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**Regional Expert Group Meeting
on the Development of the Non-ferrous
Metals Industry in Latin America and
Possibilities for Complementarity ***

**Córdoba, Argentina
27-30 March 1989**

**STUDY ON THE IDENTIFICATION OF POSSIBILITIES
OF PRODUCTION COMPLEMENTARITIES
AMONG THE PRODUCERS OF ALUMINIUM AND NICKEL
IN THE CARIBBEAN REGION ****

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* This meeting was organized by UNIDO together with the Government of Argentina.

** The views expressed in this paper are those of the author and do not necessarily reflect the views of the UNIDO Secretariat. This document has not been edited.

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PART I

PRODUCTION, TRADE AND COMPLEMENTARITIES
IN THE NON-FERROUS METALS INDUSTRY OF THE CARIBBEAN
AREA

Selected Caribbean countries and Mexico:

INTRODUCTION

The First Consultation on the Non-Ferrous Metals Industry held in Budapest, Hungary between 30th November - 4th December, 1987 considered priority areas earlier identified by the Expert Group Meeting (18 to 21 March, 1985), Regional Expert Group Meeting (23 to 26 February, 1987) and the Global Preparatory Meeting (22 to 25 June 1987). The areas included strategies of development, technological alternatives, and new forms of investment and finance.

The Consultation made a number of recommendations and anticipates co-operation by governments, public and private enterprises and international organizations, in their implementation. One of the main recommendations which emerged, both from the Regional Expert Group Meeting and the consultation, call for the formulation of medium and long term development plans for the various stages of processing non-ferrous metals with the priority of establishing clear links between mining operations and metallurgical processing, as well as with other sections of the economy at the national and regional levels.

This position was arrived at against the background of five (5) years (1982-1987) of recession in the World's mineral industry marked by historically low levels of real prices and sharp reductions in consumption which had grave consequences on the natural resources based economies of developing countries. Available data indicates that base metals production in 1986 was 2.2% below 1980 levels while the corresponding value of crude minerals commodities produced was \$997 billion in terms of constant 1983 dollars, only slightly over two-tenths of 1 percent above the revised 1985 levels, and still far short of the historic high set in 1980 of \$1.269 billion. [1].

This study focuses on the present state of the non-ferrous metals industry in the Caribbean and Mexico and suggested measures for realizing the recommendation of establishing closer links between the countries involved based on identified complementarities. The main ones were:

[1] See Volume III 1986 Minerals Yearbook US Bureau of Mines.

1. the exchange of basic information on national plans for the development of the non-ferrous metals sector in order to enhance regional co-operation;
2. encouraging dialogue between operations at all steps of the production and distribution of non-ferrous metals with a view to developing mutual strong points and complementarities in order to achieve the optimization of the whole cycle;
3. producers of semi-finished and finished products in developing countries should base their first stage of development primarily on local and regional needs;
4. the reinforcement of trade between developing countries in non-ferrous metals products as well as inputs needed by the sector;
5. encouraging industries in developing countries to forge links with national, regional and international centres of research and universities in order to increase their level of productivity and to find new uses for their products; the programme for Technical Co-operation between Developing Countries (TCDC) might provide a ready format;
6. support by governments of developing countries of inward-oriented development of the non-ferrous metals industry. This could be done through the adoption of suitable technological and investment policies to promote the establishment of small-scale units for the production of semi-finished and finished products for domestic and/or sub-regional markets;
7. the creation, with the support of UNIDO, of technical information centres in order to facilitate the preparation of feasibility studies to encourage production and use of different non-ferrous metals in developing countries;
8. the development of appropriate methods of financing to promote feasible projects by:-
 - a) increasing the generation of funds internally;
 - b) obtaining better terms from existing financial institutions;
 - c) establishing regional and inter-regional mechanisms of finance within the framework of economic co-operation among developing countries (ECDC);

- d) exploring possibilities of new ways of co-operating with the centrally planned economy countries as well as with the developed market economy countries; and
- e) involving financial institutions in the preparation of feasibility studies.

The countries to be examined (Jamaica, Trinidad and Tobago, Cuba, Dominican Republic, Haiti, Mexico) are a sub-regional grouping of Latin America having a population of approximately 106 million with Mexico being the largest both in area and population (80 million - World Bank, 1986). With the exception of Haiti these countries fall broadly within the category of middle income developing countries. All are heavily dependent on foreign trade, with primary products and tourism playing significant roles in their economies. Jamaica and Trinidad and Tobago are members of the Caribbean Common Market (CARICOM) with the Dominican Republic being an associate member; Cuba is a member of the Council for Mutual Economic Assistance (CMEA); and Mexico is a member of Latin American Integration Association (ALADI).

PART 1

INDUSTRY STRUCTURE: OWNERSHIP, PRODUCTION & MARKETS FOR NON-FERROUS METALS

1. BACKGROUND

The Caribbean area in common with Latin America was adversely affected by the recession of the early 1980s with negative GDP growth being experienced in 1982 and 1983. This was in contrast with the fairly stable growth rates achieved in the 1960s and 70s as shown in Table I below:

TABLE I: GDP GROWTH IN THE CARIBBEAN & LATIN AMERICA

<u>Period</u>	<u>%</u>
1970-75	6.2
1975-80	5.1
1981	1.1
1982	- 1.2
1983	- 2.2
1984	3.3

SOURCE: 1983/84 UN STATISTICAL YEARBOOK

The major export commodities produced include petroleum (Mexico and Trinidad and Tobago), sugar (Cuba, Dominican Republic, Jamaica), bauxite (Jamaica, Dominican Republic and Haiti (up to 1982)), nickel (Cuba, Dominican Republic).

The level of economic development in the countries under review varies considerably with Mexico having the most highly developed industrial sector and Haiti being the least developed. In fact, Mexico is a leading producer of crude petroleum and refined products (the sixth largest in the world) which in 1986 accounted for approximately 35% of total exports: the world's leading miner, refiner and exporter of silver; a major producer of antimony, natural graphite, fluorspar; natural sodium sulphate and strontium minerals and a significant world producer of arsenic, bismuth, barite, lead, mercury, molybdenum, sulfur and zinc. In spite of the fairly diversified nature of the economy it experienced a decline of 3.8% in GDP in 1986 mainly as a result of the dramatic fall in oil prices and a 7.7% decline in crude oil production. Earnings from oil exports fell by over 50% of the 1985 level. Of course, the burdensome foreign debt further aggravated its economic woes.

The Cuban economy is next in size to Mexico's and reports indicate that GDP grew by 2% in 1987. The leading sectors of the economy are sugar, nickel, chromite, steel and various agricultural products. The country also produces a small volume of petroleum.

The Dominican Republic's economy, after several years of negative growth, achieved a 2% growth in GDP in 1986 to reach an estimated US\$5.5 billion. The major sectors include sugar, nickel, gold, tourism and light manufactures and apparel which are produced in export processing zones (EPZ).

Trinidad and Tobago has relatively well developed petroleum and petrochemical industries which constitute the leading sector of that economy producing crude and refined products. Development of the fairly substantial natural gas reserves has resulted in the establishment of ammonia, urea and methanol plants and is continuing with a significant portion of the output being also used to generate electricity. In addition an iron and steel plant now supplies products to the Caribbean and South American regions as well as Western Europe and the USA. With the steep decline in petroleum prices since 1986 the economy has suffered a severe reversal experiencing a 6% fall in GDP between 1985 and 1986.

In the case of Jamaica, after three (3) years of negative growth, GDP grew by 2% in 1986 with the bauxite/alumina sector experiencing an upturn and tourism contributing significantly to improved foreign exchange earnings. The dramatic fall in oil prices in 1986 improved the competitive position of the country's bauxite/alumina industry as, on average, energy accounted for over 34% of alumina production costs in 1985. It is expected that idle alumina capacity will be eventually re-started at the Alpart and Alran (Ewarton) alumina plants.

The Haitian economy has experienced five years (1982-86) of stagnation with per capita output falling an estimated 11 percent. [2] The most important decline in economic activity has been in the manufacturing sector which has registered negative growth in 1982 and 1984 - 86. On the other hand, the construction and agricultural sectors have recorded modest growth in the period.

2. OVERVIEW OF THE WORLD ALUMINIUM AND NICKEL INDUSTRIES

The world non-ferrous metals industry has, since the mid 1970s, experienced a dramatic decline in the growth of consumption arising from the global economic crisis, fundamental changes in the pattern of demand for non-ferrous metals and the oil shocks of 1973 and 1979. Available data [3] indicates that in the 1950-1973 period, Western World consumption of primary aluminium and nickel grew by 9.2% and 5.9% per annum respectively whereas in the 1974-1983 period the rates fell to 2.1% and 0.5% respectively. In fact, during 1979-1983 consumption of both metals declined by 1.1% and 1.3% respectively. Although some recovery was experienced in the period after 1983 consumption was still fairly sluggish up to the end of 1986 with prices falling to historically low levels in real terms.

[2] Economic and Social Progress in Latin America, 1987 Report, Inter-American Development Bank.

[3] World Bank, Metals and Minerals Research Services Limited, Metallgesellschaft.

Table II below sets out world aluminium consumption and production figures for the period 1970-1987:

TABLE II: WORLD CONSUMPTION AND PRODUCTION OF ALUMINIUM
1970 - 87 (tmt)

YEAR	CONSUMPTION	PRODUCTION
1970	9,996	10,261
1971	10,717	10,495
1972	11,801	11,648
1973	13,653	12,728
1974	13,889	13,818
1975	11,350	12,836
1976	14,077	12,863
1977	14,511	14,322
1978	15,329	14,776
1979	15,981	15,175
1980	15,298	16,035
1981	14,497	15,698
1982	15,154	13,990
1983	15,378	14,309
1984	15,625	15,921
1985	15,981	15,477
1986	16,313	15,506
1987	17,131	16,297

SOURCE: WORLD METAL STATISTICS

On a worldwide basis growth of aluminium consumption declined from an annual average of 6.6% in the 1970-79 period to 1.1% in the 1980-86 period. At the same time the growth of world production also declined from an annual average of 5.3% to -0.5%. However, both consumption and production increased by 5% in 1987.

In the case of nickel (Table III) world consumption and production figures show that the growth of consumption declined from an annual average of 3.3% in the 1970-79 period to 1.5% in the 1980-86 period. Similarly the average annual growth of production moved from 1.1% to -.02%. In 1987 consumption and production increased by 8.4% and 6.9% respectively.

TABLE III: WORLD NICKEL CONSUMPTION AND PRODUCTION
(TMT)

YEAR	CONSUMPTION	PRODUCTION
1970	577	610
1971	528	620
1972	649	597
1973	566	654
1974	704	717
1975	576	684
1976	670	737
1977	642	715
1978	697	622
1979	750	673
1980	717	743
1981	663	705
1982	648	622
1983	681	688
1984	779	745
1985	783	754
1986	784	741
1987	850	792

SOURCE: WORLD METAL STATISTICS

Following five (5) years of recession, 1987 saw a dramatic reversal in the downward trend in consumption and prices for most primary commodities. Although supply for both metals rose to levels unseen since the early 1980s to meet rising consumption, output has not so far increased sufficiently to meet increased demand. Consequently, inventories have been drastically reduced from the high levels of the mid 1980s and at the end of 1987 stood at 1.3 month's consumption for aluminium and 1.6 for nickel and prices have soared. In the case of aluminium and nickel, prices reached levels unseen since the last great price peak of 1979/80. Starting towards the end of 1986 aluminium prices increased rapidly and at the end of 1987 had reached 92.5 US cents per pound on the London Metal Exchange (LME) with the average for the year being 71.1 US cents per pound - an increase of 35% over 1986. Nickel prices made the greatest gains over the period rising by a spectacular 165% from an all-time low of US\$1.55 per pound to a high of US\$4.20 per pound. These price hikes came in the wake of a 3.3% rise in Industrial Production of the OECD countries during 1987 which led to buoyant growth in demand for all metals. This trend has shown little sign of abating in the first half of 1988. In fact, the monthly average cash prices for aluminium on the LME reached a high point of US\$1.62 per pound in June and nickel prices reached a peak of US\$8.17 per pound in April, 1988.

With the continuing buoyancy in the OECD economies, in spite of the stock market crash of October 1987, indications are that the demand for most metals, including aluminium and nickel, will remain strong at least into 1989.

2.1 DEVELOPMENTS IN THE ALUMINIUM INDUSTRY OF THE LATIN AMERICAN REGION

2.1.1 Trends in Aluminium Production and Consumption

Primary aluminium production by the five (5) producing countries of the region (Table IV) increased by approximately 373%, moving from 316,200 metric tons in 1976 to 1,494,700 metric tonnes in 1987 making it the most rapidly growing region of the world industry ranking fourth (Table V) behind North America, West Europe and the CMEA grouping but ahead of Asia and Oceania. Production increased by approximately 158% between 1976 and 1980 while between 1981-1987 it was 89.5%, slower than the rate achieved earlier but starting from a much larger base.

TABLE IV: LATIN AMERICAN PRIMARY ALUMINIUM PRODUCTION
1976 - 1987 (TMT)

YEAR	ARGENTINA	BRAZIL	MEXICO	SURINAME	VENEZUELA	TOTAL
1976	43.1	139.2	42.4	45.0	46.5	316.2
1977	49.9	167.1	42.7	50.2	43.4	353.3
1978	49.4	186.4	43.1	58.0	83.7	420.6
1979	48.4	238.4	43.2	62.6	204.7	667.3
1980	133.1	206.6	42.6	54.9	325.2	816.4
1981	133.9	256.4	43.2	41.3	314.1	788.9
1982	137.6	299.1	43.3	42.5	273.6	796.1
1983	132.8	400.7	39.7	28.9	335.2	937.3
1984	133.7	455.0	44.0	23.0	386.0	1031.7
1985	139.9	549.8	42.7	28.8	403.1	1184.3
1986	549.8	757.3	37.0	28.7	423.0	1396.7
1987	150.9	843.5	71.5	--	430.8	1494.7

SOURCE: BASED ON WORLD METAL STATISTICS

TABLE V: WORLD AND REGIONAL PRODUCTION OF ALUMINIUM
1960 - 1987

YEAR	WORLD (TMT)	LATIN AMERICA %	CANADA %	USA %	WESTERN EUROPE %	AUSTRALIA %
1960	3,543	0.4	15.2	40.2	15.8	0.3
1965	6,586	0.5	11.4	37.9	16.2	1.3
1970	10,302	0.7	9.3	35.0	15.5	2.0
1975	12,837	1.6	6.9	27.4	20.4	1.7
1980	16,131	4.5	6.7	28.8	19.3	1.9
1981	15,535	4.6	7.2	28.9	19.9	2.4
1982	13,582	5.2	7.9	24.1	21.0	2.7

Cont'd.

YEAR	WORLD (TMT)	LATIN AMERICA %	CANADA %	USA %	WESTERN EUROPE %	AUSTRALIA %
1983	14,322	6.4	8.0	23.0	25.0	3.3
1984	15,964	6.6	8.0	26.0	23.6	4.8
1985	15,521	7.2	8.0	23.0	23.2	5.5
1986	15,550	8.9	9.0	20.0	23.6	5.6

SOURCE: METALLGESELLSCHAFT AG, METAL STATISTICS,
IBA, JBI

Consumption rose by approximately 92.3%, from 410,200 metric tons in 1976 to 788,800 metric tons in 1987. In effect, therefore, Latin America has moved from a position of metal deficit (94,000 mt in 1976) to a surplus position (718,500 mt) in 1987. In keeping with trends in the international industry both production and consumption declined in 1981 before recovering in 1983 and 1984 respectively (Table VI).

TABLE VI: LATIN AMERICAN PRIMARY ALUMINIUM CONSUMPTION
1976 - 1987 (TMT)

YEAR	ARGENTINA	BRAZIL	MEXICO	SURINAME	VENEZUELA	CENT. AMERICA & CARIB.	TOTAL
1976	67.4	215.5	55.5	n.a	44.5	27.3	410.2
1977	62.4	229.5	52.9	n.a	52.0	36.0	432.8
1978	60.5	240.4	85.6	n.a	69.0	31.6	487.3
1979	81.1	265.7	108.5	n.a	74.0	35.9	565.2
1980	59.5	296.4	113.1	n.a	96.2	38.9	604.1
1981	52.5	261.7	110.4	n.a	68.9	36.9	530.4
1982	62.9	281.9	84.8	n.a	47.9	18.2	495.7

Cont'd.

YEAR	ARGENTINA	BRAZIL	MEXICO	SURINAME	VENEZUELA	CENT. AMERICA & CARIB.	TOTAL
1983	80.4	270.6	56.4	n.a	89.0	34.9	531.3
1984	101.2	294.8	87.1	n.a	130.3	36.0	649.4
1985	80.9	347.5	116.4	n.a	147.0	40.0	731.8
1986	121.3	423.7	64.2	n.a	135.0	52.0	796.2
1987	101.1	430.4	70.3	n.a	135.0	52.0	788.8

SOURCES: BASED ON WORLD METAL STATISTICS
INSTITUTO MEXICANO DEL ALUMINIO, A.C.

