevent them from undertaking turn key projects. To mention one example, the construction of the hydroelectric plant of Palmar, in Uruguay, was a US$248 million turn key contract, which had as main contractors, a construction and a design engineering firm (Mendes Uunior and Engevix), involving at least a further eight design and specialized engineering firms, and was granted by CACEX financing support which amounted to 30% of the contract value.

The second kind of dealings which were mentioned above, although implying the burden of the financing arrangements, makes room for creative solutions and, in particular, allow the Brazilian firms to take advantage of specific features of the relations between Brazil and other developing countries. A recent example of such a deal is provided by a dam and hydroelectric plant to be built in Angola by Oderbrecht. This project, whose equipment will be

supplied by Soviet Union, corresponds in fact to a barter as the construction costs incurred by Oderbrecht will be paid by the supply of oil from Angola to Petrobras.

This brings forward the question of the customer preference for established suppliers, the last of the sources of barriers to entry to be examined. It is obvious that, in general, Brazilian technical reputation cannot be compared with that of the U.S. and European countries. Nevertheless, as far as civil engineering and the associated mechanical and electric engineering are concerned, Brazilian firms have accumulated a large and successful experience in domestic works which attests to their technical capability. More than that, in relation to the specific demand of the developing countries, Brazilian firms may even claim to be better qualified than their developed country competitors as they probably surpass most of them in the number of similar works undertaken in recent years and as they certainly are more acquainted with the peculiarities and difficulties of operating under developing country conditions. In any case, even if this pretension were not justified, it is certainly plausible.

On the other hand, insofar as civil engineering contracts result basically from government demand, political considerations play an important role in producing the customer preference. From this viewpoint, as already mentioned, the major shift in Brazilian foreign policy in the mid-seventies, which implied a firm alliance with the Third World countries in the international forum and the definite support to the Arab cause in the Middle East, certainly helped to ingratiate Brazilian firms with their potential clients. Furthermore, opportunities resulting from common economic interests and, in the case of the oil exporter countries, the possibility of deals which are not far from an explicit barter are factors to be taken into account by the developing country governments and which may even overshadow technical and cost considerations. In this context, it is exactly inthose undertakings sponsored by the host country governments that the exertion of Brazilian government influence to promote Brazilian firms' business abroad is more likely to be successful. In fact, the small political weight of the

Brazilian government in the international finance agencies does not enable it to intervene in those undertaking in which such agencies play the major role.

The experience of Brazilian engineering firms in Nigeria provides a good example, though perhaps an extreme one, of the importance of political factors and government-to-government relations for the expansion of Brazilian firms abroad. As a result of a political decision to reduce its dependence on European suppliers, the Nigerian Ministry of Communication approached its Brazilian counterpart in the mid-seventies. The large expansion of Brazilian telecommunication network and services from the mid-xisties as well as the role played by State-owned teleccommunication enterprises and by local design engineering firms in such expansion were taken as attesting to Brazil's capability in this area. From the Brazilian viewpoint, Nigeria was a welcome customer not only by political reasons but mainly by the bilateral trade possibilities. Therefore, the Brazilian Ministries of Communication and of Foreign Affairs strongly supported the two largest design engineering firms (Hidroservice and Promon), which have been involved in the expansion of Brazilian telecommunication network, in their effort to answer Nigeria's demand. To be sure, the initial services provided by these firms did not imply the effective supply of technology, as they referred basically to the supervision of projects which had been previously designed by European companies. Nevertheless, these initial contracts were followed by new ones, some of them involving more complex technology, and gave rise to a permanent presence of such firms in Nigeria. Such a presence has implied the diversification of the two firm's activities in the country and brought about their entry into new areas (mainly, irrigation projects). Moreover, such a presence has also strenghthened their links with local firms and given rise to the establishment of a subsidiary in Nigeria, in a joint venture with local engineers.

At this point, it is worth focusing on the relationships of the Brazilian service exporter firms not only to local companies from the recipient countries but also with other Brazilian engineering firms, and with similar service exporter enterprises from developed and developing countries.

Tables 27 and 28, which sum up information collected at the inventory on service exports presented in Part I, make explicit that the movement of engineering firms towards the external market frequently joins several Brazilian firms together into a single undertaking. In fact, a significant percentage of the design and other engineering services which were identified in that inventory is associated with works undertaken by construction firms (48 out of the total of 261 contracts). This percentagen is particularly high in the case of services related to dams and hydroelectric plants (31 out of 44 contracts) and highways and railroads (13 out of 40). Mendes Junior's undertakings account for most of such contracts (22); thirteen of them are related to a hydroelectric plant tur-key project in Uruguay and seven to a railroad in Iraq. However, the simultaneous presence of several Brazilian firms in a single undertaking is not restricted to construction works carried out by Brazilian contractors. At least in six cases, shown in Table 28, all the Brazilian participants in the undertaking are consulting, design or other specialized engineering firms. Among these six cases the most interesting one is a turn key project of a steel plant in Paraguay, which involves nine Brazilian firms and twelve contracts. This consists in a joint venture between a local State-owned holding company (with 60% of capital stock), the Brazilian engineering firm Tenenge (2%) and the Brazilian steel firm Coferraz (38%). The latter two partners are responsible for the turn key project, having recourse to Brazilian capital good producers and to the services of Brazilian design and assembling firms.

It should be pointed out, however, that the above results do not necessarily imply any kind of consortium or subcontracting between the different Brazilian firms involved in a same undertaking abroad. In fact, this simultaneous presence frequently reflects independent deals between the foreign customer and the different Brazilian companies; this is particularly true in thoses projects which are financed by international and regional development banks, as such agencies promote separate biddings for different services or stages of the work.

On the other hand, it is worth noting that subcontracting is more frequent than consortium among Brazilian firms and that,

even when the latter ocrurs, the technical specialization of the firms involved are generally complementary rather than similar. For example, a consortium between construction firms or between the large and diversified engineering firms is not usual; nevertheless, such firms can associate themselves with specialized engineering firms, either as a consortium or on a subcontracting basis.

Brazilian construction firms, in particular, see themselves as competitors in the international merket. Not only do they seldom associate themselves in undertakings abroad but also they often come across as competitors in international bidding. Nevertheless, there are hints of some kind of implicit agreements between the larger construction firms which imply their refraining from major moves into each others main activity areas. In any case, this kind of agreement is restricted to direct dealings with potential customers and does not apply to open international biddings.

Although Brazilian engineering firms are not particularly enthusiastic about associating with each other, they generally had a definite policy of searching for association with other international engineering companies, both as subcontractors or in a consortium scheme. (A recent example of such an association is provided by a US$2.4 billion contract for the construction of a railroad from Bagdad to Basrah in Iraq by Mendes Junior and a South Korean construction firm; the value of this contract, which is currently at its final negotiation stage, is twice the size of the largest Brazilian contract abroad so far).

The reasons for such different policies towards compatriot and foreign associates are evident. A Brazilian associate usually adds little to the chance of success of a Brazilian firm in the international market. On the contrary, association with large developed, or even developing, country firms can enhance their competitive position. From this point of view, a consortium with a developed country company is particularly welcomed as these companies are likely to be seen as more technically qualified than the Brazilian one by developing country customers. In addition, such associations have also been looked to as a way of widening the area of Brazilian firms' activities. Even an association in countries

where the Brazilian firm has been active, by fostering its links with other international companies, may open these companies' home markets (or other countries in which they have traditionally operated) up to the Brazilian firm.

Finally, it is worth emphasizing the Brazilian engineering firms' willingness to associate themselves with local companies. It is true that the existence of such associates is frequently a requirement of the recipient country government. It is also true that construction firms, when subcontracting with local companies, are frequently only conforming to their pattern of operation in their home country. Nevertheless, Brazilian firms have entered into such association to a larger extent than required and some of them (even design engineering firms) have as definite policy not to undertake any project abroad without such a partnership. There are obvious reasons for searching for a local associate. Their existence makes easier for a foreign contractor to operate in the country not only by their acquaintance with the institutional, commercial and financial environment but also by the political implications of such an association.

So far, association with local companies has been restricted to subcontracting or consortium and referred to specific projects. The foreign subsidiaries of Brazilian engineering firms — generally established in tax havens and in countries to which they are exporting their services — are basically wholly-controlled subsidiaries. The only known exception is Promon's subsidiary in Nigeria in which the Nigerian staff owns 60% of the capital; but the Brazilian Promon itself is controlled by its technical staff.

However, although association with locals has been restricted to specific projects so far, some industry officials envisage that the continuation of their firms' activities in some developing countries will depend on their willingness to establish more permanent links with local capital. Their evaluation — which is, to a large extent, based on Brazilian experience — has it that, sooner or later, and though to different extent, some developing country governments will reserve the local market to firms establishe

in the country and possibly require that local capital have a share in such firms. Therefore, at least in those firms which have realized that if they are to keep on being large construction and engineering firms, they should become multinational enterprises, industry officials clearly contemplate the possibility of joint ventures with local capital in the more promising developing country markets.

2 - Industrial Technology Exports and Manufacturing Firms' Investment Abroad

The inventory presented in Part I has showed that the drive of Brazilian manufacturing firms towards the external market implied a substantial increase in manufactured goods exports from the late sixties but has not yet given rise to a similar increase in other forms of undertakings abroad. Furthermore, there are hints that most of these other undertakings are related and complementary to the manufacturing export activities of Brazilian firms rather than a substitute for them.

In fact, from the 58 industrial technology suppliers which were identified by Sercovich's (1983) inventory, 27 are capital good producers. Now, technology export deals by such producers are frequently associated with and required by manufacturing exports and do not necessarily imply a new step towards the external market. Inthis respect, it is noteworthy that 63 out of 69 operations undertaken by capital goods producers correspond to technical assistance contracts and turn key operations; only six licencing agreements seem to imply a more permanent link with foreign recipients In the same way, most of the manufacturing firms' direct investment seem to be associated with their export efforts. More often than not, these undertakings correspond to sale outlets or are designed to provide technical assistance to local customers.

This paper is mainly concerned, however, about those undertakings which imply a step further towards the external market,

than merely manufacturing exports and their substitutes — that is, licencing, permanent technical assistance agreements and equity participation in wholly-owned manufacturing subsidiaries and in joint ventures. In addition, we will focus also on turn key operations, as distinct from mere capital goods exports, and, in particular, on the possibility of their bringing about permanent links between supplier and buyer.

Insofar as empirical evidence shows a small significance of such undertakings, the relevant question is whether this corresponds to a specific stage of Brazilian industrial growth, to be superseded in the future, or whether there are some characteristics in the Brazilian industrial structure which hinders the present export drive being followed by other forms of undertakings abroad.

In this respect, two points must be emphasized. The first refers to the importance of multinational enterprises in the Brazilian manufacturing sector; the second, to the sources of technology for the local manufacturing firms.

Table 29 presents the share of foreign firms in the book value of manufacturing industries in the mid-seventies. It shows that such firms accounted for 36% of total book value of manufacturing sector. This share is higher than 50% in the electrical and communication equipment, transport equipment, rubber, chemicals, pharmaceuticals, perfumary and soap and tobacco industries. In addition, the share of foreign firms in the nonmetallic minerals, metallurgy, machinery and paper and pulp industries are within the range 25%-50%. More important, however, is the fact that foreign subsidiaries in the different manufacturing industries are concentrated in the most dynamic segments of the market, in which they usually predominate.

Multinational firms account also for a significant share of Brazilian manufactured goods exports: 37% of such exports in 1978 (Table 29). This percentage is particularly high in some sectors such as rubber (81%), electrical and communication equipment (77%), transport equipment (68%), pharmaceuticals (66%) and machinery (56%)

Furthermore, 105 out of the 300 largest manufactured goods exporters in 1980 were foreign subsidiaries, which accounted for 33% of such exports (the share of the 25 largest ones was 24%).

On the other hand, it is worth emphasising the reliance of the local manufacturing firms on imported technology. At the early stages of the Brazilian industrialization process, the necessary technology was widely known, basically incorporated in the required capital goods and hence supplied by their foreign producers. Later, the more complex technological requirements were basically met by licencing and technical agreements with foreign producers. In fact, the very import-substitution nature of Brazilian industrialization favoured the recourse to imported know-how (rather than efforts by local firms to develop the required technology), as it induced the assimilation of the technological characteristics of the previously exporting industries of the developed countries and required the prompt reaction of would-be producers to the new investment opportunities.

This development not only served to weaken the technological capability of the local manufacturing firms but also hindered the mastery of industrial technologies by Brazilian consulting and design engineering firms. To be sure, government policies were introduced during the seventies in order to increase the participation of localengineering firms with the investment projects which were being undertaken during this period. However, insofar as the basic technology for such undertakings were provided by foreign suppliers, the participation of the Brazilian consulting and design engineering firms in such projects was mainly restricted to detail engineering.

Owing to these characteristics of the Brazilian industrial structure, it is unlikely that the recent rise in manufactured goods exports will be followed by a similar increase in industrial technology exports or direct investment by manufacturing firms.

To start with, the decisive engagement of Brazilian subsidiaries of multinational firms in manufacturing exports does

not necessarily indicate further moves of these subsidiaries towards the external market. In fact, multinational firms may assign particular national markets to any of its subsidiaries in order to utilize existing productive capacity, benefit from lower production costs or conform to requirements of local governments. Technology exports, however, are a different case. Multinational firms concentrate their R and D activities in developed countries, and eventual innovations by subsidiaries are likely to be appropriated by the home company and transmitted abroad through the firms' international network. In this context, particular experiences of technology exports by multinational firms' affiliates may be seen as incidental. A possible exception is provided by subsidiaries of capital good producers, as disembodied technology exports are frequently associated with and required by the capital goods exports themselves. But such technology exports do not substitute for goods exports.

In the same way, the undertaking of foreign investment by subsidiaries of multinational firms is usually restricted to tax haven affiliates. To be sure, due to its knowledge of conducting business in a developing country environment, a specific affiliate may come to provide administrative assistance to other subsidiaries or even be charged with the supervision of their activities; but this is merely a matter of administrative policy of the multinational enterprises and is unlikely to imply contractual links or give rise to payments between subsidiaries.