Brazil and Venezuela were the two (2) leading contributors to the rapid growth in both production and consumption with Brazil increasing its production six (6) fold and moving to the position of the world's fifth largest producer while doubling its consumption.

This expansion in production was largely due to the rapid development of indigenous bauxite resources (reserves of 2.20 billion tonnes, the third largest in the world)[4] with the state and North American transnationals playing the leading role but with some Japanese investments as well. The availability of hydro-electric power, competitive labour rates and the growing local market for metals were also important contributing factors to this development.

Venezuela achieved an even more dramatic nine (9) fold increase in production and became the world's eighth largest producer with also a near trebling of consumption. The Venezuelan industry's rapid growth was primarily due to the availability of massive hydro-power from the Guri scheme. The availability of surplus capital (derived from earlier massive increases in oil revenues) and latterly, the discovery of adequate bauxite reserves were also important factors as the government sought to reduce the country's dependence on petroleum.

Argentina achieved more than a three-fold increase in production whilst consumption increased by approximately 7%. Mexico followed with an increase of approximately 69% in production with consumption increasing by 104% up to 1980 sharply declining to 56.4 tmt in 1983 and recovering to a

[4] An Appraisal of Minerals Availability for 34 Commodities - US Bureau of Mines, 1987.

record of 116.4 tmt in 1985. In 1986 consumption fell once again. The performance of Mexico's economy and its mineral industry has been affected by the debt crisis which emerged in 1982 and was further aggravated by the recession brought about by the collapse in oil prices in 1986.

Suriname, which attained a maximum production of 62,600 mt in 1979, experienced consistent declines in its output and by 1987 the country's single smelter was closed. The factors influencing these developments include adverse conditions affecting the hydro-electric facilities supplying the smelter as well as political disturbances.

Aluminium consumption by the Central American and Caribbean territories (excluding Mexico) has increased from approximately 27,300 mt in 1976 to 52,000 in 1987 or by 90%. The rate of increase has been on par with that achieved by the major economies of the Latin American region.

2.1.2 Regional Production of Bauxite and Alumina

Whilst the Region has achieved significant growth in primary aluminium production over the period its performance in the raw materials sector (bauxite/alumina) has been less impressive. Table VII below provides data on the production of bauxite by Latin American countries over the 1976 - 1987 period. Overall, production increased by 25% between 1976 and 1980 but declined in the years after with a temporary recovery in 1984 which was quickly followed by a sharp 17% drop in 1985.

TABLE VII: LATIN AMERICAN BAUXITE PRODUCTION
1976-1987

YEAR	BRAZIL	DOMINICAN REPUBLIC	GUYANA	HAITI	JAMAICA	SURINAME	TOTAL
1976	998.4	632.2	3108.0	660.4	10295.6	4585.0	20268.6
1977	1040.2	576.0	3344.0	685.0	11433.6	4856.0	21934.8
1978	1130.6	568.1	3479.0	639.0	11735.8	5121.9	22574.4
1979	1642.2	524.1	3354.0	560.0	11505.0	4741.0	22326.3
1980	4152.4	510.5	3052.0	461.0	12064.3	4903.1	25143.3
1981	4662.6	504.4	2395.9	539.0	11606.9	4125.0	23734.8
1982	4186.5	152.3	1783.1	377.0	8157.7	3060.0	17716.6
1983	5238.7	--	2234.1	--	7681.9	2793.0	17947.7
1984	6433.1	--	3035.6	--	8734.9	3374.9	21578.5
1985	5846.0	--	2153.2	--	6239.3	3738.3	17976.8
1986	6446.3	--	2073.9	--	6963.9	3730.6	19214.7
1987p	6336.3	--	2073.9	--	7659.9	2800.0	18980.1

SOURCE: BASED ON WORLD METAL STATISTICS

Hence, from a peak of over 25 million tonnes in 1980, bauxite production in 1987 reached only approximately 19 million tonnes - a decline of 24.5%. In global terms, the region's share of world production slipped from 27% in 1980 to 21% in 1985 (Table VIII) continuing the trend which commenced in the late 1950s when the region - then represented by the Caribbean territories - accounted for over 50% of world production.

TABLE VIII: WORLD AND REGIONAL PRODUCTION OF BAUXITE

YEAR	WORLD (TNT)	AUSTRALIA %	LATIN AMERICA (Caribbean & Brazil)	GUINEA %
			%	
1960	27,620	0.3	46.9	5.0
1965	37,292	3.2	46.7	4.3
1970	60,162	15.4	41.0	4.1
1975	77,045	27.3	29.4	10.9
1980	91,338	29.8	27.3	14.6
1981	87,796	29.5	28.2	13.3
1982	76,905	30.7	24.0	14.9
1983	77,016	31.0	23.0	16.0
1984	90,323	36.0	23.0	14.0
1985	85,710	36.0	21.0	14.0
1986	84,445	38.0	24.0	13.0
1987	81,857	41.5	23.9	19.9

SOURCE: METALLSTATISTIK. IBA, JBI.

Analysis of production trends indicate that simultaneously with the region's relative decline in the world bauxite industry Brazil has emerged as a major producer - expanding by over six (6) fold in the 1976-87 period. This is in keeping with that nation's rapid economic expansion, the development of its industry as discussed earlier and the consequential rise in aluminium consumption.

The Caribbean territories have suffered a major decline in the bauxite sector with production ceasing in Haiti and the Dominican Republic in 1982. Jamaica experienced a drastic decline as its production, after falling from 15 million tonnes in 1974 to just over 10 million tonnes in 1976 and recovering to 12 million tonnes in 1980, went into a serious tailspin falling to just over 6 million tonnes in 1985 - the lowest level since 1961. The other producers, Guyana and Suriname have also suffered significant declines in the 1980s.

In the same period, alumina (metal grade) production by the Region has increased from 3.238 million tonnes in 1976 to 5.727 million tonnes in 1987 (Table IX). The data indicates that the Region's share of world production increased from just over 14% in 1975 to 16% by 1987. Brazil and subsequently Venezuela have become major producers with Brazilian output moving from 306,000 tonnes in 1976 to approximately 1.4 million tonnes in 1987 and Venezuela, with production commencing in 1983, reaching 1.36 million tonnes in 1987.

Meanwhile, in what was formerly the major producers of the Region, Jamaica and Suriname, output has declined overall with Jamaica slipping from a peak of 2.81 million tonnes in 1974 to 1.6 million tonnes in 1987. Suriname on the other hand achieved production of 1.36 million tonnes in 1987 which was just slightly (7%) below the peak of 1.47 million tonnes reached in 1986. Production ceased in Guyana in 1982 as a result of the closure of the country's sole refinery.

TABLE IX: LATIN AMERICAN ALUMINA PRODUCTION (TMT)
1976-87

YEAR	BRAZIL	GUYANA	JAMAICA	SURINAME	VENEZUELA	TOTAL
1976	306	285	1623	1024	--	3238
1977	368	277	2036	1104	--	3785
1978	434	240	1142	1261	--	4077
1979	449	220	2074	1199	--	3942
1980	593	214	2395	1329	--	4531
1981	520	157	2550	1165	--	4392
1982	552	73	1758	1055	--	3438
1983	629	--	1851	1146	560	4186
1984	882	--	1749	1237	1138	5006
1985	1096	--	1511	1242	1120	4969
1986	1197	--	1575	1471	1269	5512
1987	1396	--	1608	1363	1360	5727

SOURCES: JBI, IBA & METALLGESELLSCHAFT,
DEPARTAMENT NACIONAL DE PRODUCAO MINERAL,
MINISTERIO DAS MINAS E ENERGIA, BRAZIL.

The Region's overall decline in bauxite production is therefore accounted for by the fall in output of the Caribbean which also experienced a decline in alumina production although its output increased in the Region as a whole. Several factors [5] have been identified as contributing to this situation. The more important are:

1. the lower growth rate of primary aluminium consumption starting in the mid 1970s and the consequent slowdown in demand for alumina and bauxite;
2. the relative decline of the USA, which is the natural market for Caribbean producers, as a producer of primary aluminium and the change in regional distribution of aluminium production influenced by cost competitiveness with energy being the dominant item;
3. the development of fully integrated industries by energy-rich governments with bauxite reserves;
4. Take or Pay, Take and Pay Contracts and consortia arrangements entered into by the TNCS in Guinea and Brazil and the consortia arrangements applicable to several facilities in Australia which in effect replaced supply based on economic cost by preferential regimes;
5. taxation measures adopted by Suriname, Haiti, Dominican Republic and Jamaica;

In the face of these conditions it should be emphasised that the Caribbean Area maintains important positive features, not least of all a workforce skilled in bauxite mining and alumina refining accumulated over six and four decades respectively as well as:

1. abundant reserves of bauxite (Table X);
2. cheap mining costs (especially Jamaica) and relatively well developed infrastructure;
3. proximity to the North and South American continents; and
4. competitive wage costs.

[5] See C.E. Davis: The Changing Geography of Bauxite Production and its Impact on the World Aluminium Industry - Metal Bulletin's 2nd International Aluminium Congress, Monte Carlo.

TABLE 1: BAUXITE RESERVES OF LATIN AMERICA
(MILLIONS OF TONS)

Country	In situ resources	% of Western World Total
Jamaica	1,907	9.70
Suriname	533	2.71
Guyana	493	2.50

		14.91
Venezuela	236	1.20
Brazil	2,232	11.35
	-----	-----
Total	5,401	27.46
Haiti	10	
Dominican Republic	30	

	5,441	

SOURCES: AN APPRAISAL OF MINERALS AVAILABILITY FOR 34 COMMODITIES, US BUREAU OF MINES, BULLETIN 692, 1987 MINERAL FACTS AND PROBLEMS, US BUREAU OF MINES, 1985 EDITION.

2.1.3 Regional Capacity and Production of Semi-Finished and Finished Aluminium Products.

In 1986, the Latin American Region achieved its peak production of 755,000 tonnes of semi and finished products representing a capacity utilisation of 67% (total capacity of 1.123 million tonnes). In the period 1976-86, production of semi-finished aluminium products increased by 98% with Brazil and Venezuela being the largest contributors. This doubling of output resulted in the Region increasing its share of world production from less than 3% in 1976 to approximately 4.5% in 1986. Thus while the Region has registered an impressive increase in its share of world primary metal production, it has been unable to substantially increase its share of downstream activities and therefore remains essentially a primary producer.

The recession of the early 1980s and economic difficulties faced by the major economies of Latin America particularly payment problems arising from the debt crisis and its negative impact on GDP growth, have contributed significantly to the relatively slow progress in the expansion of aluminium consumption. Trade restrictions imposed by industrialised countries have also been an important factor detrimental to the

growth of production of semi-finished and finished products. In fact, these two factors mostly account for the relatively low level of capacity utilisation.

Tables XI and XII below set out production and capacity data for the Region.

TABLE XI: SEMI-FABRICATED ALUMINIUM PRODUCTION IN THE LATIN AMERICAN REGION (1976-86) (TMT)

YEAR	ARGENTINA	BRAZIL	COLOMBIA	MEXICO	PERU	VENE- ZUELA	CENT. AMERICA & THE CARIB.	TOTAL
1976	54	203	14	52	4	34	14	375
1977	47	289	14	51	5	51	17	411
1978	57	244	17	99	3	66	16	502
1979	77	260	16	124	2	70	21	571
1980	77	259	13	130	5	91	22	618
1981	50	231	15	132	5	65	25	523
1982	60	270	14	102	4	46	24	520
1983	76	269	15	78	3	95	27	553
1984	96	268	13	110	3	124	22	636
1985	77	299	22	141	4	132	25	704
1986	115	355	25	86	5	162	33	783

SOURCE: IBA, WORLD BANK,
INSTITUTO MEXICANO DEL ALUMINIO, A.C.
HUNTER ENGINEERING COMPANY, USA.

Brazil increased its production consistently over the period (by 75%) and continues to be the major producer with 1986 output more than doubling that of the next largest producer, Venezuela. This situation partly reflects Brazil's success in expanding downstream activities including the automobile sector which is a major user of aluminium, and also that country's rapid economic development.

Venezuelan production grew spectacularly (by 376%) over the period but unlike Brazil has continued to grow rapidly in the 1980s with production doubling since 1983.

As mentioned earlier, trade restrictions imposed by industrialised countries represent a severe limitation on the continued growth of Venezuela's exports hence its attempts to secure ownership in fabricating facilities in the USA and western Europe.

Argentina and Mexico achieved significant growth in their semi-fabricating industries as well but in the case of Mexico this trend was reversed by the economic difficulties of the 1980s. The negative impact of the Mexican economic crisis on the industry is demonstrated by the fact that production in 1986 was below the 1978 level and capacity utilisation, at 52%, was the lowest in Latin America.

TABLE XII: SEMI-FABRICATED ALUMINIUM PRODUCTS CAPACITY
IN THE LATIN AMERICAN REGION
(000 TONNES PER YEAR)

	1988	1989	1990
		----PROJECTED----	
ARGENTINA	132.7	132.7	132.7
BOLIVIA	3.9	3.9	3.9
BRAZIL	466.1	466.1	470.1
CHILE	8.7	8.7	8.7
COLOMBIA	49.4	49.4	49.4
COSTA RICA	12.7	12.7	12.7
DOMINIA REP.	0.0	0.0	0.0
ECUADOR	10.8	10.8	10.8
EL SALVADOR	3.2	3.2	3.2
GUATEMALA	0.0	0.0	0.0
HONDURAS	0.0	0.0	0.0
JAMAICA	4.3	4.3	4.3
MEXICO	168.5	168.5	168.5
NICARAGUA	2.7	2.7	2.7
PANAMA	6.0	6.0	6.0
PARAGUAY	0.0	0.0	0.0
PERU	11.9	11.9	11.9
PUERTO RICO	10.8	10.8	10.8

Cont'd.

	1988	1989	1990
		----PROJECTED----	
TRINIDAD & TOBAGO	0.0	0.0	0.0
URAGUAY	3.9	3.9	3.9
VENEZUELA	227.4	267.4	348.4
	-----	-----	-----
TOTAL	1123.0	1163.0	1246.0

SOURCE: IBA, WORLD BANK
 INSTITUTO MEXICANO DEL ALUMINIO, A.C.
 HUNTER ENGINEERING COMPANY, USA, DEPARTAMENTO
 NACIONAL DE PRODUCAO MINERAL, MINISTERIO DAS MINAS
 E ENERGIA, BRAZIL.

2.1.4 Regional Consumption of Semi-Fabricated Aluminium Products

Crude estimates of regional consumption for these products indicate that Latin America was in a deficit position of 212,260 mt in 1985. Hence imported products accounted for 25% of consumption whilst capacity utilization stood at 66%. Table XIII provides data on consumption by individual countries. The Caribbean Area accounted for approximately 2.6%. Central America for 27% and South America 70%.

If it is assumed that installed capacity in the Region generally reflects the range of products in demand, then it is reasonable to also assume that regional consumption can be met by increasing capacity utilization. This, of course, does not take into account the rigidities of the market-place and the barriers to trade existing between countries of the Region. The fact that over 33% of capacity is owned by INCS and is therefore subject to their world-wide system dynamics, the uncompetitiveness of some of the facilities and the ability of end users to import their requirements of semi-fabricated products are factors which together largely explain the disjuncture between capacity, production and consumption.

TABLE XIII: ESTIMATED LATIN AMERICAN ALUMINIUM
CONSUMPTION LEVELS IN 1985

	POPULATION	PER CAPITA ALUMINIUM CONSUMPTION (LBS/CAPITA)
SOUTH AMERICA		
ARGENTINA	30.049	5.5
BOLIVIA	6.316	1.2
BRAZIL	130.945	5.6
CHILE	12.088	2.1
COLOMBIA	28.572	1.3
ECUADOR	9.831	1.3
FRENCH GUIANA	.082	1.5
GUYANA	.832	.8
PARAGUAY	3.432	1.4
PERU	18.838	1.1
SURINAME	.362	1.5
URUGUAY	2.947	1.5
VENEZUELA	17.604	5
CENTRAL AMERICA		
BELIZE	.161	1
COSTA RICA	2.569	2.4
EL SALVADOR	5.269	1.1
GUATEMALA	8.474	1.3
HONDURAS	4.344	.8
MEXICO	80.448	5
NICARAGUA	3.263	1.2
PANAMA	2.081	4.9

CARIBBEAN

ANTIGUA & BARBUDA	.08	.8
ANTILLES	.262	1.5
BAHAMAS	.235	1.5
BARBADOS	.256	1.5
CUBA	10.134	1.5
DOMINICA	.075	.8
DOMINICAN REPUB.	6.303	1.5
GRENADA	.119	.5
HAITI	5.456	.2
JAMAICA	2.547	1.2
PUERTO RICO	3.95	1.8
ST. KITTS-NEVIS	.05	.8
ST. LUCIA	.131	.6
TRINIDAD & TOBAGO	1.264	3.5
MARTINIQUE	.33	.8
ST. VINCENT & GRENADINES	.117	.5

GRAND TOTAL 846.620 MT *)

* Estimated

SOURCE: BASED ON METALLGESELLSCHAFT, METALLSTATISIK 1975-85,
IBA.