The previous remarks suggest that technology exports and direct investment abroad are possibilities which are basically restricted to local firms. In this context, the large share of multinational firms in the Braziliam manufacturing sector is itself a factor which hinders such forms of expansion abroad. Nevertheless, one can argue that such a possibility still exists as far as the local firms are concerned.

However, this is only a possibility, unlikely to turn into effective undertakings, in those industries in which foreign subsidiaries predominate and local firms merely fill the interstices left open by the multinational enterprises. The weak and subordinate position of these local firms in their domestic market certainly

does not favour their venturing abroad.

We must focus, then, on the large local firms. It is worth noting the predominance of some particular forms of market structure among those industries in which such large local firms are present, and have a strong position and significant market share. In fact, these are usually competitive or homogeneous oligopolistic industries. In contrast, the market control by multinational enterprises occurs mainly in those industries in which product differentiation competition plays a major role.

This peculiarity is not surprising.For one thing, insofar as local firms are usually unable to match the product differentiation capability of the multinational enterprises, their ability to stand up to competition from foreign affiliates is usually restricted to homogeneous product industries. More important, however, is the fact of local firms being less exposed to competition from multinational enterprises in these latter industries, in which the phenomenon of multinationalization is less significant. In this respect, economic literature has emphasised product differentiation as one necessary characteristic of industries in which substantial direct investment occurs.

This proposition of the literature on multinational enterprises has further implication from the point of view of the expansion of Brazilian manufacturing firms abroad. The historical evolution of the Brazilian economy brought about the concentrarion of the large local firms in those sectors in which they did not have to match, or could stand up to the competition of multinational firms. This means, however, that Brazilian manufacturing firms are mainly concentrated in those industries which have been traditionally less prone, even in developed economies, to substitute capital exports for manufacturing goods exports and to undertake direct investment abroad. This characteristic suggests that the present export drive of the Brazilian manufacturing sector does not necessarily point to further steps towards the external market.

On the other hand, the passive reliance of the local manufacturing firms on imported technology does not favour their

becoming industrial technology exporters. Furthermore, this reliance on imported technology has implied that Brazilian consulting and design engineering firms were bound to play a subsidiary role in the manufacturing investment undertakings, as their participation was mainly restricted to providing detail engineering for imported projects. Now, this specialization in detail engineering even hinders their possibility of exporting in this very area. In fact, even those developing countries which are eager to resort to civil engineering services from Brazilian companies are likely to demand the detail engineering for their investment projects from firms associated with the process engineering suppliers, rather than from Brazilian firms. As a result , the prospects for industrial technology exports by Brazilian consulting and design engineering firms are certainly not so hopeful as for their civil engineering exports.

These comments on the manufacturing and engineering firms should not be taken, however, as a sweeping generalisation. In fact, many local firms have assimilated very complex technology and have been able to adapt imported technology to suit Brazilian conditions; local capital has also been able to hold its ground in several differentiated markets; large local firms from homogeneous product industries have undertaken direct investment abroad; and Brazilian manufacturing and engineering firms do undertake industrial technology exports.

The point to stress, however, is that the inventory of direct investment by manufacturing firms and of industrial technology exports is indeed a "collection of isolated cases" not only for not comprehending significant segments of Brazilian manufacturing industries overall, but also for only involving local firms in a few undertakings abroad, rather than giving rise to genuine multi-nationalization of its activities. In fact, of the 63 largest investors abroad, 52 firms have investment in a single country and eight firms, in two countries. In the same way, fourteen out of twenty engineering firms which have sold industrial technology abroad have only one contract. On the other hand, even in those sectors which account for the largest shares of direct investment

or industrial technology exports, the numbers of such investors and technology suppliers are not significant.

These "isolated cases", besides reflecting the good fortune of particular firms, are likely to occur in sectors in which Brazilian firms have acquired some comparative adavntages — probably related to simple technology products or to technologies which have been adapted to peculiar conditions of developing countries or to particular raw materials. Nevertheless, it is difficult to identify regular patterns or definite trends which can be derived from such a collection of isolated cases.

As a result the remainder of this section will focus on some of these isolated cases. They were chosen as examples (possibly, the most interesting examples) of the different kinds of undertakings abroad by Brazilian firms. It must be emphasized, however, that these examples should not be taken as representative of any general pattern or trend.

Direct investment as a complement to manufactured goods exports: the Vilares case

Vilares' investments abroad, which amount to US$1.1 million, present larger geographical diversification than any other Brazilian investor's covering six Latin American countries (Mexico, Colombia, Chile,Uruguay, Paraguay and Argentina).

Vilares in one of the largest and most diversified capital goods producers. Its sales amounted to US$500 million in 1983 and includes:lifts and escalators; electric motors and generators; steel products, such as rolled and forged bars, rolling mill rolls and castings; hydroelectric turbines and generators; material handling equipment; electrical control equipment; excavators, diesel engines and locomotives; and heavy industrial equipment. Its exports amounted to US$42 million in 1982.

The group started its activities before the II World War as a lift producer. By the late fourties, Vilares was already

exporting this product to Latin American countries and began to gain significant shares of some of these markets. At the begining of 1983, its contracts for lift and escalator exports amounted to US$8.5 million; Bolivia, Chile and Paraguay were the main importers.

The establishment of subsidiaries abroad was undertaken during the seventies - Mexico in 1972, Colombia in 1974, Chile in 1977, Uruguay in 1978, Paraguay in 1979 and Argentina in 1980 — and aimed at giving support to its lift exports to these countries. These subsidiaries are mainly sales outlets and provide assembly and installation of the exported lifts as well as after-sales technical assistance. They are hence mere instruments of Vilares' export activities. Nevertheless, in some countries, Vilares is compelled to add local parts to the exported lifts which turns its subsidiary into a customer of the local industry. Local content is particularly high in Argentina where Vilares exports only the lift engine.

Vilares policy has aimed at the establishment of wholly-owned subsidiaries, but the firm was forced to undertake joint ventures with local capitalin Mexico (49% of the capital owned by Vilares) and Colombia (85%) as a result of local government requirements.

Vilares officials do not envisage the undertaking of productive activities abroad but may be eventually foreced into them if import restrictions were to threaten its exports to some of these markets.

Tur key operations: the Dedini case

Dedini is certainly the main exporter of complete manufacturing plants in Brazil, having exported nine distilleries and two sugar plants.

Dedini group includes three main units:

- Dedini Metalurgica was established in the 1920 to manufacture crushing mills, boilers and other equipments for sugar and alcohol plants. Its present activities involve three manufacturing areas-mechanics, boilers and turbines-and it suppliers made-to-order capital goods to the steel, cement, mining, chemical and petrochemical and paper and pulp industries.

- CODISTIL was created in 1943 to manufacture alcohol and rum distileries. Its present production also includes equipment for chemical and petrochemical, paper and ceramics industries, as well as sugar mills and steel structures.

- Dedini Siderurgica was established in 1955 in order to provide the group with liquid metal for casting. It now produce rolled steel for civil construction and casting steel parts for sugar, alcohol, cement, mining and naval industries and for hydroelectric plants.