Based on detailed estimates of the levels of imports and consumption by Jamaica and Trinidad and Tobago, and consumption in Venezuela, it appears that overall consumption of aluminium is even higher than the level reflected in Table XIII and hence the disjuncture between production and consumption is more severe. The problem of capacity utilization therefore appears to be critical to the future development of the industry in the region as the apparent underutilization of semi-fabricating capacity undoubtedly reflects negatively downstream on the durable goods and final-use industries and upstream on the production of smelted and refined metals thus lowering the efficiency of the industry as a whole. [6]

[6] See CEPAL Review No. 20 : New Objectives for the development of mining resources, ECLAC, December 1986.

This issue will be developed in subsequent analysis of the prospects for regional expansion of the industry and in discussing the measures to reinforce complementarities within the Latin American Region.

2.1.5 Ownership of Regional Aluminium Industry

Initially, the regional industry was dominated by the four North American transnationals Alcoa, Alcan, Reynolds and Kaiser. The companies first established bauxite and alumina facilities in the Caribbean commencing in the Guianas but subsequently developed reserve bases in Jamaica, Dominican Republic and Haiti. Later, smelter and semi-fabricating facilities were also established in the Region on the basis of total ownership by the companies.

With the growing nationalist tendency evident in the 1960s the level of government and local private sector participation in natural resources development increased. This trend continued in the 1970s and led to increased local participation in the ownership of the industry from bauxite mining through to semi-fabrication. Hence the industry in Brazil, Venezuela, Guyana and Jamaica has witnessed increased state participation with the Venezuelan industry being largely state owned.

Tables XIV & XV below provide detailed information on the ownership structure of regional alumina and smelter plants. As stated earlier, the TNCS control over 33% of regional fabricating facilities.

TABLE XIV: OWNERSHIP STRUCTURE OF LATIN AMERICAN ALUMINA CAPACITY (000 MT)

COUNTRY	FACILITY	TMT CAPACITY	OWNERSHIP & STRUCTURE
-----	-----	-----	-----
BRAZIL	Alcan Alumina do Brazil SA Saramenha (1944)	130	Alcan 100%
	C.B.A. Sorocaba, Soa Paulo	400	Votorantim - 80% Govt. 20%
	Alcoa Aluminio Sa Poca de Caldas 1972	180	Alcoa - 50% Hanna Mining -32%

Cont'd.

COUNTRY	FACILITY	TMT CAPACITY	OWNERSHIP & STRUCTURE
BRAZIL	Alunorte Barcarena 1985	800	CVRD - 60% Nippon Amazon - 40%
	Alcoa Aluminio San Luis 1985	500	Alcoa - 60% Billiton Metals - 40%
GUYANA	Guyana Mining Enterprise, Linden 1961	350	BIDCO 100% Govt. owned
JAMAICA	Alpart, Nain 1969	1200	Reynolds - 50% Kaiser - 50%
	Jamalcan Kirkvine & Ewarton 1952 & 1959	1110	Alcan - 93% Ja. Govt. 7%
	Jamalco	800	Alcoa - 50% Ja. Govt. 50%
SURINAME	Suralco Paranam 1965	1330	Alcoa - 100%
VENEZUELA	Interalumina Puerto Ordaz	1000	Venezuelan Govt. Alusuisse -

SOURCE: JBI, CRU, Metals and Minerals Research
Services Limited.

Of course, the TNCs continue to exert important control over technology, markets and price. Hence, even in the case of Venezuela, for these reasons, but also as a means of meeting the heavy capital investments involved, attempts have been made to attract foreign participation in expansion projects.

TABLE IV: OWNERSHIP STRUCTURE OF LATIN AMERICAN SMELTER CAPACITY (000 MT)

COUNTRY	FACILITY	CAPACITY	OWNERSHIP STRUCTURE
BRAZIL	Alcan Aluminio do Brazil Saramenha Minas Gerais 1945	60	Alcan - 100%
	Aluminio do Brasil Aratu, Bahia (1972)	58	Alcan - 100%
	C.B.A. Sorocaba (1955)	170	Votorantim - 80% Govt. - 20%
	Alcoa Aluminio Pocos de Caldas Minas Gerais (1970)	90	Alcoa - 50%
	Valesul Aluminio Santa Cruz (1982)	92	CVRD (Govt) - 52% Reynolds - 4% Shell Braz - 44%
	Aluminio Brasileiro (ALBRAS) Villa do Conde (1985)	166	CVRD (Govt.) - 51%
	Aluar Alcoa Aluminio Sao Luis	245	Alcoa - 60% Billiton - 40%
ARGENTINA	Aluminio Argentinas (Aluar) Puerto Madryn (1975)	150	Fate - 51% Pvt. Int. - 49%
SURINAME	Suriname Aluminium Company, Paramaribo (1965)	66	Alcoa - 100%
VENEZUELA	Aluminio del Caroni (Alcasa) Puerto Ordaz	215	FIV - 77% CVG - 8% Reynolds - 15%
	Venezuela de Aluminio (VENALUM) (1978)	338	FIV - 61% CVG - 19% Japanese Consortium - 15% Other - 5%
MEXICO			

SOURCE: JBI. CRU, GRUPO ALUMINIO, METALS AND MINERALS RESEARCH SERVICES LIMITED.

2.2 DEVELOPMENTS IN THE NICKEL INDUSTRY OF LATIN AMERICA

2.2.1 Trends in Production and Consumption

Production by the five (5) nickel producing countries of the Region increased over 1976-1987 with mine production expanding by approximately 51% and refinery production by approximately 89%. The Region's share of world mine production moved upwards from 8.6% in 1976 to 12.7% in 1987 whilst in the same period its share of world refinery production increased from 6.1% to 10.7%.

These increases were above the global growth rates of 1.6% for mine production and 7.5% for refinery production. Hence the regional industry was expanding during a period of stagnation for the worldwide industry. Tables XVI and XVII below provide data on regional mine and refinery production over the period. As can be observed Brazil and Colombia experienced the most spectacular expansions in mine production, with Brazil, after a period of stagnation in 1977-1982, increasing its production by 162% from 5,300 tonnes in 1976 to 13,900 tonnes in 1987 and Colombia by 290% from 5,000 tonnes in 1982 to a peak of 19,500 tonnes in 1987 with more than a three-fold increase between 1982 and 1983.

TABLE XVI: NINE NICKEL PRODUCTION IN LATIN AMERICA
1976 - 1987 (000 MT)

YEAR	BRAZIL	COLOMBIA	DOMINICAN REPUBLIC	GUATEMALA	CUBA	TOTAL
1976	5.3	--	24.5	--	36.9	66.7
1977	4.2	--	24.5	0.3	36.8	65.8
1978	3.6	--	14.3	1.8	34.8	54.5
1979	2.9	--	25.1	6.3	32.3	66.6
1980	2.5	--	15.5	6.9	38.2	63.1
1981	2.5	--	17.9	--	40.2	60.7
1982	5.3	5.0	6.0	--	37.6	53.9
1983	10.7	16.0	20.2	--	39.2	86.1
1984	12.7	16.5	24.3	--	33.2	86.7
1985	13.2	24.0	25.4	--	33.6	86.2
1986	13.5	19.0	24.1	--	35.1	91.7
1987	13.9	19.5	31.3	--	35.3	100.0

SOURCE: BASED ON WORLD METAL STATISTICS

In the case of the Dominican Republic mine production stagnated in the 1978 - 1982 period with a precipitous decline to 5,000 tonnes in 1982 before embarking on a steady recovery to a peak of 31,300 tonnes in 1987. Cuban mine production after reaching a peak of 40,300 tonnes in 1981 has stagnated in the 1982-1987 period in the face of technical difficulties being experienced in its new Punta Gorda facilities.

TABLE XVII: NICKEL REFINERY PRODUCTION IN LATIN AMERICA (TMT):
1976 - 1987

YEAR	BRAZIL	COLOMBIA	DOMINICAN REPUBLIC	CUBA	TOTAL
1976	2.1	--	24.4	18.4	44.9
1977	2.5	--	24.9	18.6	46.0
1978	2.2	--	14.3	18.6	34.8
1979	2.5	--	25.1	19.1	46.7
1980	2.5	--	16.4	20.6	38.9
1981	2.3	--	19.0	20.9	42.2
1982	4.8	1.5	5.8	21.0	32.9
1983	10.7	13.1	20.2	21.2	44.0
1984	12.7	16.5	23.0	7.6	69.8
1985	13.2	11.4	25.4	16.1	66.1
1986	13.5	19.0	21.8	7.0	71.3
1987	13.9	19.5	31.3	20.0	84.7

SOURCE: WORLD METAL STATISTICS

Regional refinery production experienced declines in 1978, 1980 and 1982 before recovering and achieving its peak of 84,700 tonnes in 1987. It should be noted that the three major periods of decline have been associated with severe cutbacks in production in the Dominican Republic.

In common with the other non-ferrous metals, primary nickel consumption grew strongly during the 1946-1974 period in response to postwar reconstruction, increased per capita incomes and rapid growth of the stainless steel industry in developed countries. The annual consumption of the western world increased from about 136,000 tonnes in 1950 to some

453,600 in 1970 and reached the then record of almost 589,700 tonnes in 1974. Consumption growth over the years 1946 to 1974 was about 6% per annum compounded.

Starting with the oil crisis of 1973, the substantial rise in energy costs resulted in stagnant demand for both capital and consumer durable goods. As a consequence nickel consumption and production declined in absolute terms before recovering in the late 1970s. Following a second round of significant oil price increases in 1979-80 there were substantial reductions in consumption and production with the former reaching a low of 446,800 tonnes in 1980. After 1982, western world consumption recovered significantly as world stainless steel production climbed. World consumption reached a peak of 850,500 tonnes in 1987 with the western world accounting for 641,800 tonnes in step with the record level of its stainless steel production of 9 million tonnes. [7]

In 1979, the previous record year of demand, nickel consumption was assisted by heavy capital expenditures by the process industries which use high-nickel alloys for many items of capital equipment. In recent years, however, capital expenditures have been lower, the intensity of nickel use has declined per unit of output, and there has been growing substitution of plastic for nickel-chrome plating on automobile bumpers among other things. Consumption has in the meantime been assisted by stronger demand for consumer durable goods. Fig. 1 shows the end uses of nickel in the western world in 1986 and confirms that consumer products now constitute the largest single end user.

In terms of applications, available information indicates that 85% of western world primary nickel consumption relates to its use in stainless steel production and as an alloy with other metals due to its ability to impart strength and corrosion resistance to alloys. Of course, stainless steel has thousands of uses - from kitchen sinks to nuclear reactor components - and now accounts for approximately 55% of western world primary nickel consumption, up from about 45% a decade ago. Engineering alloy steels account for about 10%, non-ferrous alloys used in coinage, electronics, gas turbine engine components and other diverse products account for 15 to 20%, foundry industry castings consume 10-15%, and electroplating and numerous applications of nickel powders account for the remaining 15% of consumption.

In respect of this last category, many consumer durables are nickel-chrome electroplated; automotive bumpers and metal furniture are two well-known examples. Carbonyl nickel powder

[7] See INCO's 1987 Securities and Exchange Commission Form 10-K Annual Report.

applications include rechargeable nickel cadmium batteries, conductive paints for electromagnetic interference shielding and other high technology metallurgical uses.

Nickel consumption data for Latin America is very sparse, however. Table XVIII below provides figures for the three largest economies of the region.

TABLE XVIII: PRIMARY NICKEL CONSUMPTION IN THE LATIN AMERICAN REGION (TNT) 1976-87

YEAR	ARGENTINA	BRAZIL	MEXICO	OTHERS INCLUDING CENTRAL AMERICA & THE CARIB.	TOTAL
1976	0.6	4.7	5.2	1.0	11.5
1977	0.5	5.2	2.5	1.8	10.0
1978	0.4	6.5	2.7	1.0	10.6
1979	0.8	7.0	3.4	1.6	13.3
1980	0.6	11.2	2.6	2.5	16.9
1981	0.4	7.5	4.0	1.0	12.9
1982	0.4	7.1	4.3	1.0	12.8
1983	0.7	7.1	1.2	1.0	10.0
1984	0.9	10.3	3.6	1.6	16.4
1985	0.9	11.5	3.4	1.6	17.4
1986	0.9	13.8	1.5	1.5	17.6
1987	0.9	14.4	1.4	1.5	18.2

SOURCE: BASED ON THE WORLD METAL STATISTICS
SECRETARIA DE COMERCIO y FOMENTO INDUSTRIAL,
MEXICO; DEPARTAMENTO NACIONAL DE PRODUCAO
MINERAL, BRAZIL.

The Region registered a 58% increase in consumption over the 1976-87 period compared to approximately 30% for the western world and 27% for the world. Brazil, however, was the only one of the three listed countries to register significant demand for nickel in keeping with its rapid economic expansion over the period which also spurred local production and use of the metal.

Mexican consumption stagnated in the late 1970s but recovered somewhat in 1981 and 1982 before declining in 1983 and reaching very low levels in the recession over the last two (2) years.

As earlier indicated, nickel consumption is heavily influenced by capital goods production and more recently, by the demand for consumer durables. Hence, it is not surprising, given the economic crisis experienced in the Region in the 1980s, that growth in nickel consumption has tended to be moderate except in the case of Brazil where economic activity expanded significantly after the recession of 1982-83. Of course, the Mexican experience has been more extreme given the impact of the oil price decline of 1986 on its foreign exchange earnings capacity and on overall economic activity.

It should be noted that in 1987 the Region's consumption as a proportion of its production was 21.5% as against 26% in 1976, with Brazilian consumption being in balance with its output. With the declining rate of industrial growth of the region the prospects for future growth in consumption is not too positive. Table XIX presents data on annual growth rates in industry and in the manufacturing sub-sector for selected Latin American countries.

TABLE XIX: GROWTH OF PRODUCTION (AVERAGE ANNUAL) FOR THE LATIN AMERICAN REGION (PERCENT)

COUNTRY	G.D.P.		INDUSTRY		MANUFACTURING	
	1965-73	1973-84	1965-73	1973-84	1965-73	1973-84
ARGENTINA	4.3	0.4	5.1	-0.7	4.6	-0.2
BRAZIL	9.8	4.4	11.0	4.2	11.2	4.9
COLOMBIA	6.4	3.7	8.2	2.5	8.8	2.0
COSTA RICA	7.1	2.8	9.3	3.3	n.a	n.a
CHILE	3.4	2.7	3.0	1.9	4.1	0.7
ECUADOR	7.2	4.8	13.9	4.8	11.4	7.6
GUATEMALA	6.0	3.1	7.2	4.3	7.4	3.4
MEXICO	7.9	5.1	8.6	5.5	9.9	5.0
PERU	3.5	1.5	4.1	1.1	4.4	-0.1
URUGUAY	1.2	2.0	1.4	1.5	n.a	n.a
VENEZUELA	5.1	1.9	4.1	1.1	5.7	3.4

Cont'd.

COUNTRY	G.D.P.		INDUSTRY		MANUFACTURING	
	1965-73	1973-84	1965-73	1973-84	1965-73	1973-84
JAMAICA	5.4	-1.4	4.5	-3.9	4.0	-3.3
TRINIDAD & TOBAGO	3.5	5.2	2.3	n.a	n.a	n.a
DOMINICAN REPUBLIC	8.5	3.3	14.4	3.7	12.0	3.9
HAITI	1.7	2.7	4.8	4.5	3.0	5.4

SOURCE: WORLD DEVELOPMENT REPORT 1986.
WORLD BANK.

Given the reduced rate of G.D.P. and industrial growth in the mid 1970s it is certain that the consumption of nickel, aluminium and other metals generated by industrial use will remain at a moderate level. However, the scope exists for substitution of metals found in the net imports of manufactured, semi-finished and final-use products which table XI indicates totalled US\$46 billion in 1982. Of this amount final-use products accounted for US\$40 billion or approximately 87% suggesting that the expansion of Latin America's consumption of its metals production would require massive investments in facilities for the manufacture of final-use products.

TABLE XI: 1986 LATIN AMERICAN IMPORTS OF MINERALS & METALS FROM OUTSIDE THE REGION (thousands of millions of dollars)

Minerals and concentrates	0.6
Metals	4.1
Semi-finished products	1.4
Final-use products	40.0

TOTAL	46.1

SOURCE: CEPAL REVIEW # 30, NEW OBJECTIVES FOR THE DEVELOPMENT OF MINING RESOURCES
ROLANDO SANZ GUERRERO, DECEMBER, 1986

Table XII provides the breakdown of individual country's share of these imports and indicates that Venezuela, Mexico and Brazil are the major importers accounting for over 71% of the total. These are followed by Colombia, Argentina and Peru which are at a much lower level.