In addition, the Dedini group produces also, in other units, automatic equipment for sugar cane loading, plantation and transportation (in a joint venture with the Australian Toft Brothers Ltd.), turbines (in a joint venture with Coppus Corporation Engineering), synthetic resines and equipment for the casting industries (in a joint venture with the English Fordath), refractories and electrical equipament. Dedini has also set up an engineering firm in 1978, through a joint venture with Kawasaki Heavy Industries Ltd.

In contrast with many Brazilian capital good producers, Dedini undertook an orderly diversification process which exploited its previous technological and marketing experience and aimed at a greater horizontal and vertical integration. Its technological development was mainly based on its own research and learning process but has also benefited to a large extent from know-how supplied by foreign producers through technical assistance and licencing contracts and joint ventures. Dedini has a leading position in the sugar and alcohol equipment markets. It halves the former with another local producer (Zanini) and accounts for 80-90% of the latter.

Dedini has been decisively engaged in export activities. Siderúrgica Dedini has been the main exporter in the group. We are concerned, however, with complete plant exports and these have been undertaken by Metalurgica Dedini and, mainly, by Codistil. The former has indeed a limited experience in such exports which includes only two sugar plants sold to Venezuela and Honduras on a turn key basis. In addition, it also includes know-how exports to Andritz Machinenfabriek in Austria and Sporacen in France. Codistil, in turn, has exported nine alcohol distilleries and is near to export six additional plants.

Codistil was established in 1943 through the take-over of a small distillery producer and kept a pratically monopolistic position in the distillery market until the mid-seventies. At that time, some of Codistil's managers and engineers left the firm and established a new company-Conger — to compete in the alcohol equipment market. Insofar as the know-how of the new firm was restricted to the distillation process, it entered into association with Zanini (the sugar equipment producer) which were to supply the necessary know-how. This partnership broke down some years later but then Zanini had already assimilated Codistil's distillation know-how. By the late seventies, Zanini started manufacturing its own distilleries. These three producers-Dedini, Conger and Zanini, account for pratically all the Brazilian distillery production at present; Codistil's share in such market is between 80% and 90%.

Following the general pattern of Dedini group, the technological development of Codistil was mainly based on its own research activities but relied also on technical assistance agreemen with French, German, American and Swedish companies. An example of such a mix is provided by the recent introduction of two new distillation processes in Codistil's alcohol plants: one (Biostil) was licenced from the Swedish innovator (the plant erected by Codistil in 1981 was the second commercial plant to use such a process in the world); the other (Flegstil) was developed by the Brazilian firm, being introduced in 1983. Codistil considers its process and product technology to be equivalent to its foreign competitors. Nevertheless, the degree of automation of its alcohol

plants is small, as compared with those produced by developed country companies. This can be attributed to the scarcity of specialized workers in the Brazilian economy and, rather than being a handicap, may favour Codistal's sales in developing countries where potential customers are likely to face the same scarcity. What may adversely affect the firm's competitiveness, however, are the contractual links with its licensors. In fact, although not necessarily a decisive obstacle to exports, licencing agreements are always a nuisance as Codistil has to enter into specific, and frequently hard, negotiations with its licensors in order to get their authorization for most of its prospective export deals.

Codistil's alcohol plant exports have been restricted to Latin America, as shown in the table below. Most of these exports consisted of the supply of the complete plant on a turn key basis. The exceptions are the three sales to Venezuela and Peru; in these cases, Codistil supplied only the distillation unit on a turn key basis and provided technical assistance for the installation of other sections of the plant.

Year	Country	Capacity (1000 l/day)	Type
1964	Bolivia	15	beverage
1970	Paraguay	12	beverage
1975	Venezuela	60	beverage
1977	Bolivia	30	beverage
1978	Costa Rica	120	fuel (anhydrous)
1978	Costa Rica	120	fuel (anhydrous)
1979	Paraguay	120	fuel (anhydrous)
1981	Peru	20	beverage
1982	Peru	10	beverage

The launching of the Alcohol National Program (Proalcool) by the Brazilian Government in 1974 was decisive for Codistil. This Programme, which aimed at the substitution of alcohol for petrol in automotive vehicles, required a very substantial increase in alcohol production and gave rise to massive investments in the alcohol industry. The large rise in demand for distilleries not only implied a very rapid increase in Codistil production but also induced

significant technological advance. In fact, of the 510 distilleries which Codistil produced until 1983, 365 units (73% of the total) were produced after 1973. Annual production, which had declined to an average of three units during the period 1968/1973, jumped to 16 in 1974 and rose continuously to reach 58 units in 1978. During the last five years, annual production fluctuated around an average of 38 units. In addition, the evolution of productive capacity (expressed in thousand liter/day) of Codistil's distilleries also reflects the impact of the Alcohol Program on the firm's technologic l capability: 12 in 1946; 20 in 1949; 30 in 1953; 60 in 1955; 90 in 1967; 120 in 1974; 220 in 1976; 240 in 1981; and 300 in 1983.

It is noteworthy that the increase in Codistil's export effort (and in its effective exports) ocurred simultaneously with the rise in domestic demand. In fact, this move towards external markets resulted from its growing technical capability and long-run policy rather than from the necessity of finding an outlet for its production capacity. In any case, the firm has limited expectations about the role of exports in its future evolution. Firm officials are conscious that domestic demand for distilleries will decline in the near future as a result of the completion of the investment programme introduced by Proalcool. They do not consider, however, that the external market will provide a sufficient outlet for the firm's productive capacity. In this respect, Codistil is rather prepared to respond to any future decline in domestic demand for distilleries through the further diversification of its activities.

Furthermore, despite being itself a large sugar and alcohol producer in Brazil, Codistil does not envisage undertaking such productive activities abroad. In fact, firm officials flatly deny the possibility of associating its turn key exports with undertakings of joint ventures abroad.

Finally, it must be pointed out that the efforts to export alcohol distilleries on a turn key basis are not restricted to Dedini. Zanini has set up a wholly-owned subsidiary in Panama (1978) to market its technology, as well as establishing a cooperation agreement with Foster-Wheeler to manufacture, sell and install

alcohol distilleries abroad. Furthermore, Conger has effectively sold, on a turn key basis, a pilot plant (with a capacity of 2,500 liter/day) to Peru in 1976, a small plant (7,500 l/day) to Venezuela in 1977 and a 60,000 l/day plant to Kenya in 1979. Also Fives Lille, a marginal producer in Brazil, has supplied a complete plant to Panama.

Turn key cum equity participation: The Acepar case

The supply of a steel plant on a turn key basis to Paraguay is certainly the most interesting (though possibly not the most relevant) case of industrial technology exports by Brazilian firms. The 100,000 tons p.a. charcoal-based plant, which will be the first steel plant in Paraguay and is due to produce steel bars, light shapes and steel wire, is a joint venture between the Paraguayan government and the technology suppliers — Tenenge and Coferraz.

Coferraz is a semi-integrated steel producer, which was established during the sixties with the take-over of a 20;000 tons p.a. steel plant. The firm has undergone significant productivity improvement and capacity expansion since then and its production reached 250,000 tons in 1981. In 1982, Coferraz went bankrupt.