TABLE XII: INDIVIDUAL COUNTRY SHARE OF 1986 LATIN AMERICAN MINERALS AND METALS IMPORTS (PERCENTAGES)

COUNTRY	MINERALS & CONCENTRATES	METALS	SEMI-FINISHED	TOTAL
ARGENTINA	0.5	4.1	1.6	6.2
BOLIVIA	---	0.5	0.2	0.7
BRAZIL	3.1	7.4	4.1	14.6
COLOMBIA	0.7	5.6	1.7	8.0
COSTA RICA	---	0.5	0.2	0.7
CHILE	0.4	0.9	1.1	2.4
ECUADOR	0.1	0.3	0.2	0.6
EL SALVADOR	0.1	0.3	0.2	0.6
GUATEMALA	---	1.2	0.5	1.7
HONDURAS	---	0.4	0.2	0.6
MEXICO	4.2	17.9	6.0	28.1
NICARAGUA	---	0.5	0.2	0.7
PARAGUAY	---	0.1	0.2	0.3
PERU	0.2	2.4	1.4	4.0
URUGUAY	0.1	0.2	0.1	0.4
VENEZUELA	0.8	22.9	4.7	28.4
	----	----	----	----
TOTAL	10.2	66.7	23.1	100.0

SOURCE: CEPAL REVIEW #30, NEW OBJECTIVES FOR THE DEVELOPMENT OF MINING RESOURCES
ROLANDO SANZ GUERRERO, DECEMBER, 1986

The possibilities for expanded intra-regional trade and the financing implications thereof will be discussed later.

Of course, countries with major and well established automobile and consumer durables industries are in a position to greatly influence the future growth of nickel consumption. In this regard, the Brazilian steel industry has announced plans to double its capacity to 50 million tonnes per annum by the year 2000 while Mexico is also undertaking a programme to upgrade its industry. The automobile industries of Argentina, Brazil, Colombia and Mexico are well established and if operated at a large enough scale should be able to supply, on a competitive basis, a significant portion of the regional requirements for vehicles.

2.2.2 Ownership, Export Markets and Reserves.

The western world nickel industry is dominated by three major producers-Inco and Falconbridge of Canada and SLN of France. The USSR is a major producer, and exporter to the West. Table XXII below sets out the share of the major producers and ownership arrangements. The Regional industry has a mixture of foreign private, local private and state participation. The Cuban industry, which is the Region's largest producer, is state owned whilst in the Dominican Republic, Falconbridge of Canada owns 85.2% with the Government holding 10%.

The Colombian industry is jointly controlled by the government, Royal Dutch/Shell group and MA Hanna Company. The Guatemala facility (Exmibal), which is presently closed, is owned by INCO (80%) and MA Havana Co (20%) although the government had negotiated for transfer of 30% of Exmibal's equity to state ownership by 1988. The Brazilian enterprise, Moro do Miquel, is owned by the Anglo America Company. It should be noted that BP Mineracao has announced plans to establish a facility of 10,000 tons per year of nickel metal in Minas Gerais [8].

[8] See Metal Bulletin, January 25, 1988 p.7

TABLE XXII: WESTERN WORLD REFINED NICKEL PRODUCERS

COMPANY	COUNTRY	PRODUCTION (Ni CONTENT) SHARE OF WESTERN WORLD TOTAL				CONTROLLED By
		1985		1986		
		kt	%	kt	%	
Inco	Canada, UK	152	30	162	32	
Falconbridge	Indonesia Canada, Norway, Dominican Republic	95	18	91	18	Placer Dome
Sie Le Nickel	New Caledonia France	53	10	51	10	French State
Suwayama	Japan	33	6	33	6	
Sherritt Gordon	Canada	18	4	24	5	Newmont, AAC
Western Mining	Australia	25	5	21	4	
Cerro Matoso	Colombia	11	2	19	4	Shell Colombian State
Gutokumpu	Finland	26	3	18	4	
Pacific Metals	Japan	15	4	15	4	
Rustenberg	South Africa	12	2	12	2	AAC
Bindura	Zimbabwe	11	2	11	2	
Impala	South Africa	10	2	10	2	Gencor
Larco	Greece	16	3	10	2	Greek State
Nippon Yakin	Japan	11	2	9	1	
Locantins		10	2	10	2	Votorantim
Morro do Niquel	Brazil	5	1	7	1	AAC
Nippon Mining	Japan	9	2	7	1	

COMPANY	COUNTRY	TOTAL				CONTROLLED BY
		1985	1986			
		kt	z	kt	z	
Kesovo	Yugoslavia	3	1	5	1	Yugoslav State
Aneta Tambung	Indonesia	5	1	4	1	Indonesia State
Hanna	USA	4	1	---	---	
Western Platinum	South Africa	2	0	2	0	Lonbro
		---	---	---	---	
		525	100	520	100	

SOURCE: FALCONBRIDGE AND THE INTERNATIONAL NICKEL INDUSTRY.
RAW MATERIALS GROUP
FEBRUARY, 1988

BRAZIL MINERAL FOR EXPORT, MARCH 1988.

By controlling the ownership and management of the Dominican Republic's industry Falconbridge Limited of Toronto controls the country's ferronickel production which it supplies to markets principally in the US, Japan and Europe. The Cuban industry on the other hand is state owned and reportedly exports about 50% of its production mainly in the form of NiCo precipitate to the USSR and other CMEA countries whilst the balance of its output is exported in the form of refined Nickel and Nickel briquettes mainly to Western Countries.

Colombia's production is exported in the form of ferronickel to markets in Europe, North America and India. Table XXIII shows its importance to the country's export earnings.

TABLE XXIII: COLOMBIA'S MINERAL-RELATED EXPORTS

COMMODITY	(US\$M)			
	1983	1984	1985	1986
Crude Oil	--	--	--	320
Fuel Oil	378	444	407	284
Coal	29	59	151	224
Ferronickel	56	81	53	63
Cement	34	38	46	43
Emeralds	33	31	25	34
	-----	-----	-----	-----
Total	530	635	682	968
Total Exports	3.176	3.469	3.763	5.008

SOURCE: VOL. III MINERALS YEARBOOK 1986, US BUREAU OF MINES.

As previously mentioned Brazilian production is almost entirely dedicated to meeting the requirements of the domestic market.

In terms of ore reserves, the Latin American Region (Cuba, Dominican Republic, Brazil, Colombia, Guatemala) possesses demonstrated nickel reserves of over 10 million tonnes (Ni content) compared to a western world total of over 64 million tonnes and therefore accounts for over 16%. Tables XXIV and XXV provide individual Latin American country reserves and world reserves by regions. These estimates suggest that Latin America has the fourth largest, ahead of Africa and Western Europe.

TABLE XXIV: NICKEL RESERVES OF THE LATIN AMERICAN REGION
(TMT) JANUARY, 1985

COUNTRY	RECOVERABLE NICKEL	Z
Brazil	4,267	41
Cuba	2,200	40
Colombia) 1,952	
)	
Dominican Repub.)	
)	
Guatemala)	19
	-----	---
	10,419	100

SOURCE: AN APPRAISAL OF MINERALS AVAILABILITY FOR 34
COMMODITIES, US BUREAU OF MINES, BULLETIN 692, 1987

Given the Region's low level of nickel consumption and its relatively large share of world reserves it obviously possesses the base to expand consumption provided enterprises for manufacturing the intermediate and final-use products can be established.

TABLE XXV: WORLD NICKEL RESERVES - JANUARY 1985 (tmt)

REGION	RECOVERABLE NICKEL	Z
Africa	3,989	5.1
South West Pacific	37,182	47.0
Western Europe	2,340	3.0
Latin America (Including Cuba)	10,419	13.0
North America	14,912	19.0
Eastern Europe (Mainly USSR)	10,000	13.0
	-----	----
	78,296	100.0

SOURCE: AN APPRAISAL OF MINERALS AVAILABILITY FOR 34
COMMODITIES, US BUREAU OF MINES BULLETIN 692, 1987

The International Political Economy of Cuban
Nickel Development. Theodore H. Moran, Johns
Hopkins School of Advanced International
Studies, 1976.

3.0 Structure of Production of the Aluminium and Nickel Industries in the Caribbean Area

3.1 Overview of the Caribbean Aluminium Industry

The Caribbean area became involved in the world aluminium industry with the commencement of bauxite production in British and Dutch Guiana in 1917 and the early 1920s respectively and up to the 1970s produced a significant portion of world requirements of bauxite and alumina. This development was in keeping with the emergence of North America and especially the USA after the Second World War, as the major producer and consumer of the metal.

Alcoa through the establishment of the Demerara Bauxite Company (DENBA) in the 1890s, was the first of the North American transnationals to start operations in the area with production commencing in British Guiana in 1917.

Subsequently, in the period of rapid economic expansion starting in the late 1940s, Alcan, Reynolds and Kaiser joined Alcoa in exploring and developing bauxite deposits in the Caribbean territories of Jamaica, Guyana, Suriname, Dominican Republic and Haiti. In fact, bauxite production from the Area (Guyana and Suriname only) which stood at 264,000 tons or 19.1% of world production in 1925 rose to 1.36 million tonnes or 36.7% by the end of World War II. With the continued expansion of production from the Guianas and the emergence of Jamaica, Dominican Republic and Haiti starting in the early 1950s, the region's share of world bauxite production increased further to 54.9% by 1958. In fact, both Suriname and Jamaica at various times occupied the position of the world's leading producer.

Table XXVI below sets out a summary of Caribbean bauxite production.

TABLE XXVI: CARIBBEAN BAUXITE PRODUCTION (000 TONNES)

YEAR	PRODUCTION	% OF WORLD PRODUCTION
1940	1,250	28.8
1945	1,361	36.7
1950	3,690	43.8
1955	9,412	52.3
1958	11,713	54.9
1960	12,456	45.1
1965	16,248	43.6
1970	24,192	40.2
1975	21,266	28.1
1980	19,695	21.6
1985	12,130	14.2
1986	12,769	15.1
1987	12,534	15.3

SOURCE: IBA, JBI, WORLD METAL STATISTICS

Starting with Alcan in Jamaica, North American transnationals had also moved to establish alumina refineries and smelters in the region. These investments were undertaken during the period of rapid economic expansion in the 1950s and 1960s when aluminium demand was growing at 8-10% per annum and also in response to attractive investment incentives from host governments, as well as the INCS drive to control bauxite resources. The economies of the countries involved (Jamaica, Guyana, Suriname and to a lesser extent Mexico) were stimulated by these major investments which contributed significantly to their GDP growth as well as to foreign exchange earnings. By the mid 1970s alumina refinery capacity had reached 4.88 million tonnes with 3.2 million tonnes of that located in Jamaica. Smelter capacity of 105,000 tonnes in Suriname (60,000 tonnes based on hydro-electric power) and Mexico (45,000 tonnes geared to meeting the local market) represented the Area's limited metal capacity.

Tables XIVII (a) and XIVII (b) below show the Caribbean's share of world alumina production in the period 1960-1987 and Caribbean Bauxite production, between 1970 and 1987, by country.

TABLE XIVII (a): WORLD PRODUCTION OF ALUMINA

YEAR	WORLD (TMT)	AUSTRALIA %	CARIBBEAN %	BRAZIL %	USA %	CANADA %	WESTERN EUROPE %
1960	9,132	0.3	7.4	0.4	38.5	11.0	8.6
1965	13,388	1.5	8.1	0.4	37.8	6.1	7.8
1970	21,198	10.1	14.5	0.6	28.5	5.2	12.4
1975	26,680	19.2	13.9	1.0	19.2	4.3	14.7
1980	34,737	20.9	11.9	1.7	22.2	3.5	16.0
1981	33,815	20.9	11.7	1.5	18.3	3.6	17.8
1982	29,677	22.3	9.8	1.9	14.4	3.8	18.7
1983	31,147	23.2	11.6	2.0	13.5	3.6	17.3
1984	35,283	24.9	11.6	2.5	13.4	3.2	18.3
1985	34,007	25.8	11.8	3.3	10.9	3.0	17.7
1986	34,708	27.1	12.5	3.4	9.6	3.5	17.8
1987	35,500	28.5	12.1	3.6	11.1	2.9	17.5

TABLE XVII (b) : CARIBBEAN BAUXITE PRODUCTION
('000) 1970-1987

YEAR	TOTAL	HAITI	D.R.	SURINAME	GUYANA	JAMAICA
1970	24,196	673	1,086	6,011	4,418	12,010
1975	21,268	522	785	4,751	3,830	11,380
1979	21,070	518	524	4,769	3,354	11,905
1980	19,695	477	510	4,893	1,837	11,978
1981	18,305	488	405	4,125	1,681	11,606
1982	13,407	431	152	3,060	1,430	8,334
1983	12,267	--	--	2,973	1,791	7,683
1984	15,146	--	--	3,375	3,036	8,735
1985	12,130	--	--	3,738	2,153	6,239
1986	12,769	--	--	3,731	2,074	6,964
1987	12,534	--	496	2,800	2,074	7,660

SOURCE: WORLD METAL STATISTICS, JBI, IBA

As was stated earlier the Caribbean industry is dominated by North American transnationals who owned and controlled all of the bauxite mining and alumina refinery operations up until the mid 1970s when first Guyana and then Jamaica sought to participate in the ownership. In the case of the smelter facility in Suriname, ownership is wholly in the hands of Alcoa whilst in Mexico majority ownership in the Vera Cruz smelter, established in 1963, was held by Alcoa until recently with local Mexican interests holding a minority share.

These companies therefore control production and exports thus reaping most of the profits from the exploration of bauxite resources. Furthermore, the operations in the Area are integrated into the worldwide systems of the parent companies with minimal linkages being established with local economies.

In the era of the post 1973 energy crisis, there has been a significant decline in production of both bauxite and alumina. Total bauxite production fell from approximately 27.56 million tonnes in 1974 to 12.534 million tonnes in 1987 moving from 28.1% of world production in 1975 to 15.3% in 1987. The relative decline of its traditional market, the USA, as an aluminium producer especially over the last decade, the expansion of Western Europe's output and the development of

Australia as the major producer of bauxite and alumina and also as an important producer of metal are major reasons for this shift.

Although Caribbean bauxite and alumina exports are geared principally to meet the requirements of TNC owned and operated refineries and smelters in North America and Europe to a much lesser extent the area also supplies bauxite to Venezuela and alumina to Brazil. With the coming on stream of the Interalumina refinery and the Bauxiven bauxite operations the possibility of Caribbean producers supplying Venezuela with alumina and bauxite has been severely restricted.

In fact, Venezuela has now become an alumina exporter. However, plans for large scale expansion of its aluminium industry in the 1990s are likely to present an opportunity for Caribbean producers to resume alumina exports at least for a period. Tables XXVIII present data on the exports of bauxite and alumina by the area and on exports to the Latin American Region.

TABLE XVIII

BAUXITE & ALUMINA EXPORTS BY MARKETS FROM THE CARIBBEAN FOR SELECTED YEARS

		(tct)												
I. BAUXITE		1970			1973			1980			1985			
YEARS	MARKETS	1	2	MARKETS	1	2	MARKETS	1	2	MARKETS	1	2		
JAMAICA	7,697	U.S.A.	100.0	5,483	U.S.A.	100.0	6,040	U.S.A.	100.0	1,340	U.S.A.	66.0	U.S.S.R.	34.0
GUYANA	363	U.S.A.	18.0	600	U.S.A.	33.0	585	U.S.A.	48.0	372	U.S.A.	19.0	U.S.S.R.	1.0
	2,317	Canada	73.0	919	Canada	51.0	347	Canada	29.0	398	Canada	23.0	U.S.S.R.	23.0
	172	Europe	8.0	220	Europe	12.0	247	Europe	20.0	387	Europe	34.0	U.S.S.R.	13.0
	32	Japan & Others	1.0	54	Japan & Others	3.0	30	Japan	2.0	223	U.S.S.R.	13.0	Japan	3.0
	3,004		100.0	1,793		100.0	1,209		100.0	133	Venezuela	8.0		
										1,718		100.0		
SURINAME	2,987	U.S.A.	92.0	1,087	U.S.A.	92.0	1,369	U.S.A.	94.0	136	U.S.A.	14.0	U.S.S.R.	1.0
	177	Canada	5.0	104	Canada	5.0	43	Canada	4.0	12	Canada	1.0	U.S.S.R.	1.0
	104	Europe	3.0	71	Europe	3.0	29	Europe	2.0	13	Europe	1.0	Venezuela	83.0
	3,268		100.0	2,062		100.0	1,441		100.0	941		100.0		
DOMINICAN REP.	923	U.S.A.	100.0	949	U.S.A.	100.0	565	U.S.A.	100.0	6	U.S.A.	100.0		
HAITI	627	U.S.A.	100.0	503	U.S.A.	98.0	452	U.S.A.	100.0	-	-	-		
				11	Europe	2.0								
				314		100.0								
II. ALUMINA														
JAMAICA	1,633	N. America	60.0	904	N. America	34.0	653	N. America	27.0	998	N. America	62.0	U.S.S.R.	38.0
	6	L. America	0.3	23	L. America	1.0	56	L. America	2.0	-	-	-	U.S.S.R.	1.0
	376	Europe	34.0	1,302	Europe	53.0	1,204	Europe	54.0	487	Europe	36.0	U.S.S.R.	1.0
	79	Africa	5.0	97	Africa	4.0	106	Africa	8.0	135	Africa	8.0	U.S.S.R.	0.6
	19	U.S.S.R.	1.0	145	U.S.S.R.	6.0	211	U.S.S.R.	9.0	-	-	-	U.S.S.R.	0.1
	3	Local & Hyd.	0.2	1	Local & Hyd.	0.0	2	Local & Hyd.	0.0	2	Local & Hyd.	0.1		
	1,716		100.0	2,374		100.0	2,394		100.0	1,622		100.0		
SURINAME	314	U.S.A.	42.0	442	U.S.A.	42.0	229	U.S.	22.0	276	U.S.A.	22.0	U.S.S.R.	34.0
	34	Canada	5.0	-	Canada	-	-	-	-	435	Europe	34.0	U.S.S.R.	5.0
	400	Europe	53.0	605	Europe	57.0	817	Europe	78.0	124	Netherlands	26.0	U.S.S.R.	15.0
	748		100.0	7	Japan	1.0	-	-	-	169	Brazil	15.0		
				1,054		100.0	1,046		100.0	1,264		100.0		
GUYANA	35	U.S.A.	12.0	26	U.S.A.	5.0	6	U.S.A.	5.0	-	-	-		
	91	Canada	31.0	24	Canada	6.0	104	Europe	95.0	-	-	-		
	169	Europe	57.0	138	Europe	34.0	-	-	-	-	-	-		
	293		100.0	106	Other	25.0	110		100.0	-	-	-		
				121	U.S.S.R.	30.0	-	-	-	-	-	-		
				409		100.0	-	-	-	-	-	-		

SOURCE: IDA Quarterly Reports
TRADE REPORTS
METAL STATISTICS

Of special note is the fact that in 1985 83% of Suriname's bauxite exports were supplied to Venezuela and 13% of its alumina exports were destined for Brazil.

3.1.1 Structure of Jamaica's bauxite-alumina industry

3.1.1 (a) Bauxite and Alumina Production

Production of bauxite commenced in Jamaica in 1952 by Reynolds as a source of supply for its US facilities while Alcan started alumina production at its Kirkvine refinery later in the same year. These companies were followed by Alcoa and Kaiser which exported bauxite to US plants and subsequently in the latter 1960s and early 1970s. established alumina operations at Alpart (joint venture with Kaiser, Reynolds and Anaconda) and at Halse Hall (Alcoa).

Alcan established a second alumina refinery in 1959 at Ewarton. In the early 1970s Revere Copper and Brass also established a refinery at Maggottv. Table XXIX sets out Jamaica's bauxite and alumina production over the 1952-87 period. Production of bauxite expanded rapidly up to early 1970s and in fact by 1957 the island became the world's leading producer holding this position until 1971 when it was overtaken by Australia.

TABLE XXIX: JAMAICA'S BAUXITE AND ALUMINA PRODUCTION 1952-87 (TMT)

YEAR	BAUXITE PRODUCTION	% OF WORLD PRODUCTION	ALUMINA PRODUCTION	% OF WORLD PRODUCTION
1952	346	2.8	--	--
1953	1,173	8.5	29	n.a.
1954	2,077	12.8	109	n.a.
1955	2,688	14.9	187	n.a.
1956	3,192	16.8	217	n.a.
1957	4,669	22.7	443	n.a.
1958	5,814	27.2	379	n.a.
1959	5,208	22.6	406	n.a.
1960	5,872	21.3	676	7.4
1961	6,616	22.6	715	n.a.

Cont'd.

YEAR	BAUXITE PRODUCTION	% OF WORLD PRODUCTION	ALUMINA PRODUCTION	% OF WORLD PRODUCTION
1962	7.706	24.7	638	n.a
1963	7.078	23.2	737	n.a
1964	7.828	23.6	781	n.a
1965	8.722	23.4	732	5.5
1966	9.062	22.1	804	5.4
1967	9.396	20.7	838	5.0
1968	8.526	18.0	922	5.3
1969	10.499	18.9	1,156	5.9
1970	12.010	21.0	1,716	8.1
1971	12.440	18.6	1,812	7.4
1972	12,539	17.7	2,137	8.9
1973	13.646	18.2	2,417	8.3
1974	15,166	18.1	2,806	9.6
1975	11,380	14.8	2,375	8.9
1976	10,296	12.8	1,1623	5.8
1977	11,434	13.4	2,036	7.0
1978	11,736	13.9	2,142	6.9
1979	11,905	13.1	2,074	6.4
1980	11,978	13.1	2,395	6.9
1981	11,606	13.2	2,550	7.4
1982	8,334	10.8	1,758	5.9
1983	7,683	9.7	1,907	6.1
1984	8,735	9.4	1,713	4.8
1985	6,239	7.0	1,622	4.8
1986	6,964	7.6	1,586	4.6
1987	7,660	9.0	1,572	4.4

SOURCE: JBI, WORLD METAL STATISTICS, METALLGESSELLSCHAFT,
IBA.

The companies control of the industry extended to the ownership of large acreages of land with bauxite reserves, and ports. There was no participation in ownership by the local private sector or the state and the industry operated more or less like an enclave i.e. directly importing virtually all of its raw materials and exporting all of its production. Jamaican input was limited to labour, minor services, rail (some), transportation and miscellaneous supplies. Local earnings from the industry were therefore limited to wages and government taxes. Table XIX provides data on Jamaica's earnings from the industry indicating the low level of returns to the economy especially before 1974. On production of over 13 million tonnes of bauxite in 1973 the tax revenues amounted to US \$24 million or just about \$1.75 per tonne.

TABLE XIX : REVENUES FROM THE JAMAICAN BAUXITE/ALUMINA INDUSTRY (US\$M)

YEAR	TAX AND/OR LEVY
1972	19
1973	24
	Levy Regime
1974	180
1975	150.5
1980	205.7
1985	70.6
1986	72
1987	94

SOURCE: JBI

Taxes proved extremely difficult to assess as it was impossible to determine either the value of the bauxite mined or the profit of the companies in its extraction. This was due to the vertically integrated structure of the companies where prices paid to subsidiaries for bauxite or alumina were not related to any market price. Hence taxes had to be based on assumed profits. This situation was reversed by the imposition in 1974 of a production levy indexed to primary aluminium ingot prices.

The introduction of the production levy was part of a new set of policies on the industry which included the re-acquisition of bauxite lands (over 130,000 acres) with the government owning the lands and thus controlling the allocation of reserves; equity participation in the bauxite mining operations of Kaiser and Reynolds and the alumina refineries of

Alcan and Alcoa and the establishment of state enterprises to manage the equity investments (Jamaica Bauxite Mining Limited), market the share of bauxite and alumina production derived from the joint venture operations (Bauxite and Alumina Trading Company) and carry out research into the technological and economic aspects of the industry (Jamaica Bauxite Institute). Hence, after 1974, the ownership arrangements in the industry were modified with the state now playing a vital if not controlling role. These new arrangements are reflected in Table XXXI which sets out data on capacity, ownership and location of individual bauxite mining and alumina operations.

TABLE XXXI: BAUXITE AND ALUMINA OPERATIONS IN JAMAICA (1980)
TMT

Bauxite Mining	Capacity	Ownership
1. Kaiser Jamaica Bauxite Ltd., Discovery Bay, St. Ann	3,650	51% Ja. Govt. 49% Kaiser
2. Reynolds Jamaica Bauxite Ltd, Lynford, St. Ann	2,800 (1)	51% Ja. Govt. 49% Reynolds
Alumina Refineries		
1. Jamalcan:		
Kirkvine) Ewarton)	1,100	93% Alcan 7% Ja. Govt.
2. Jamalco (2)	800	5% Ja. Govt. 94% Alcoa
3. Aloart (3)	1,200	50% Kaiser 50% Reynolds

SOURCE: JBI

(1) Closed in 1984

(2) Now JAMALCO with 50% Alcoa and 50% Government of Jamaica participation.

(3) Formerly owned by Kaiser, Reynolds, Anaconda with Anaconda being replaced by Atlantic Richfield in 1976. Closed since 1985.

As earlier mentioned the 1973 and 1979/80 oil shocks adversely affected the worldwide aluminium industry but the effects on energy dependent producers such as Jamaica were even more pronounced. Jamaica is 97% dependent on imported fuel oil for

its energy needs and consequently the production costs of bauxite and especially alumina increased sharply as result of the massive movements in oil prices.

This factor together with the diversification of the aluminium industry as a result of emerging competitive producers in Australia and Brazil, the maturation of the US industry, and the response of the TNCs to the imposition of the bauxite levy resulted in a decline in bauxite production after 1974 which was even more pronounced after the second oil shock of 1979/80 and the recession of 1982. Table XIII provides data on oil use in the Jamaican alumina industry for the period 1974-83.

Following the closure of Revere's alumina plant in 1975 and cutbacks in production by all the companies firstly, the mining operations jointly owned by Reynolds and the Jamaican Government (the output of which had continued to be supplied to Reynolds' system); and subsequently the Alcoa and Alpart refineries were closed in 1984 and 1985 respectively. The Alcoa refinery in which the Government held a small equity was later leased by Clarendon Alumina Production Limited (CAP), a state-owned company, and successfully operated until early 1986 when a new joint venture agreement for 50:50 ownership by CAP and Alcoa was signed. Interestingly, in spite of Alcoa's claim of being unable to find markets for the plant's alumina, CAP was able to operate it at full capacity (as against 50% utilization previously by Alcoa) up to the introduction of the new agreement.

A Venezuelan supply contract for alumina together with, first, alumina supply arrangements and then a long term bauxite supply contract with the USSR, commercial contracts for the disposal of alumina from CAP and various barter arrangements have increased the share of exports handled by the state sector.

Thus, in spite of the closures, the marketing efforts of the state sector have provided some new opportunities to partly offset the general decline.

TABLE XXXII: OIL USE BY JAMAICAN ALUMINA OPERATIONS

Year	Oil consumption barrels/tonne alumina	Fuel Oil Price US\$ per barrel	Avg. cost per alumina US\$ /Tonne
1974	3.6	9.55	34.38
1975	3.4	9.82	33.39
1976	3.5	9.94	34.79
1977	3.4	11.69	39.75
1978	3.2	11.60	37.12
1979	3.3	15.36	50.69
1980	3.2	23.26	74.43
1981	3.1	27.05	83.86
1982	3.0	24.70	74.10
1983	2.8	25.20	70.56

SOURCE: KEY DEVELOPMENTS IN TRENDS IN THE WORLD
BAUXITE/ALUMINIUM INDUSTRY BY C.E. DAVIS, CAPITAL METALS
FORUMS, MARCH 1984.

3.1.1 (b) Export Markets and Policies for Development of
Complementarities

Prior to the policy initiatives of 1974, the entire production of bauxite and alumina was disposed of by the TNCs to North America, Western Europe and to a lesser extent, Latin America.

Data in Table XIV shows that up to the early 1980s all of Jamaica's bauxite exports and 62% of its alumina went to the USA.

With the direct involvement of the state sector in the ownership of the industry attempts have been made to diversify the markets for bauxite and alumina. In the recent past Jamaica has supplied 900,000 tonnes of alumina to Venezuela under a long term contract (1977-86). Alumina supplied by Reynolds (from ALPART or Corpus Christi which was partly based on Jamaican bauxite) was also supplied to Alcasa. Starting with the initiatives to establish a joint venture alumina refinery and aluminium smelting operations between Jamaica, Mexico and Venezuela on the one hand and Jamaica, Trinidad and Tobago and Guyana on the other, a number of feasibility and engineering studies were conducted in the 1970s. These initiatives included:

- i) JAVEMEX - announced by the parties in 1974 as a joint venture alumina refinery of 600,000 tonnes to be located in Jamaica with majority ownership by the Jamaican government and minority holdings by Mexico and Venezuela. The refinery would supply the alumina requirements for the expanding Venezuelan smelter capacity and for a jointly owned smelter in Mexico;
- ii) JALUMEX - announced in 1974 as a joint venture aluminium smelter of 150,000 tonnes to be located in Mexico primarily to supply the domestic market and the requirements of the Caribbean and Latin America.
- iii) Caribbean Regional Smelter - conceived in 1974 as a joint venture smelter of 120,000 tonnes to utilize Jamaican and Guyanese alumina and electricity based on Trinidadian natural gas. The smelter project was aimed at increasing the value-added of the raw materials to be supplied by the partners and form the basis for launching the Caribbean's thrust in the downstream activities of the aluminium industry.

The economic difficulties affecting the Mexican and Jamaican economies in the late 1970s eventually led to the abandonment of the JAVEMEX and JALUMEX projects, whilst disagreements amongst the Caribbean countries also led to the demise of the Regional Smelter project.

Nevertheless, Jamaica and Venezuela arrived at the arrangements mentioned above for Jamaica to supply alumina over a seven (7) year period to meet part of the requirements of the newly established VENALUM smelter.

The initiatives undertaken by the political leadership of the countries mentioned had anticipated a much wider range of co-operation and integration of the industry involving:

Joint Caustic Soda Production

Due to the scale of the alumina industry the region is a large consumer of caustic soda. Caustic soda prices and availability fluctuate widely depending on the demand by the petrochemical industry. Hence production costs and output are adversely affected in periods of caustic soda shortage. Given the region's possession of well developed and large scale petrochemical industries in

Mexico, Venezuela and Trinidad and Tobago and the competitive advantages enjoyed in electricity prices it was considered logical that these complementarities could be exploited to the advantage of all the countries:

Joint Semi-Fabrication Facilities

With the comparative advantage in energy cost enjoyed by Venezuela and the then growing Mexican market for aluminium it was felt that the Region could expand its downstream fabricating facilities in Mexico, Venezuela and possibly Trinidad on the basis of supplying the Mexican, Central American, South American and Caribbean markets with the surplus being exported at competitive prices to North America and Western Europe. Of course, this idea was conceived at a time of relatively strong growth in GDP in all these regions and with aluminium enjoying a high income elasticity in all regions of the world (1960-70 : 2, 1970-80 : 1.75, 1980-90 (estimated) : 1.5).

The developments of the 1980's in terms of the fall in Jamaica's output of bauxite and alumina, and the recession in the worldwide industry - including the relative unprofitability of aluminium (up to 1986) - have deeply affected production and the foreign exchange earnings from the industry and emphasises further the need for diversification of markets.

Further, in view of the energy constraint faced by Jamaica it is imperative that the option of forward integration with partners having the available energy resources and markets necessary for linkage and downstream activities be considered. This issue will be addressed in a later section.

3.1.1 (c) Semi-Fabrication Industry and Consumption

The island possesses an extrusion plant which is fully owned and operated by Alcan. It has a rated capacity of 4,300 tonnes and produces a range of products for the domestic and regional markets. The plant produces material for windows, door frames, roofing, siding and guttering. Table XXXIII below provides export data for the period 1982-87.

TABLE XXXIII: JAMAICA'S EXPORTS OF EXTRUDED ALUMINIUM PRODUCTS
(1982-87)

Year	Quantity (tonnes)
1982	1,238
1983	1,174
1984	912
1985	794
1986	782
1987	808

SOURCE: ALPROJAM, JAMAICA

As part of its strategy for downstream development in the aluminium industry, the Jamaican government in the 1970s considered the establishment of a 10,000 tonne per annum rolling mill to service the domestic and regional markets. Market surveys carried out for the proposed project showed local consumption of aluminium as follows:

YEAR	AMOUNT
1978	3,996 mt
1979	4,259 mt
1980	4,537 mt
1981	4,833 mt
1982	5,486 mt
1983	5,845 mt

SOURCE: JBI

Due to the large size of the capital investment the project was not implemented. However, the economic assessment showed that the project could have been operated on a profitable basis. In fact, interest is being shown, once again, by local private sector groups. The present proposal is based on a 20,000 tonne capacity casting, rolling and finishing facility together with 15,000 tonnes paint line and foil facility at a total cost of approximately US\$79 million [9] . In addition to the regional

[9] Source: JBI.

markets. it is proposed that the US market be considered on the basis of US equity investment linked to a long term contract for offtake of fabricated products.

3.1.2 Structure of Dominican Republic's Aluminium Industry

3.1.2 (a) Bauxite Production

Bauxite mining is the only stage of the bauxite/alumina/aluminium industry that exists in the Dominican Republic. Production was started in 1959 by Alcoa with all bauxite being shipped to the company's alumina plant at Point Comfort, Texas and at one stage accounted for 10% of Alcoa's worldwide production [10]. Mining ceased in 1982 when the company closed its operations claiming that market conditions in the aluminium industry made the operations uneconomic and that there was a surplus of bauxite on the market. The country possesses reserves of approximately 30 million tonnes and formerly supported operations with a capacity of 1.425 million tonnes from mines at Las Mercedes and Aceidillar. Table XXXIV shows the level of output over the 1960-82 period. The destination of bauxite exports was earlier shown in Table XXV.