The key agent in the Paraguayan undertaking, however, is Tenenge — a large construction and engineering firm, with a turnover of US$290 million in 1982, and the leading position in the Brazilian assembling service market. Its previous experience spans the steel, chemical and petrochemical, pulp and paper and cement industries, electric power plants and electric transmission systems and offshore oil prospecting and production platforms. As far as steel is concerned, Tenenge has a great deal of experience in the erection of steel plants as it has participated in the building or expansion of most of Brazil's largest units. Furthermore, Tenenge has enlarged its know how by taking over, in 1975, the Brazilian subsidiary of the French firm Serete, which accounted for the detail engineering of many large steel plants in Brazil. Nevertheless, Tenenge had no previous experience in basic engineering for steel plants.

Tenenge has moved steadily towards the external market during the seventies, and become the second largest exporter of assembling services (the first place is held by a foreign subsidiary - SADE). Its activities abroad have been concentrated in Paraguay and Chile, where it has established wholly-owned subsidiaries to give support to its assembling activities. Furthermore, Tenenge has also set up a subsidiary in Paraguay (Mepar) in order to produce and erect steel structures; however, this subsidiary would be closed down because of a lack of orders.

Tenenge started its attempt to sell a steel plant to Praguay in 1970. It took Tenenge more than five year to overcome the institucional and financial obstacles to such an undertaking. The institutional scheme for making the project viable included the establishment of a State-owned holding company (Siderpar) which was to become the main partner of the new steel producer company. This was set up as a joint venture in which Siderpar holds 60% of the capita Coferraz, 38% and Tenenge 2%.

The Paraguayan Government, however, could not meet the costs of the undertaking, which is now estimated at US$200 million. The Foreign Trade Division of Banco do Brasil (Cacex) then agreed to finance the project, with the requirement of a local counterpart of only 10%. As a result, Cacex's financing is expected to reach US$186 million: the remaining US$15 million will be financed from Acepar's own funds. Cacex had already paid out US$145 million by the end of 1983, which corresponds to the second largest financing supplied by Cacex to service exports (the largest amounted to US$210 million and is related to a US$1.2 billion railroad project in Iraq). This financing is paid out in cruzeiros and should be spent in the purcha of capital goods and in the payment of engineering services in Brazil.

Tenenge was to be responsible for the project and construction management, Siderpar for the charcoal supply scheme, and Coferraz was to be charged with the plant operation and with the sale of part of its production in the Brazilian market (since domestic demand in Paraguay corresponds to only half of the plant

productive capacity). It is noteworthy, however, that the recent bankruptcy of Coferraz may affect some of these arrangements.

As mentioned above, Tenenge had no previous experience in basic engineering for steel plants. In order to overcome such a shortcoming, Tenenge contracted in experienced engineers from Acesita and Belgo Mineira - a State-owned firm and a foreign subsidiar respectively, which operate large charcoal-based steel plants. The first outline of the basic engineering for the Acepar project was hence a result of the operational experience of those engineers. In addition to the basic engineering, Tenenge has accounted also for some of the detail engineering, for the civil construction and assembling and for the procurement of equipment.

It is noteworthy that the technological contribution of the equipment producers went further than the mere undertaking of detail engineering and the supply of equipment as they have included, in some cases, important changes in the basic engineering originally outlined by Tenenge. These equipment suppliers are mainly Brazilian subsidiaries of multinational capital goods producers, and local firms under licencing of those producers. The foreign subsidiaries are Demag (which supplied the steel works and the continuous ingot line), Pholig Heckel (transport equipment) and L'Air Liquid (oxygen plant). The local producers are CONFAB (which supplied the blast furnace, in association with Paul Wurth), Prensas Schuller (rolling unit, with technology from Schelsman) and GTI (calcination unit).

Acepar project has involved also at least eight different engineering firms which have provided design, assembling and specialized engineering services. Among them, the most important contributions are those by Cobrapi (a State-owned engineering firm with large experience in steel technology) and Clepan (a subsidiary of a French firm) which have provided detail engineering for the blast furnace supplied by CONFAB and for the oxygen plant supplied by L'Air Liquid, respectively.

The previous information suggests some final comments. To start with, it must be pointed out that the Acepar project was made

possible due to Tenenge's ability to build up the necessary institutional and financing framework. It is also noteworthy that, when undertaking this project, Tenenge could only partially rely on its know-how and previous experience. In fact, although it did not involve very complex technology, the project requirements were a step beyond Tenenge's technological capability. In this context, as the project nears its end, its successful completion can be ascribed to Tenenge's ability to undertake project management and procurement.

Finally, it is worth noting that the experience of such projects is likely to facilitate new undertakings abroad. Tenenge has been near to sell a similar steel plant to Uruguay; the project was postponed, however, as a result of the financial difficulties faced by the Uruguayan government.

Direct investment in a homogenous product industry: the Gerdau case

Gerdau is the second largest foreign investor among Brazilian manufacturing firms. Its investments amount the US$14,5 million and result from its taking over two steel producers in Uruguay in 1981.

Gerdau is the largest non-flat steel manufacturer and also the largest private steel producer, with total output capacity of 2,040 million tons p.a. and accounts for six plants spread from the North to the South in Brazil. Its sales-which include construction steel, bars and light shapes and wire — account for 33% of the domestic demand for these products. Its exports correspond to 35% of its production. Its six productive units are semmi-integrated plants using electric furnaces and cover a wide range of output capacity: two are around 50 thousand tons p.a.; three, within the 240 thousand to 320 thousand tons p.a. range; and the largest one, 1,035 tons p.a.

Originally a nail manufacturer, Gerdau entered into the steel industry through the take over of a small plant in the South

of Brazil during the fourties. This pattern was repeated when it came to expand its activities to other regions: its entry into three regional markets resulted also from the take over of small plants which were then significantly expanded.

By the late seventies, Gerdau had come to account for more than 30% of its domestic market and decided that it was too risky to increase its market share on the ground that further growth might make it liable to nationalization. The move towards the external market arise as an alternative strategy.

Uruguay was a natural choice. To start with, Uruguay is nearer the company headquarters than most of its Brazilian plants. Furthermore, Gerdau was familiar with the Uruguayan market as it had experience in exporting ingots and final products to this country. In particular, Gerdau came to know that one of its customers was facing a difficult situation and was willing to sell its business. Finally, the entry into Uruguayan industry did not require significant investment and could be considered an experiment in going abroad. On the other hand, the take over solution was a convenient option. For one thing, Gerdau had previous experience of such a growth policy. In addition, the progressive expansion of existing productive capacity avoided disturbing the tiny Uruguayan market.

Gerdau's entry into Uruguay involved the take over of two firms, which were partially owned by the same shareholders. Allis was a steel ingot producer which operated a electric furnace. Laisa was a flat rolled producer, with an output capacity of 12,000 tons. p.a., which had accounted for 30% of domestic demand but whose market share had declined to 15%. Laisa produced bars and light shapes and had Allis and Gerdau as its main ingot suppliers.