TABLE XXXIV: BAUXITE PRODUCTION OF THE DOMINICAN REPUBLIC
1960 - 87 (tat)

YEAR	PRODUCTION
1960	689
1965	942
1970	1,090
1971	1,332
1972	1,036
1973	1,146
1974	1,477
1975	910
1979	524
1980	511
1981	410

YEAR	PRODUCTION
1982	152
1983-86	---
1987	324

SOURCE: JBI. WORLD METAL STATISTICS. IBA, BANCO CENTRAL DE LA REPUBLICA DOMINICANA

Mining of bauxite was resumed in 1987 by Ideal Dominicana, a local private sector company, which has taken over the former Alcoa operations. Production was estimated at 324,000 tonnes in 1987 and is projected to reach 450,000 tonnes in 1988 [11]. In 1987, 75% of the output was exported to Suriname to Alcoa's SURALCO plant to meet a shortfall arising from cutbacks in bauxite production as a result of political disturbances. The remainder was exported to the US market.

With the increased demand for aluminium in 1987 and 1988 and the consequent pressure on alumina supplies, it is expected that the market could support bauxite exports at the present level over the near term. In addition, the export price (f.o.b.) quoted by official sources (US\$12.52 per tonne) is highly competitive under present conditions. Given the country's relatively limited reserves, production is likely to continue at the projected 1988 level but the earlier idea of establishing an alumina plant is not now considered feasible.

3.1.2 (b) Aluminium Consumption

The Dominican Republic imports all of its unwrought aluminium and semi-fabricated products and virtually all of its finished products.

In 1980 imports of these items amounted to US\$11.9 Million but appears to have fallen to less than US\$7 million by 1985. This trend is in keeping with the overall decline experienced in the economy over that period but with improvements in exports and the overall macro-economic situation since 1986 it is anticipated that aluminium consumption, as reflected in the imports of unwrought aluminium and aluminium semi-finished and finished goods, will show increases over the near term. Table XXXV indicates the level of imports of the various products in the periods for which data is available.

[11] Banco Central De La Republica Dominicana.

TABLE XXIV: IMPORTS OF ALUMINIUM BY THE DOMINICAN REPUBLIC
FOR SELECTED YEARS (\$000)

Year	Unwrought Aluminium	Semi- Manufactures	Finished Products
1980	3,204	5,940	2,771
1983	n.a	3,806	1,154
1985	1,662	n.a	n.a

SOURCE: UNCTAD

The major items of semi-manufactured imports included plates, sheets and strips, foil, and tubes, pipes and hollow bars. The finished products included wire, cables and ropes, casks, drums and finished structural parts. The major sources of imports were the EEC, USA and Canada. The country also imported significant amounts of unwrought aluminium mainly from the USA and Venezuela. This product is used by numerous small foundries to manufacture finished products.

3.1.3 Structure of Haiti's Aluminium Industry

3.1.3 (a) Bauxite Production

Bauxite deposits were discovered in Haiti in 1944 by Reynolds Metals Company only three miles from a sea port. Although the government granted the company a sixty year mining concession in 1944, production did not commence until 1957 [12]. All output was exported to the USA to supply Reynolds' Corpus Christi alumina refinery in Texas. The mining operations at Miragoane had an installed capacity of 790,000 tonnes and achieved peak production of 700,000 tonnes in 1973.

The Haitian government instituted a bauxite levy regime, similar to Jamaica's, in 1974 and as a consequence tax payments increased from \$901,000 in 1973 to \$6,960,000 in 1974. Production declined subsequently from the 1973 high to 626,000 tonnes in 1974, recovered in 1976 and 1977 but fell consistently thereafter, ceasing in 1982. As in the case of Alcoa's closure in the Dominican Republic and Reynolds' departure from Jamaica the pull-out from Haiti was attributed to the economic downturn of the early 1980s and the uncompetitiveness of Caribbean bauxite as a result of the taxation policies pursued. There is no doubt that this was a contributory factor but a fuller analysis indicates that the Take and Pay or Take or Pay Contracts and Consortia

[10] Transnational Corporations in the Bauxite Industry of Caribbean Countries : CEPAL 13th August, 1979.

Arrangements entered into by these companies in Brazil, Guinea and Australia meant that with the downturn in the industry cuts in production had to be made elsewhere.

Bauxite mining was the only aspect of the industry undertaken in Haiti. Production figures for the 1958 - 82 period are provided in Table XXXVI below.

TABLE XXXVI : HAITI'S BAUXITE PRODUCTION FOR 1960 - 82 (tmt)

YEAR	PRODUCTION
1960	340
1965	382
1970	673
1971	764.5
1972	782.8
1973	700
1974	626
1975	522
1976	660.4
1977	685
1978	639
1979	560
1980	461
1981	539
1982	377

SOURCE: WORLD METALS STATISTICS, TRANSNATIONAL CORPORATIONS IN THE BAUXITE INDUSTRY OF CARIBBEAN COUNTRIES, CEPAL, AUGUST 13, 1979; METALLGESELLSCHAFT

At its peak Haitian bauxite accounted for 20% of the requirements of Reynolds' Corpus Christi alumina refinery and in 1967-68 represented 11.4% of the country's merchandise exports.

In discussions with officials of Haiti's Bureau of Mines and Energy it was reported that the Government and Reynolds Metals Company were still in dispute over the closure of the mining operations. The Government is maintaining that Reynolds violated the terms of the 1974 agreements between the parties

by breaching certain clauses on production and was therefore liable to pay compensation. Reynolds has reportedly offered to pay cash of US\$6 million and hand over all the mining assets and port facilities.

A former senior officer of Reynolds' Haitian operations who now works with the Bureau has indicated that the facilities could be rehabilitated and mining resumed as most of the equipment, the port and the power house are still in place. With bauxite reserves of some 10 million tonnes it should be possible, in the present market conditions, for an operation of 300-400,000 tonnes per annum to be sustained especially if shuttered alumina refineries in the USA are restarted and presently operating refineries are extended to full capacity. Of course, the export price would have to be competitive with Australian and Guinean material.

3.1.3 (b) Aluminium Consumption

Data on Haiti's imports and consumption of aluminium and aluminium products are extremely difficult to obtain. The major items include finished structural parts and structures for the construction industry and coil for local manufacture of pots and pans.

Haiti Metal, a local privately owned enterprise, has been in business for over thirty-five (35) years and fabricates pots and pans for the domestic market. It employs over three hundred (300) persons and imports about 200 tonnes of aluminium coils from Hong Kong, Taiwan and the USA.

3.1.4 Structure of Mexico's Aluminium Industry

3.1.4 (a) Aluminium Production

Primary Production

Mexico is the fourth largest producer of primary aluminium (13) (60,200 tonnes in 1957) and the second largest consumer (102,840 tonnes in 1957) of aluminium and aluminium products in the Latin American Region. It also produces a wide range of semi-fabricated and finished products. The country however does not possess commercial grade bauxite and imports all of its alumina requirements.

Production of aluminium commenced in 1963 with the coming on stream of a 45,000 tonnes smelter at Vera Cruz. This smelter was then majority-owned by Alcoa with Mexican private sector participation. The plant is based on the older Soderberg technology and power supplies are based on a combination of hydroelectric and thermal sources. Output is geared to the domestic market and has been consistently above 90% of rated

(13) Instituto Mexicano Del Aluminio, Grupo Aluminio S.A.

capacity. Capacity has been increased to 62,000 tonnes as of 1987 and the smelter has now been merged into the Grupo Aluminio conglomerate which has majority Mexican private sector ownership (58%) with Alcoa holding 42%. Grupo Aluminio also operates a recycling facility of 28,000 tonnes capacity which is the second largest in Latin America. Mexico's production statistics are set out in Table IV.

As mentioned in Section 3.1.1 (b) the Mexican and Jamaican governments of the 1970s had contemplated establishing a joint venture smelter to supply the Mexican domestic market and for export primarily to the Caribbean and other Latin American countries. This plan emerged at a time of significant growth in the consumption of aluminium. In fact, as Table XXVII shows, imports of primary aluminium started to exceed local production in 1979 and this trend continued until 1982 before being reversed by the economic difficulties of the period and also by the increased production of secondary metal from imported scrap.

With the expansion of smelter capacity, imports declined to 33% of domestic production in 1987 i.e. below the ratio for the 1972-87 period as a whole. Of course, the strengthening of the US dollar in the 1984-86 period was also an important factor as in 1985 the US accounted for over 40% of primary metal imports [14].

[14] U.S. Bureau of Mines, 1986 Minerals Yearbook.

TABLE XXXVII: MEXICO'S PRODUCTION AND IMPORTS OF PRIMARY ALUMINIUM 1978-87 (MT)

YEAR	PRODUCTION	IMPORTS	IMPORTS AS % OF PRODUCTION
1978	43,092	42,676	99
1979	43,196	65,285	151
1980	42,601	70,507	165.5
1981	43,237	67,571	156.3
1982	41,180	43,808	106.4
1983	39,706	17,517	44.1
1984	43,988	45,198	102.8
1985	42,743	78,729	184.2
1986	37,016	35,203	95.1
1987	60,200	19,904	33.1

SOURCE: INSTITUTO MEXICANO DEL ALUMINIO. A.C.

The smelter's alumina requirements are met entirely from Alcoa's Port Comfort refinery and are covered by a long term supply contract which expires in the early 1990s. The bulk of metal output is supplied to domestic fabricators some of which are owned by Grupo Aluminio.

A small but recently increasing, 16% in 1987, portion of metal is exported (Table XXXVIII) to the United States reflecting, inter-alia, the increasing competitiveness of the industry.

TABLE XXXVIII: MEXICO'S EXPORTS OF PRIMARY ALUMINIUM 1978-87 (MT)

YEAR	PRODUCTION	EXPORTS	EXPORTS AS % OF PRODUCTION
1978	43,092	3	--
1979	43,196	1	--
1980	42,601	24	--
1981	43,237	426	1.00
1982	41,180	229	0.56
1983	39,706	873	2.20

YEAR	PRODUCTION	EXPORTS	EXPORTS AS % OF PRODUCTION
1984	43.988	2.042	4.64
1985	42,743	5,030	11.76
1986	37.016	7.986	21.57
1987	60.200	9.7875	16.25

SOURCE: INSTITUTO MEXICANO DEL ALUMINIO. A.C.

Secondary Production

Recycling of aluminium is undertaken primarily by Grupo Aluminio using locally generated and imported scrap, mainly from the USA. Production statistics for secondary metal is contained in Table XXXIX which also includes data on imports of scrap metal. Production achieved a peak of 25,770 tonnes in 1982, approximately 63% of primary metal production but has since fallen to a historic low of 8,765 tonnes in 1987.

TABLE XXXIX: MEXICO'S PRODUCTION OF SECONDARY METAL AND IMPORTS OF ALUMINIUM SCRAP, 1978 - 87

YEAR	PRODUCTION OF SECONDARY METAL (MT)	IMPORTS OF SCRAP (MT)
1978	12,291	n.a
1979	14,921	n.a
1980	17,111	n.a
1981	20,341	n.a
1982	25,770	n.a
1983	15,122	n.a
1984	19,636	n.a
1985	22,078	42,999
1986	13,760	18,248
1987	8,765	10,981

SOURCE: INSTITUTO MEXICANO DEL ALUMINIO. A.C.
 DIRECCION GENERAL DE ESTADISTICA
 SECTORIAL e INFORMATICA
 SISTEMA DE ESTADISTICA DE
 COMERCIO EXTERIOR

The declining levels of secondary production and scrap imports reflect both Mexico's foreign exchange difficulties as well as the growing demand for scrap worldwide and hence its short supply and high price.

3.1.4 (b) Fabrication Industry

At the start of 1988 Mexico had installed semi-fabricated capacity of 168,500 tonnes. Table XXXX shows the breakdown between the various products - wire rod, rolled products (excluding foil), foil and extrusions and forgings. This capacity is exceeded only by Brazil and Venezuela in the Latin American Region.

TABLE XXXX: MEXICO'S SEMI-FABRICATED ALUMINIUM PRODUCTS
CAPACITY (000 MT)

	Mexico	Latin America
Total	168.5	1,123.0
% of L.A.	15	
Wire rod	8.2	336.5
% of L.A.	2.4	
Rolled Products	64.7	329.2
% of L.A.	19.7	
Foil	36.4	91.8
% of L.A.	39.7	
Extrusions & Forgings	58.2	343.5
% of L.A.	16.9	

SOURCE: INSTITUTO MEXICANO DEL ALUMINIO,
WORLD BANK, JBI.

Domestic fabrication of aluminium products peaked at 141,344 tonnes (84% of capacity) in 1985 of which 12% was exported. Production statistics for the 1978-87 period are set out in Table XXXXI below.

TABLE XXXI: PRODUCTION OF ALUMINIUM PRODUCTS BY MEXICO.
1978-87 (TONNES)

YEAR	TOTAL	SHEET & PLATE	FOIL	EXTRUSIONS	POWDER & PASTE	BARS FOR ELECTRICAL CONDUCTORS	CASTINGS
1978	87882	20915	5945	23993	515	13000	32903
1979	87524	23713	7763	31111	586	12900	47600
1980	141344	25140	8547	34413	1088	12742	47837
1981	109760	22941	8214	36284	1285	12400	50690
1982	77661	19336	8369	32093	583	6250	34995
1983	101626	14961	7724	17984	576	7800	28616
1984	131814	16615	6473	19989	879	19500	46304
1985	129767	19755	9945	27237	935	23230	60242
1986	123673	15694	8626	22629	833	13000	26742
1987	97271	15462	8478	20029	1180	14733	28100

SOURCE: INSTITUTO MEXICANO DEL ALUMINIO, A.C.

The data above shows that Mexico's production of aluminium products increased by approximately 36% between 1978 and 1981 boosted by the rapid economic expansion made possible by increased oil revenues earned in the period. Following the negative effects on the economy of the debt crisis the industry declined considerably with production falling to 101,626 tonnes in 1982 or by 23% and to 77,661 tonnes in 1983 representing a further decline of approximately 24%. Thereafter there was some recovery in line with the overall economic upturn achieving a peak production of 141,344 tonnes in 1985 before, once again, slipping dramatically to 87,524 in 1986, a fall of 38%.

Table XXXII contains data showing the relationship between GDP growth, growth in the main sectors and output of aluminium products and motor vehicles over the period, 1978-86. Construction and manufacturing registered the largest declines hence the drastic fall in the demand and output of sheet, plate and extrusions (see also table XXXVII above) which are directly related to the state of these sectors. The production of castings is especially closely related to the production of automobiles.

TABLE XXXII: MEXICO'S G.D.P GROWTH BY SECTORS AND OUTPUT OF ALUMINIUM PRODUCTS AND MOTOR VEHICLES (1978-86)

YEAR	Total GDP	Agri.	Mining	Manufact. (a)	Constr.	Motor Vehicles (units)	Aluminium (b) (mt)
1978	7.3	--	--	8.8	13.3	384,127	77.811
1979	8.0	-0.7	--	8.7	14.1	444,426	102,424
1980	7.4	5.3	--	5.6	12.8	490,006	107,390
1981	7.9	6.1	15.3	7.0	11.8	597,118	109,915
1982	-0.5	-0.6	9.2	-2.9	-5.0	472,637	86,424
1983	-5.3	2.9	-2.7	-7.3	-18.0	285,485	61,561
1984	3.7	2.5	1.8	4.8	3.4	367,996	82,908
1985	2.8	3.8	-0.7	5.8	3.0	458,690	107,234
1986	-3.8	-2.1	-5.8	-5.6	-9.1	341,052	65,065

(a) Excluding Petroleum & Petrochemicals

(b) Sheet, plate, extrusions and castings

SOURCE: ECONOMIC AND SOCIAL PROGRESS IN LATIN AMERICA, 1987 REPORT, INTER-AMERICAN DEVELOPMENT BANK, WASHINGTON, D.C. U.S.A.

DIRECCION GENERAL DE LA INDUSTRIA METAL, SECRETARIA DE COMERCIO Y FOMENTO INDUSTRIAL, MEXICO.

Imports of aluminium products increased dramatically (by 158%) in the 1978-81 period moving from 27,538 tonnes in 1978 to a record 70,995 tonnes in 1981 - more than four times the pace of domestic production. In keeping with the country's economic decline during the early 1980s, imports fell by 28.5% in 1982 to 50,730 tonnes and precipitously (approximately 88%) in 1983 to 6,212 tonnes before recovering to 25,717 in 1985 (below the 1978 level) and to 35,219 in 1987 after benefitting from the removal of import restrictions under Mexico's economic reform measures. Import statistics are set out in Table XXXIII.

TABLE XXXIII: IMPORTS OF ALUMINIUM PRODUCTS BY MEXICO,
1978-87 (TMT)

YEAR	Primary Metal	Semi- Fabricated	Finished Products	Total
1978	42676	24913	1062	68651
1979	65285	25627	1537	92449
1980	70507	33908	8534	112949
1981	65571	59958	14150	139679
1982	43808	45603	5137	94548
1983	17517	5574	638	23729
1984	45198	14335	965	60498
1985	78729	24287	1430	104446
1986	35203	18794	1819	55816
1987	19904	22323	12896	55123

SOURCE: INSTITUTO MEXICANO DEL ALUMINIO, A.C.