Technically both plants were in rather bad shape. By merging the two firms, Gerdau's became the first semi-integrated steel manufacturer in Uruguay (however, its two competitors would soon build their own ingot unit). Furthermore, Gerdau introduced significant changes and innovations in the productive process and

undertook investment aiming at expanding output capacity and improving productivity. The ingot unit (Allis) which had been producing 800 tons per month in three shifts was soon brought up to produce 1,600 tons per month in two shifts. Flat rolled output capacity was raised to 39,000 tons p.a.. At the moment, Gerdau is setting up a continuous ingot line and expanding the number of items produced by its subsidiary. Gerday supplies 40% of the Uruguayan demand for flat rolled products; its competitors are an Argentinian subsidiary (with 40% of the market) and a local producer (20%).

Insofar as Gerdau sticks to its decision of not increasing its share in the domestic market, its growth will depend , in the long run, on further expansion abroad or on the diversification of its activities. Nevertheless, the firm is unwilling to undertake investment abroad at the moment, due to the prevailing conditions in the world steel market. In any case, its preference for the next investment is the U.S. market where, following its traditional pattern, the firm contemplates to enter by taking over a local producer. However, if Gerdau's investment in Uruguay is to be seen as an experiment on going abroad, it is hard to see how it could lead up to the U.S. market.

Gerdau is not attracted by the undertaking of joint ventures abroad. In fact, it has a previous experience in Brazil where it built its largest plant in a joint venture with Thyssen. The partnership did not work well and broke down some years later. This unsuccesful experience seems to account for its lack of interest in similar undertakings abroad.

Joint venture in a differentiated oligopoly: the Caloi case

Caloi constitutes a most interesting case on several grounds. To start with, it is one of the few examples of local firms able to keep a leading position in a differentiated oligopolistic market. Furthermore, its drive towards the external market has not been restricted to exports but includes also the

undertaking of productive activity abroad in joint ventures with local capital. The following comments on the experience of Caloi sums up the case study presented in Sercovich (1981).

Caloi was set up to sale, service and repair imported bicycles and motorcycles at the end of the last century. It started manufacturing parts during II World War and assembling bicycles in 1948. Its production expanded significantly during the following decades. Its marketing strategy, like its competitors', has progressively changed from a small and rather stable product range into a production differentiation policy which implies the increase in the number of models supplied to the market and periodic product design changes. Its successful engagement in this new pattern of competition has ensured Caloi a significant share in this differentiated market: it produces 40 different models and halves 90% of the bicycle market with the subsidiary of the Swedish firm Monark.

This evolution was associated with an effort of technology absorption undertaken by Caloi from the sixties, which consisted mainly in sending teams of technicians to Europe to get acquainted with European technology. This effort did not solely contemplate the mere assimilation of European productive methods but also entailed the adaptation of such technology to the smaller size of the Brazilian bicycle market. This adaptation implied the redesign of equipment and new manufacturing specifications and led Caloi to undertake vertical integration onthe basis of its own technology. The growth of the Brazilian market, however, would cause a rise in Caloi's production output and in a few years it became clear that this adapted technology was inadequate.

The large growth potential of Caloi and the oligopolistic structure of the Brazilian bicycle market induced the firm to move towards the external market in the early seventies. Its exports, originally directed to Latin American countries, were progressively extended to other areas and now amount to US$10 million per year.

This export drive was soon associated with the undertaking of productive activities abroad as a result of the setting up of a

subsidiary in Bolivia in 1973. Seven years later, a second subsidiar was established in Colombia. Both undertakings are joint ventures in which Caloi's share amounts to 49% of capital, the remainder being scattered among local individuals. Furthermore, Caloi's Bolivian subsidiary implies also royalty payments for its technological contribution (such payments are not allowed by Colombian legislation).

Although the establishment of these subsidiaries aimed at circumventing import restrictions, it also provided an alternati use for the technology which Caloi had developed for its domestic activities and had become inadequate due to the growth of the Brazilian market. In fact, the output of its subsidiaries abroad is quite small as compared with the parent company's. The demand of both the Bolivian and Colombian markets amount 80 thousand bicycles per year each and jointly correspond to about 10% of the Brazilian market. Furthermore, while Caloi has gained the significar share of 60% in the former, it still accounts for less than 10% of the latter.

Caloi supplies a complete engineering package to its subsidiaries and supervises local part manufacturing. Local contents differ only slightly in the two countries — 60% in Bolivia and about 75% in Colombia. Nevertheless, the Bolivian subsidiary presents a higher degree of backward vertical integration due not only to its larger production scale in Bolivia but also to the fact of the more developed metal-mechanic sector in Colombia allowing a more important role for independent local part producers in this country.

As suggested by Sercovich (1981), the most relevant characteristic of the Caloi experience abroad is that, in undertaking productive activities in smaller and less sophisticated foreign markets, Caloi could benefit from its previous experience in its domestic market, which it found necessary to supersede as a result of the very expansion of this market. In fact, both in Bolivia and Colombia, Caloi not only has the chance to reuse the small scale production experience which it had developed to supply the Brazilian market but also to return to a marketing strategy in which productio

is concentrated in only a few models (ten in Bolivia and six in Colombia) and dispense with permanent product design change.

TABLE 25

FINANCING SUPPORT TO SERVICE EXPORTS BY CACEX[a]

US$ million (number of projects)

	CONSTRUCTION				ENGINEERING SERVICES			Total
	Latin America	Africa	Middle East	Total	Latin America	Africa	Total	
Dams and hydroelectric plants	141.6(2)			141.6(2)	13.6(2)	35.0(1)	48.6(3)	190.2(5)
Highways and railroads	33.4(3)	165.2(3)	285.0(2)	483.6(8)		5.5(1)	5.5(1)	489.1(9)
Ports	14.7(1)			14.7(1)				14.7(1)
Airports	13.5(1)			13.5(1)				13.5(1)
Manufacturing and processing plants					145.7(1)	46.3(6)	192.0(7)	192.0(7)
Electric systems					3.7(1)	5.6(1)	9.3(2)	9.3(2)
Building	28.3(3)	20.3(1)		30.3(4)	6.0(1)		6.0(1)	36.3(5)
Others					0.5(1)		0.5(1)	0.5(1)
Total	231.5(10)	167.4(4)	285.0(2)	683.7(16)	169.5(6)	92.4(9)	261.9(15)	945.6(31)

Source: Cacex unpublished data.

(a): Until December 1983.

TABLE 26

TECHNOLOGY EXPORTS DEALS WITH INTERBRAS' PARTICIPATION

Supplier	Civil Engineering Projects	Industrial Technology	Total
Construction firms	9	-	9
Assembling firms	6	-	6
Consulting and design firms	5	3	8
Manufacuring firms	-	7	7
Total	20	10	30

Source: Interbras.