Production of semi-fabricated and finished products is carried out mainly by Grupo Aluminio, Reynolds Aluminio, Aluminio Conesa, Cuprum and a number of other relatively small operators. A full list of the companies, their location and capacity is contained in Table XXXIV. Grupo Aluminio fabricates over 2,750 semi-finished and finished products 50% of which are supplied to the construction sector, and 20% to the transportation sector with Volkswagen and Nissan being the major consumers. The raw material for beverage can production is met exclusively from imported sheet (approximately 14,000 tonnes in 1986).

TABLE XXXIV: MEXICO'S FABRICATION FACILITIES BY PLANT

COMPANY	LOCATION	AFFILIATION	TYPE	CAPACITY (TNT)
Alcomex	Ticomán	Alcoa	EXT	8.0
Alaexa-Aluminio	Puebla	Alusa (Grupo Aluminio)	CR	5.9
Alumexa-Aluminio	Puebla	Alusa (Grupo Aluminio)	EXT	6.0
Alu Mexsa	Naucalpan	Grupo Aluminio	EXT	9.5
Alu Mexsa	Tlalnepantla	Grupo Aluminio	Foil	24.0
Alu Mexsa	Tulpetlac	Grupo Aluminio	Powder	1.0
Alu Mexsa	Tulpetla	Grupo Aluminio	HR/CR	8.7
Aluminio Laminado	Tultitlan		HR/CR	35.0
Aluminio SA de CV	Vera Cruz	Alusa	Rod	7.2
Conalum	Puebla		Rod	1.0
Conesa- Nac. de Extr.	Guadalajara/ Jalisco		EXT	3.9
Cuptum	Monterrey		EXT	12.0
Fxal	Monterrey		EXT	2.0
Indalum			EXT	5.0
Lam. Mex. de Metals	Monterrey		CR	4.0
Laminadora de Aluminio	Quantitlan		HR/CR	7.2
Metals Extruidos	S- Nicolas		EXT	4.0
Reynolds Aluminio	Tlalnepantla	Reynolds	HR/CR	3.9
Reynolds Aluminio	Tlalnepantla	Reynolds	Foil	12.4
Reynolds Aluminio	Tlalnepantla	Reynolds	EXT	3.0

Cont'd.

COMPANY	LOCATION	AFFILIATION	TYPE	CAPACITY (TMT)
Tubos y Perfiles Hall	Mexico City		EXT	0.8
Valsa - Consortia Ind.	Mexico City		EXT	2.0
Zinc Industrial	Mexico City		EXT	2.7

SOURCE: GRUPO ALUMINIO, INSTITUTO MEXICANO DEL ALUMINIO,
A.C., HUNTER ENGINEERING COMPANY, USA

3.1.5 Structure of Trinidad and Tobago's Aluminium Industry

Trinidad and Tobago is not involved in production at any of the three stages of the industry. It also does not possess any fabricating facilities. All of its requirements for semi-fabricated and finished products are therefore imported except for some minor domestic articles which are fabricated by small foundries in the country.

3.1.5 (a) Aluminium Consumption

Import statistics for the period 1983-1987 are contained in Table XXXIV. The figures show that after reaching a peak of just over 15,000 tonnes in 1985, imports plummeted to 3,639 tonnes in 1986 and 3,302 tonnes in 1987. Indications are that this trend will continue in 1988. The USA is the largest supplier of aluminium products consistently accounting for over 40% of total imports.

The major items of aluminium consumption in Trinidad and Tobago are cans, boxes and packaging containers (30%) with the country rapidly expanding its exports of canned soft drinks especially to CARICOM countries. Wrought bars, angles etc and structures, sheets, plates and strips for the construction industry; foil and domestic articles; and aluminium wire for electrical cables constitute the remaining items consumed.

The rapid expansion in the import and consumption of aluminium witnessed in the 1970s and early 1980s was derived from the fairly rapid growth in the economy (5.2% average annual growth in the 1973-84 period)[15] and the surge in per capita income, resulting from vastly increased oil revenues.

However, the dramatic fall in oil prices in 1986 and the rapid depletion of the country's foreign exchange reserves have resulted in severe cutbacks in imports and a sharp decline in

[15] World Development Report, 1986.

TABLE: XXIV

TRINIDAD & TOBAGO IMPORTS OF ALUMINIUM PRODUCTS (Tonnes)

PRODUCTS	1983	Source	1984	Source	1985	Source	1986	Source	1987	Source
1. Drawn Sheet Aluminium	75	Canada	-	-	14	Hong Kong	60	U.S.A. - 46	144	Venezuela - U.S.A. - 40
2. Aluminium Rods	2	U.S.A.	3	U.K.	1	U.S.A.	2	-	4	-
3. Aluminium Wire	1929	U.S.A. - 570 Brazil - 926 U.K. - 263	330	Brazil - 296	149	Brazil - 91	253	South Korea - 45 Thailand - 27 Brazil - 25	325	Brazil - 2
4. Drawn bars, angles etc.	791	U.S.A. - 467 Jamaica - 149 U.K. - 41 Puerto Rico - 179	5894	Jamaica - 1261 U.S.A. - 462 Puerto Rico - 100	8394	U.S.A. - 8001 Jamaica - 171	819	U.S.A. - 453 Jamaica - 192 Puerto Rico - 149	908	U.S.A. - 494 Austria - 17 Jamaica - 12
5. Sheets, Plates, Strips	656	U.K. - 210 Canada - 102 U.S.A. - 219 Japan - 24	1119	U.S.A. - 562 U.K. - 332 Canada - 173	1251	U.S.A. - 657 U.K. - 371	313	U.K. - 156 U.S.A. - 90	373	U.S.A. - 140 Canada - 73 Mexico - 59
6. Foil	1682	Sweden - 1212 U.S.A. - 337	1617	Sweden - 1507	1487	Sweden - 956 U.S.A. - 414	503	U.S.A. - 384	532	U.S.A. - 4 Venezuela -
7. Tubes, Pipes, Tubes & Pipe fittings	45.5	U.S.A.	77	U.S.A.	26	U.S.A. - 20	47	U.S.A.	41	U.S.A.
8. Structures of Aluminium	2733	France - 1241 Jamaica - 437 U.S.A. - 358	1198	France - 260 Puerto Rico - 53	438	U.S.A. - 207 Barbados - 66	284	U.S.A. - 110	157	U.S.A. - 114 Barbados Jamaica Puerto Rico
9. Cans, Boxes, and other Packaging Containers	5286	U.S.A. - 3448 Puerto Rico - 1431	3036	U.S.A. - 2453 U.K. - 262 Puerto Rico - 1097	3012	U.S.A. - 2201 Venezuela & Colombia - 270 Puerto Rico - 439	1134	Venezuela - 387 U.S.A. - 363	611	U.S.A. - 123 U.K. - 235 Venezuela -
10. Domestic Articles	347	U.S.A. - 95 Brazil - 44	234	U.S.A. - 73 China - 42 USSR - 33	132	-	112	-	33	-
11. Other Articles	335	U.S.A. - 81	390	U.S.A. - 260	152	-	112	-	154	-
	13,901.5		10,698		15,056		3,639		3,302	

SOURCE: Trinidad & Tobago Industries Development Corporation

the economy (6% in 1986)[16]. Hence imports and consumption of aluminium have fallen drastically and are not expected to recover in the near term.

3.1.5 (b) Prospects for establishing Aluminium Industry

As earlier indicated, the governments of Jamaica, Guyana and Trinidad and Tobago had examined, in the 1970s, the feasibility of establishing a joint venture smelter in Trinidad. It was proposed that the three countries share equally in the ownership with Jamaica and Guyana supplying alumina, and Trinidad supplying natural gas as the source of energy. For various reasons, the project was not implemented although the feasibility studies had suggested that it was viable.

The government, in planning and developing its industrial complex at Port Lisas, proceeded to earmark a site for the project, designed and constructed its gas pipelines to include capacity for the smelter and installed gas turbines and transmission facilities on the same basis. Given these factors and also bearing in mind that estimates of proven gas reserves (430 x 10⁶ cu. ft. per day for 100 years)[17] indicate that supplies for power generation of 300 megawatts for a 150,000 tonnes smelter can be easily met, it appears that the project still merits consideration in view of Trinidad's competitive energy costs (15 mills) and in the light of present market conditions. Of course, the major constraint for such a project would be the high capital costs for the power plant and the smelter. An alternative could be the establishment of semi-fabricating facilities sized to meet the needs of the Caribbean, Central American and EEC markets under the Lomé Convention.

3.1.6 Structure of Cuba's Aluminium Industry

The Cuban industry consists of a 5,400 tonne extrusions and forgings plant which is geared to meeting the needs of the domestic market. Raw material for the plant is imported mainly from Western Europe and the CMEA countries. Overall consumption of aluminium is estimated at 12-15,000 tonnes. [18] Imports from a wide range of sources make up the difference between total consumption and local production.

[16] US Bureau of Mines, 1986 Yearbook.

[17] See CEPAL Review No. 30: New objectives for the development of mining resources. ECLAC, December 1986.

[18] Based on Metallgesellschaft, Metallstatistik, 1975-85, JBI Unpublished reports, The Aluminium Industry in Eastern Europe and Communist Asia by Ivan Stankovich, 1981, Metal Bulletin PLC, England.

In the absence of any publicly announced plans, it is expected that the Cuban industry will remain at the present level in the near future.

3.2 Overview of the Caribbean Nickel Industry

The production of nickel in the Caribbean commenced with the establishment of mining operations by the Freeport Sulphur Company in 1943 to supply a U.S. government-owned plant at Nicaro, Cuba. Commercial production of nickel oxide got underway in 1944 [19]. A second extraction plant was established in 1959 by Freeport Sulphur at Mao Bay to the east of Nicaro. Hence, by 1973 Cuba was the fifth largest producer of nickel behind Canada, the USSR, New Caledonia and Australia. Table XXXIVI shows production and export figures for 1973 and 1974.

TABLE XXXIVI: CUBA'S PRODUCTION AND EXPORTS OF NICKEL
1973-74 (000 SHORT TONS)

	1973		1974	
	Prod.	Exports	Prod.	Exports
CANADA	269	91	290	87
USSR	152	n.a.	155	n.a.
NEW CALEDONIA	109	52	115	61
CUBA	33	34	35	34
AUSTRALIA	44	n.a.	17	34
OTHER	117			

Total	726			

SOURCE: U.S. BUREAU OF MINES, COMMODITY DATA
SUMMARIES, 1975
THE INTERNATIONAL POLITICAL ECONOMY OF CUBAN
NICKEL DEVELOPMENT. THEODORE H. MORAN, 1976.

A third facility, at Punta Gorda was developed in collaboration with the USSR and was commissioned in 1985.

The Dominican Republic became a producer in 1971 when Falconbridge Dominicana commenced production at its 30,000 tonnes operations. Initially the company was jointly owned by Falconbridge Limited (67.7%) Araco Steel (17.5%) CORDE

[19] The Winning of Nickel. Joseph R. Boldt Jnr. and Paul Gueneau, Longmans, 1967.

(Dominican Corporation of State Owned Companies - 10%) with the remaining 4.8% in the hands of local, Canadian and US shareholders. [20]

Falconbridge Limited has now increased its participation to 85.2% with the acquisition of Araco's share. [21] The mining and smelting facilities were established at a cost of US\$180 million [22] (1971 dollars) and represented the largest mining investment in the country. Peak production of 31,300 tonnes was achieved in 1987 after recovery from a precipitous decline in 1982.

In the Caribbean, and other tropical areas, nickel deposits occur as lateritic nickel ores as opposed to the sulphide ores found in Canada and the USSR. Cuban ores are estimated to contain 1.1 - 1.3% nickel while the content of the Dominican Republic is in the range of 1.5 - 2.0%.

Up to 1982, Caribbean production accounted for over 80% of Latin American output (96% in 1981) but the area's share has fallen to two-thirds since 1983 with the emergence of Brazil and Colombia as major producers. In 1987 production achieved a peak level of 67,200 tonnes reflecting the overall world industry trend. The entire production of the area is exported with the Cuban industry supplying markets in the CMEA countries, Western Europe, India, Mexico and Japan and the Dominican Republic exporting mainly to North America and Europe.

Consumption of nickel in the area (including Mexico) declined in the early 1980s with Mexico showing a drastic fall, in keeping with the negative growth experienced by its industrial and construction sectors. The area together with Central America accounted for 19% of Latin America's consumption in 1987 sharply down from 38% in 1981.

3.2.1 The Structure of the Cuban Nickel Industry

3.2.1 (a) Production

As indicated above Cuba presently operates three nickel producing facilities with total effective capacity estimated at 59,000 tonnes. [23]

[20] Mining Journal Annual Review 1976, Northern Miner Magazine, August 1987.

[21] Falconbridge Limited, October 1988.

[22] Falconbridge Limited, October 1988.

[23] Metals and Minerals Research Services Limited, INCO, The Winning of Nickel, Joseph R. Boldt, Jr, Paul Gueneau.

Data on the capacity of individual plants, and recent production is set out in Table XXXVII. The plants produce nickel oxide and briquettes, nickel sulphide and sinter. The oxide, briquettes and sinter are sold as finished products whilst the nickel sulphide is refined in the USSR.

TABLE XXXVII: NICKEL PRODUCTION FACILITIES OF CUBA

Smelter / Refinery	Year of Commissioning	Rated Capacity	Effective Capacity	Production 1985	Production 1986
Mao Bay, (Pedro Sotto Alba)	1959	26,000 (as of 1988)	26,000	16,000	16,000
Nicaró (René Lanos Latour)	1943	23,000	23,000	16,000	17,000
Punta Gorda (Che' Guevaral)	1985	30,000	10,000	----	1,600

SOURCE: METALS & MINERALS RESEARCH SERVICES, LTD.
THE MINING OF NICKEL, BOLDT & QUENEAU

The plants at Mao Bay and Nicaró have been operated by the Cuban Government for nearly 30 years and are managed by Cuban experts with assistance from the USSR. Production was sustained in spite of the withdrawal of all technical support by the former US owners.

The technology utilised involves atmospheric pressure leaching with ammonia at the Nicaró plant and pressure leaching with sulphuric acid at Mao Bay and reflects the difference in the ores. Nicaró produces refined nickel oxide and Mao Bay produces a slurry of precipitated nickel and cobalt sulphides which is refined into nickel and pure cobalt in the USSR.

The Punta Gorda plant was developed in the 1980s with USSR technical assistance and present capacity is 10,000 tonnes. However, in 1986, its first year of operation, production was limited to 1,600 tonnes and reports indicate that technical difficulties being experienced have resulted in the postponement of the second potline which was expected to have opened in 1987. It was planned to increase the capacity to 30,000 tonnes by 1990 but this timetable is not likely to be met.

Production statistics for Cuba are contained in Table XVI. The data show that Cuban Mine production reached a peak level in 1981 and has stagnated in the 1984-87 period. However, the production of refined nickel, estimated at 20,000 tonnes, has been almost fully restored to the historically high 1983 level

of 21,200 tonnes. Based on 1987 figures, Cuba now ranks sixth among World producers and was the largest Latin American producer accounting for 4.5% and 36% of world and Latin American production respectively.

Expansion of output at Punta Gorda to the expected 30,000 tonnes would increase Cuban production to over 60,000 tonnes placing it in fourth position in world terms behind Canada, the USSR and Australia.

In 1987, refining of 15,900 tonnes or 44% of the country's total nickel output of 35,900 tonnes was carried out in the USSR. This level was below the average of the 1976-83 period of over 50%.

Industry sources have indicated that the composition of Cuban ores make them relatively difficult to process and therefore processing costs are significantly higher than sulphide ores and some other lateritic ores. In fact the earlier plants were designed specifically to process available ores at Nicaro and Mao Bay.

The competitive position of the plants are further affected by the relatively old technology and labour intensive nature of their operations. In addition, energy consumption is considered high by world standards.

Measures to address these problems have been developed by the local industry. One of these was the establishment of a pilot plant for processing studies and research and development which was established in collaboration with the United Nations Department of Technical Co-operation for Development (DTCD).

3.2.1 (b) Exports

Refined nickel (nickel oxide) is exported mainly to Europe while nickel cobalt sulphide precipitate is shipped to the Urals in the USSR for processing. Export figures published in the Statistical Yearbook of Cuba, 1986 reveal that the country is a supplier of nickel to over 25 countries. Table XXXVIII contains data on Cuban exports to individual countries in the 1970-86 period. In 1986 the CMEA and EEC accounted for over 78% of the total of refined products whilst the USSR processed all of the sulphide precipitate, a pattern established since the early 1970s. Hence the USSR imported approximately 59% of the combined Cuban exports of refined nickel and nickel concentrate.