TABLE 27

CONSTRUCTION ACTIVITIES ABROAD IN WHICH MORE THAN ONE BRAZILIAN ENGINEERING FIRM IS INVOLVED

Works	Country	Contractor	Other Brazilian engineering firms involved	Number of contracts
Dams and Hydroelectric plants				
Palmar	Uruguay	Mendes Júnior	9	13
Colbun	Chile	Oderbrecht	5	5
Charcani	Peru	Oderbrecht	2	2
Acaray	Paraguay	C.B.P.O.	3	4
Iguazú	Paraguay	C.B.P.O.	1	1
El Izdahar	Algeria	Rabello	3	3
Guri	Venezuela	Camargo Corrêa and Cetenco	3	3
Total			26	31
Highways and railroads				
Railroad	Iraq	Mendes Júnior	6	7
Highway	Mauritania	Mendes Júnior	2	2
Chimoré-Yapacani	Bolivia	Andrade Gutierrez	1	1
Metro de Caracas	Venezuela	Cetenco	1	2
Moroguno-Dodoma	Tanzania	Ecisa	1	1
Total			11	13
Others				
Airport -Porto Suarez	Bolivia	Affonseca	1	1
Port - La Paloma	Uruguay	Ecex and Concic	2	3
Total			40	48

TABLE 28

PROJECTS ABROAD IN WHICH MORE THAN ONE BRAZILIAN ENGINEERING FIRMS IS INVOLVED

Project	Country	Main Supplier	Other Brazilian Engineering firms involved	Number of Contrac
Dams and hydroelectric plants				
Paso Severino	Uruguay	Hidroservice	2	3
Mindu	Tanzania	Tecnosolo and Geotecnica	-	2
Tablachaca		Geotecnica	1	2
Highways				
Quito-Guaiaquil	Ecuador	Hidroservice	2	3
Santa Cruz-Corumbá	Bolivia		2	2
Manufacturing plants				
Aceros del Paraguay	Paraguay		8	13
Total			15	25

TABLE 29

FOREIGN SUBSIDIARIES' SHARE IN THE BOOK VALUE (1975) AND EXPORTS (1978) OF MANUFACTURING INDUSTRIES

	Percentage	
	Book Value (1975)	Exports (1978)
Nonmetallic Minerals	28	30.5
Metallurgy	32	16.9
Machinery	36	55.8
Electrical and Communication Equipment	58	76,7
Transport Equipment	66	67.9
Timber	0	12.2
Furniture	-	-
Paper and Pulp	20	22.6
Rubber	87	80.6
Leather	0	21.5
Chemicals	55	18.4
Pharmaceuticals	80	65.9
Perfumary and Soap	60	11.9
Plastic Material	0	17.3
Textile	11	24.6
Apparel	10	1.8
Food Processing	18	23.3
Beverages	10	28.1
Tobacco	100	-
Editorial and Printing	0	1.5
Other	40	26.5
TOTAL	36	37.2

Source: A.S.Calabi, G.D. Reiss and P.M. Levy, Geração de Poupanças e Estrutura de Capital das Empresas do Brasil, São Paulo: Instituto de Pesquisa Econômica, 1981 e H.C.Braga, "Aspectos distributivos do esquema de subsídios fiscais à exportação de manufaturados, Pesquisa e Planejamento Econômico, Vol. 11, nº 3, Rio de Janeiro, 1981.

3. The Expansion of Brazilian Firms Abroad: Conclusions and Implications

The substantial rise in manufactured goods exports from the late sixties was followed by the increase in the Brazilian firms' foreign investment and service exports in recent years. The previous analysis has suggested, however, that the importance of each of these forms of undertaking differ. While the increase in Brazilian direct investment abroad can not be characterized as a definite and expressive process, the rise in service exports reveals a clear-cut and significant trend. Furthermore, a distinction has also to be made in relation to the importance of such exports for firms of different sectors. While industial technology exports are not a widespread and expressive phenomenon, the expansion in civil engineering service exports by construction and design engineering firms does correspond to a definite movement towards the external market which gathers a substantial proportion and includes the largest firms of the sector.

These different performances and prospects reflect the previous history and the current characteristicis of these sectors in Brazil. In relation to the manufacturing industry, two characteristics hinder the present export drive being followed by other forms of undertakings abroad. The first refers to the importance of multinational enterprises in Brazilian economy and to the concentration of the large local firms in industries which have been traditionally less prone, even in developed countries, to substitute capital export for manufactured goods exports and to undertake direct investment abroad. The second characteristic is the passive reliance of local manufacturing firms on imported technology which does not favour their becoming industrial technology exporters. These characteristics, though not precluding particular experiences of direct investment and technology exports, imply that an inventory of such experiences corresponds to a collection of isolated cases, from which a regular pattern or a definite trend can hardly be identified.

In contrast, the past experience of the civil engineering works in Brazil not only brought about the national control over

this sector but also gave rise to large and powerful construction and design engineering firms. This process was favoured, in particular, by the large investment programs undertaken by the Brazilian government from the fifties. Furthermore, the technical knowledge of such firms has been accumulated during the last four decades through both the mastery of some specific transferable technologies and mainly a process of learning-by-doing, which acquainted them with the undertaking of large works under very tough environmental conditions. Therefore, Brazilian firms combine the mastery of the most modern civil engineering technology and the capability to take into account the conditions prevailing in developing countries.

The movement of construction and design engineering firms towards the external market has resulted from the Brazilian market becoming insufficient to ensure the realization of their growth potential from the mid-seventies. On the other hand, the significant increase in their service exports has reflected both the rapid growth of the developing countries demand for construction works and engineering services during the last decade and the competitive advantages of Brazilian firms.

At this point, it is worth inquiring on the importance of new forms of investment for the internationalization of the activities of Brazilian construction and design engineering firms. To be sure, service exports by such firms are mainly sale operations and scarcely involve any element of investment by the exporting firms. Nevertheless, the expansion of these firms abroad became possible due to the new forms of undertakings which have accounted for meeting the infrastructural need of developing countries in recent years. In the past, public utilities in the developing countries were usually supplied by foreign firms; as a result, the large construction works demanded by such foreign public utility enterprises were undertaken by these firms themselves or by contractors from the developed countries. Such was the experience of most Latin American countries. Later on, Third World governments would take charge of implementing and operating these public services. However, their funding requirements meant a handicap to potential contractors from developing countries vis-a-vis developed

country firms with closer relations with private banks and public finance institutions and easier access to their home country supplier's credit. Therefore, the continual increase in financing by development banks and funds, the favourable liquidity conditions in the international finance market and the investment programs of oil exporter countries during the seventies were certainly decisive for the international expansion of the construction and design engineering firms from more advanced Third World countries. These changes in funding conditions have allowed both the emergence of large undertakings sponsored by the host country governments (mainly in oil exporter countries) and trilateral associations which bring together financial institutions, host governments and construction and design engineering firms from developing countries.

An evaluation of the implication of the expansion of Brazilian firms abroad for the firms themselves and their home economy is hindered by the lack of published data, as well as by the secretiveness of the firms involved. These are usually eager to discuss the general aspects of their successful ventures but very reticent when it comes to talk about specific figures. As a result, the implications of Brazilian undertakings abroad can only be assessed in broad outline.

As previously suggested, direct investment abroad (in wholly-owned subsidiaries or joint ventures) by Brazilian manufacturing firms is not significant. Neither are its implications for the Brazilian economy as a whole. From the point ov view of the investing firms, insofar as it gives rise to production abroad, foreign investment is likely to imply a reduction in the firms' domestic production and exports. However, if it provides sale outlets and post-sale technical assistance or aims at the assembly of parts exported from the home country, direct investment may enhance the investing firms' competitiveness and contribute to a rise in their exports. Foreign investment by Brazilian manufacturing firms corresponds, more often than not, to this latter case, being associated with their export activities rather than substituting for them.

In relation to the construction and engineering service exports, they have been stimulated by the Brazilian government on the grounds of the resulting foreign currency revenue and of their possible effect on capital good exports.

Available information and our interviews suggest, however, that the impact of service exports on the exports of capital goods has not been significant. To start with, this outcome reflects the poor performance of Brazilian firms as industrial technology exporters: consultancy and design associated with the building of manufacturing and processing plants are the very kind of service exports which are more likely to give rise to subsequent sales of machinery and equipment. Brazilian experience, however, seems to include, more frequently, the inverse situation: technology export deals follow and are induced by previous capital good sales.

Brazilian firms have been more successful in exporting engineering services related to infrastructural works and public utilities. Such exports, however, usually do not open up many opportunities for subsequent sales of capital goods. From this point of view, hydroelectric plants and telecommunication network and services constitute exceptions. Nevertheless, even such cases have not accounted for expressive sales of Brazilian equipment so far, not only because Brazilian firms' participation in these projects has been frequently limited to civil engineering services but also because projects financed by international and regional development banks and by host governments are usually broken up according to their successive stages and into several biddings, so that design and procurement are not necessarily undertaken by the same contractor.

Construction jobs abroad, however, have given rise to a certain amount of equipment exports. To be sure, such exports do not add to the value of the construction contract, as they are paid by the contractor itself. Nevertheless, they may be important for Brazilian producers of such equipment, mostly subsidiaries of multinational enterprises, specially in a period in which domestic demand has significantly decreased as a result of the decline in

construction activity in the country.

The effect of service exports on Brazilian foreign currency revenue can be assessed from Central Bank data presented in Table 10. During the period 1979/1982, "specialized engineering services" accounted for annual revenues within the range US$81-90 million, with the exceptional figure of US$141 million in 1981. The total amount (US$401 million) corresponds to only 0.5% and 1.1% of Brazilian total exports and manufactured goods exports during the same period. On the other hand, despite being inferior to the revenue computed by the Central Bank as "administrative services" (US$773 million in the period 1979/82), this US$401 million revenue is substantially higher than those associated with "patents and trademarks" (US$30 million) and "industrial technology supply" (US$15 million).

This figure, however, does not take into account the overall contribution of the foreign contracts by construction and engineering firms to the Brazilian balance of payment, as it does not include equipment and material exports induced by such contracts. It is worth noting, however, that a large proportion of the value of these contracts necessarily corresponds to expenditure in the host country; this includes the purchase of local suppliers, the hiring of native and expatriate workers and the subcontracting with local companies. Such expenditure is obvious in construction jobs but occurs also in consultancy and design engineering contracts. Unfortunately, the construction and engineering firms' secrecy has prevented any evaluation of the magnitude of their purchases from Brazilian and local suppliers.

Central Bank data induce also the underestimation of the profits of Brazilian construction and design engineering firms which stems from their contracts abroad. Again, despite the lack of precise information, there are hints that a probably substantial share of their profits are not brought back to their home country but rather diverted into the international finance market and into tax havens.

Finally, a further implication of the construction and engineering firms' activities abroad refers to their direct effect on employment in their home country. Although construction undertakings aboroad have provided work opportunities for a certain amount of Brazilian unskilled workers, this amount is certainly negligible when compared with Brazilian unskilled man-power. Nevertheless, the effect of such service exports on employment has been more significant in relation to more skilled labour. In fact, service exports have not only created work opportunities for engineers and qualified technicians abroad but mainly prevented a more substantial increase in the redundancy of such workers in Brazil as a result of the current recession and decline in government demand for large construction and engineering projects. From this point of view, the main implication of the recent rise in service exports has been to mitigate the decline in the level of activity of the construction and design engineering sector.

This latter remark suggests that, despite the relatively small effect on Brazilian economy as a whole, the activities of construction and design engineering firms abroad may be rather important for the firms involved. As previously suggested, the expansion of the largest of such firms during the seventies has implied their outgrowing the domestic market. Therefore, their movement towards the external market is more than a reaction to a cyclical down-turn. It rather corresponds to a strategic decision which takes into account that the huge investment program undertake by the Brazilian government during the last decade is unlikely to be repeated and, hence, that these large firms have to find out new outlets for their growth potential. In fact, this search has induced the leading firms not only to move towards the external market but also to diversify their activities and enter new sectors, mainly manufacturing industries and mining. It is worth noting, however, that, from these alternative ways, expansion abroad is probably the one which provides best opportunities for the firms to collect on their underutilized resources and technical expertise.

Furthermore, insofar as the external market grows in importance for these service exporting firms and comes to account

for an increasing share of their profits, they are likely to step up their engagement abroad. This possibility is already envisaged by some industry officials who expect that, sooner or later, and though to different extent, some developing country governments will reserve the local market to firms established in the country and possibly require that local capital have a share in such firms. In this context, Brazilian firms are likely to undertake investment in these developing countries — either in wholly-owned subsidiaries or in joint ventures — in order to ensure the continuation of their activities. In addition, the possibility exists that the presence of a construction or design engineering firm in a Third World country gives rise to the diversification of its activities in the country and to the entry into new sectors — following, perhaps, the path of its diversification process in the home country.

Therefore, if Brazilian multinational enterprises are to arise, they are more likely to arise from the drive of construction and design engineering firms towards the external market rather than from the few ventures of manufacturing firms abroad.

REFERENCES

Almeida, J.S.G. et alli. (1983). Estudos sobre a Construção Pesada no Brasil (mimeo), Rio de Janeiro, IEI/UFRJ, 1983.

Atlas Financeiro do Brasil. Rio de Janeiro, Interinvest, 1981.

Braga, H.C. (1981). "Aspectos distributivos do esquema de subsídios fiscais à exportação de manufaturados", Pesquisa e Planejamento Econômico, 11(3), Rio de Janeiro, 1981.

Calabi, A.S.; Reiss, G.D. and Levy, P.M. (1981). Geração de Poupança e Estrutura de Capital das Empresas no Brasil, São Paulo:Instituto de Pesquisa Econômica, 1981.

IPEA/CEPAL (1981). "La Experiencia de Brasil en la Venta de Servicios de Consultoria e Ingenieria en el Exterior y Algunas Posibles Areas de Cooperacion con los Paises del Grupo Andino" (mimeo), Santiago, 1981.

Oman, C. (1982). "New Forms of International Investment in Developing Countries", OECD Development Centre (mimeo), Paris, 1982.

Sercovich, F.C. (1981). "Brazil as a Technology Exporter", Final Report to the Inter-American Development Bank (mimeo).

Sercovich, F.C. (1983). "The Sale of Brazilian Technology Abroad: Scope, Performance and Implications" (mimeo).

Periodicals and newspapers

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