TABLE: CXXXVIII

CUBA'S NICKEL EXPORTS 1965 - 1986 (tonnes)

COUNTRY	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986
a) Sinter										
U.S.S.R.	6483	359	-	-	-	610	732	338	65	243
Other CMEA	1607	1558	2331	5759	4058	3052	3308	3845	2475	2151
EEC	53	2794	2369	3853	3915	6264	9713	6021	2258	2774
China	892	1169	-	-	-	-	-	-	-	-
North Korea	-	-	300	461	300	297	150	203	257	364
Yugoslavia	-	-	20	-	151	80	-	-	274	-
Switzerland	-	-	-	-	-	21	5	-	-	-
Austria	-	-	820	563	751	749	548	919	449	506
Sweden	-	135	502	701	829	699	513	607	307	912
Mexico	-	-	116	112	78	-	150	167	85	10
India	-	-	-	252	169	155	158	1430	286	471
Other	-	-	9	-	-	-	-	280	291	560
	9115	6015	6567	11701	10231	11927	15277	13810	6657	7991
b) Nickel Oxide										
U.S.S.R.	3107	1760	-	-	-	646	1013	1409	3050	2255
Other CMEA	1052	1522	1973	1627	1799	2664	2677	3119	3289	3860
EEC	5033	4358	2919	3697	2166	2744	1262	505	1428	1983
China	441	1381	1073	-	-	-	-	-	-	-
Japan	-	-	27	1400	1131	1396	-	315	-	105
Hong Kong	-	-	-	25	17	25	8	7	-	-
Yugoslavia	-	-	-	-	-	-	-	-	156	-
Switzerland	-	-	-	4	-	-	-	2	1	-
Austria	-	96	103	219	85	129	-	42	206	51
Sweden	-	382	336	-	-	-	-	-	-	-
Mexico	-	-	5	45	20	-	20	24	31	8
India	-	-	-	866	2637	1597	-	-	322	89
Other	-	5	12	53	15	40	102	967	682	567
	9633	9504	6448	7936	7870	9241	5082	6390	9165	8918
c) Nickel Cobalt Sulphides										
U.S.S.R.	7368	16957	17998	18139	19453	16837	17448	16458	17594	18033
Other CMEA	176	1659	-	-	-	-	-	-	-	-
Others	-	647	-	-	-	-	-	-	-	-
	7544	19263	17998	18139	19453	16837	17448	16458	17594	18033

SOURCE: Anuario Estadístico De Cuba, 1986.
Comité Estatal De Estadísticas

Outside of the EEC and the CMEA groupings. Sweden, Austria, India and North Korea were the major markets. Exports to Mexico continued to decline and amounted to only 18 tonnes compared to a peak of 191 tonnes in 1984.

Looking at the 1970-86 period as a whole it is clear that imports by the EEC of both sinter and nickel oxide have declined consistently since 1984 moving from a total of 10,975 tonnes in 1983 to 4,757 tonnes in 1986, significantly influencing the decline in overall exports of these products from 20,359 tonnes in 1983 to 16,909 in 1986.

Of course, the fall in production was also influenced by the depressed level of prices in the 1984-86 period which itself was partly due to excess production capacity and high inventory levels worldwide.

The CMEA countries increased their total imports from 7,730 tonnes in 1983 to 8,509 in 1986 although reducing their sinter imports by 44% between 1984 and 1986.

3.2.1 (c) The Nickel Industry in the Cuban Economy

Since its establishment in the 1940s the industry has played a significant role in the Cuban economy especially in terms of foreign exchange earnings. It is the country's second largest export earner, the major mining activity and employs over 40,000 workers.

Export earnings increased from over 40 million pesos in 1965 to an estimated 302 million in 1986 and its contribution to overall export earnings increased from 5.8% in 1965 to a peak of 16.5% in 1970, declining in the 1975-80 period before increasing to 7.7% in 1981 when production achieved an all time high. For the 1980s it has averaged over 5%. Details of export earnings are set out in Table XXXIX below. It should be pointed out that the fourfold increase between 1965 and 1970 was largely a result of the rapid increase in nickel prices as was the 77% increase between 1980 and 1981.

Consequently, it is expected that earnings will be boosted by the surge in prices which started in 1987 and has continued in 1988.

TABLE XXXIX: EXPORT EARNINGS OF CUBA FOR SELECTED COMMODITIES
(a) (000 PESOS)

YEAR	TOTAL	NICKEL	%	SUGAR
1965	690,645	40,364	5.8	583,338
1970	1,049,477	173,242	16.5	784,851
1975	2,952,173	135,686	4.6	2,630,515
1980	3,966,730	184,159	4.6	3,279,206
1981	4,223,817	326,520	7.7	3,300,814
1982	4,933,228	291,610	5.9	3,771,510
1983	5,534,907	290,540	5.2	4,078,000
1984	5,476,524	290,908	5.3	4,090,116
1985	5,991,477	295,828	4.9	4,441,486
1986	5,325,012	301,822	5.7	4,069,812

(a) Sugar, Nickel, Refined honey, Fresh & Frozen fish, Finned fish and Shellfish, Citrus, Alcoholic drink, Twisted tobacco, Raw tobacco, Black Cigarettes, Blond cigarettes, Ethyl alcohol.

SOURCE: ANUARIO ESTADISTICO DE CUBA, 1986
COMITE ESTATAL DE ESTADISTICAS

The available information indicates that virtually 100% of Cuba's nickel production is exported. However, the existence of the 400,000 tonne per year steel plant at Cotorro, near Havana, provides a basis for the future development of alloy steels and stainless steel industries adding to the country's growing exports of steel and steel products [24]. The plans of the Cuban government also call for increased local production of capital goods and consumer durables which as earlier indicated are major users of refined nickel.

[24] (in the 1981-85 period a total of 600,000 tonnes of ingots, bars, sheets and wire rods was exported to Latin America, the Middle East and Asia and this is projected to rise to 1 million tonnes in the 1986-90 period).

3.2.2 The Structure of the Dominican Republic's Nickel Industry

3.2.2 (a) Production

The production of ferronickel involves mining of lateritic nickel ore typically containing 1.9% nickel, calcining the ore in a reduction plant and afterwards smelting it in three 55 MVA electric furnaces. The metal from these furnaces is then processed in a refining station and finally cast into pigs (ingots) representing 66-75% of total output with the remainder becoming ferrocones.

Processing facilities are powered by a 200 MW oil-fired power plant which consumes 2.5 - 3 million barrels of oil annually. Improvements in energy efficiency over the years has reduced power consumption at the operations allowing the company to provide excess power (60 MW) to the national grid.

As earlier indicated production cutbacks occurred in 1978, 1980, 1981 and 1982. These cuts were in the main motivated by a weakening of demand for ferronickel and excessive inventories in the 1978-81 period which was also marked by over-production on the part of INCO, the major world producer, in an attempt to recapture market share. The general decline in world steel production (ferronickel is used exclusively in the steel industry) and particularly in the US and Europe, was also an important contributing factor. With the upturn in the industry since early 1987 production achieved a peak of 31,300 tonnes - increasing by approximately 44% over 1986. Given the present tightness in the market and worldwide recovery in steel production and industrial production generally it is expected that the present output can be maintained in the near future.

The Falcondo Dominicana operations are run by Falconbridge under an evergreen "life of mine" contract with the government. Mining is currently being carried out at Loma Caribe, Loma Taina and Loma Peguera. A new mine at Ortega is being developed for commissioning in the near term and will account for 40% of annual ore production.

Industry experts view the Falcondo operations as among the most cost competitive particularly in view of the depressed oil prices obtaining at the time of writing. The smelting process is energy intensive and in fact energy costs typically are 60% of total production costs. It is reported that cash costs in 1988 are running well below US\$2.00 per tonne whilst costs in sulphide ore refining are above US\$2.00, with these refining processes being more labour intensive. In addition, it is estimated that the 98% recovery of nickel achieved in the Dominican Republic is about the highest in the world.

The labour force is estimated at 1,200 persons employed in various aspects of the industry. This figure is a significant reduction on the employment levels of the 1970s and early 1980s and represents one of the factors contributing to the cost reductions achieved in the recent past.

The Dominican Republic does not produce semi-fabricated nickel products and at present does not possess the industrial base to engage in downstream activities. The development of these activities would necessarily be based on export markets.

3.2.2 (b) Exports

The total production of Falcondo Dominicana is exported with Falconbridge Limited being responsible for disposal of the entire output, through its worldwide system. Data presented by Falconbridge Limited shows that in 1987 Europe was the largest importer accounting for just under 50% followed by North America with 35%. Table L provides figures on the destination of exports for the 1984-87 period.

TABLE L: DOMINICAN REPUBLIC'S EXPORT MARKETS FOR NICKEL
(PERCENTAGE)

	1984	1985	1986	1987
EUROPE	39	47	45	47
NORTH AMERICA	38	28	32	35
OTHER	23	25	23	18

SOURCE: FALCONBRIDGE LIMITED

Discussions with the company suggest that the tariffs and non-tariff barriers in force in the major Latin American markets of Mexico, Argentina and Brazil have restricted exports of ferronickel from the Dominican Republic.

Foreign exchange earnings from the industry amounted to approximately US\$78 million in 1986 well below the 1985 figure due both to the 14% fall in production and exports and the depressed price of ferronickel. This situation was reversed in 1987 with the dramatic turnaround in world prices which has continued into 1988. In addition, the recent agreement between the Dominican Government and Falconbridge has significantly raised the taxes to be paid by the industry. Indications are that under the new tax regime (55% on profits) government revenues should increase to US \$ 70 million for 1988 at present market prices. Export data presented in Table LI shows that in 1986 ferronickel ranked as the country's fourth largest export commodity down from second spot in 1985 - with revenues falling by 55% due mainly to the weakening in world nickel prices.

TABLE LI: PRINCIPAL EXPORTS OF THE DOMINICAN REPUBLIC. 1982-86
(US '000)

Commo- ditv	1982	% of Total	1983	% of Total	1984	% of Total	1985	% of Total	1986	% of Total
Sugar	265514	42.6	263562	39.6	271886	38.8	158477	28.6	133850	26.17
Coffee	90612	14.5	76288	11.5	95074	13.6	86149	15.5	112833	22.07
Cocoa	52913	8.5	55518	8.3	70064	10.0	58078	10.5	58873	11.5
Tobacco	21433	3.4	21816	3.3	24228	3.4	17612	3.2	18581	3.6
Bauxite	5250	0.8	--	--	--	--	--	--	--	--
Ferro- nickel	24210	3.9	83471	12.5	108.522	15.5	120715	21.81	77820	15.1
Gold/ Silver	153639	26.2	164511	24.7	131810	18.8	113611	20.5	111804	21.87
TOTAL	623570		665166		701564		554642		513761	

SOURCE: DIRECTOR GENERAL DE ADUANAS y OFICINA NACIONAL DE ESTADISTICA

3.2.3 The Mexican Nickel Industry

3.2.3 (a) Production and Consumption

Mexico does not produce primary nickel importing all of its requirements of sinter, nickel oxide and ferronickel. It does, however, produce nickel-containing stainless steel, alloy steel and some electroplated products.

The major firms engaged in the manufacture of nickel based products are: Mexinox, steel mill which produces nickel-containing stainless steel; Campos Hermanos and Solarus, producers of alloy steels including components for heavy duty earth moving equipment, bars and profiles. Industry sources estimate that 65% of Mexico's primary nickel consumption is utilised in the production of electroplated products, coinage, stainless steel and other nickel alloys.

The decline in industrial production over recent years has reduced the country's consumption of primary nickel as demonstrated in Table XVIII.

Trade statistics for 1985-87 reveal that imports of nickel products have also declined, moving from over 5,000 tonnes in 1985 to approximately 3,000 tonnes in 1987. Table LII provides details of the products imported by Mexico and the sources (1987 only).

TABLE III:

MEXICO'S IMPORTS OF NICKEL PRODUCTS 1985 - 1987							SOURCES
PRODUCTS	1985		1986		1987		
	Quantity (tonnes)	Value US\$	Quantity (tonnes)	Value US\$	Quantity (tonnes)	Value US\$	
Ingots, Scraae	3.539	17.957	1.896.0	7.972	2.197	10.196	Canada, Netherlands, USA
Bars, Profiles (unalloved & alloved)	363	2.296	165	1.498	120	1.291	USA, FRG
Wire (unalloved & alloved)	295	3.115	218	2.052	198	2.117	USA, FRG, Canada
Sheets, Slabs, Plate Strips (unalloved & alloved)	125	1.192	144	1.578	64	908	Canada
Powder	301	2.062	268	1.465	326	1.845	Canada, USA
Tubes, hollow bars	274	1.464	74	1.155	145	1.695	USA
Tube fittings	70	382	58	539	3.0	25	USA
Anodes	9	97	12	95	4.0	14	USA
Crucibles	0.5	29	0.1	19	.2	21	USA
Others	190.0	789	70	584	16.0	425	USA, FRG, Switzerland, Brazil
TOTAL	5.976.6	29.383	2.905.1	16.957	3.073.2	18.437	

SOURCE: Secretaria De Comercio y Fomento Industrial

The USA was the largest single source of imports of nickel products in 1987 accounting for 37% of the total tonnage. Canada and the Federal Republic of Germany were also major sources with Brazil being the only Latin American supplier (wire only).

Mexico exports small quantities of nickel products, mainly bars and profiles, sheets, slab and plate, anodes, tubes and hollow bars and scrap. In 1985, total exports amounted to 25 tonnes but by 1987 this had declined to 7 tonnes.

4. SUMMARY

The foregoing analysis of the structure of the non-ferrous metals industry of the Caribbean Area highlighted a number of salient features which are generally applicable to the Latin American Region as a whole as well as to the vast area of the globe referred to as the 'Third World': These include:

1. large reserves of natural resources;
2. high production of minerals and primary metals and a simultaneous low development of downstream activities;
3. high foreign ownership and/or control through investment, technology and markets resulting in vertically integrated 'enclave' industries;
4. low level of per capita consumption of non-ferrous metals;
5. low level of interaction at the regional level (investment, technology and research, trade and specialization);
6. high export ratio of output to extra regional centres;
7. generally unsuccessful attempts at bilateral and multilateral co-operation through failure to adequately exploit complementarities.

These features represent the weaknesses and strengths in the regional non-ferrous metals industry and form the framework, in Part II, for analysis of policies and strategies for the future development of the industry.

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 - 9.2.2 Smelting and Fabrication
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 - 9.2.3 (b) Regional Technological Development in Aluminium Smelting

- 10.0 Analysis of the Present Modalities of Commerce in the Caribbean Area
 - 10.1 Commercial Arrangements in the CARICOM Countries
 - 10.2 Commercial Arrangements Between Mexico and Cuba, the Dominican Republic and Jamaica

- 11.0 Exploration of new forms of Commerce in the Caribbean Area that could avoid the use of hard currency
 - 11.1 Barter and Counter Trade arrangements involving countries of the Caribbean Area
 - 11.2 Tolling and metal exchange arrangements in the Aluminium Industry
 - 11.3 Possible Credit and Payments Arrangements for Joint Projects in the Non-Ferrous Metal Industry
 - 11.4 Conclusions.

PART II

TITLE: Trade, Production, Complementarities and Opportunities for Co-operation in the Non-Ferrous Metals (Aluminium and Nickel) Industry of the Caribbean Area

5.0 COMMERCIAL FLOWS OF MINERALS, REFINED, SEMI-FINISHED AND FINISHED PRODUCTS AMONG THE COUNTRIES OF THE CARIBBEAN AREA.

5.1 OVERVIEW

Historically, the economies of the area developed as sources of raw materials for metropolitan countries and latterly, in the 1960s, along the path of import substitution of semi-finished and finished (largely consumer) goods. This approach was universally adopted by all the countries leading to an orientation in trade relations away from intra-regional markets.

Consequently, trade among the countries of the area is conducted in a limited range of primary products and manufactured goods. Petroleum and petroleum products are the major items of this trade with Mexico and Trinidad and Tobago being the two exporters of these within the grouping.

Overall trade between the countries amounted to US\$385.7 million [25] in 1983 (excluding trade by Trinidad and Tobago with Haiti and Cuba; and Haiti with Mexico and Cuba) declining to US\$345.0 million in 1985. The significantly reduced levels of trade between Jamaica and Trinidad and Tobago and also between Mexico and the Dominican Republic were largely responsible for the decline. As indicated above, petroleum was the major item of trade, accounting for at least 68% of the total in 1983 and nearly 80% in 1985.

Trade between Jamaica and Trinidad and Tobago was adversely affected by the contraction in Jamaica's imports and in its economy generally, as well as payment difficulties associated with the demise of the CARICOM Clearing Facility. The decline in trade between Mexico and the Dominican Republic was due, in large measure, to the economic recession in both countries and the fall in oil prices in the latter part of 1985. These developments occurred at a time of growing stagnation in the major export markets of the USA and the E.E.C. which brought about drastic reductions in the export earnings of the countries of the Area.

[25] Caribbean Development Bank, Inter-American Development Bank.

5.2 TRENDS IN TRADE AMONG CARIBBEAN AREA COUNTRIES

The figures on imports and exports between the countries of the Area reveal that trade declined over the 1983-95 period and indications are that this trend continued up to 1986. Based on statistics for Mexico and Jamaica it appears that this situation was reversed in 1997 with both significantly increasing their trade with the countries of the Area. Trade data is set out in Tables LIII, LIV and LV which are attached.

Mexico's trade with countries outside of the Area accounted for 71%, 77% and 79% of its overall trade in 1983, 1984 and 1985 respectively and was overwhelmingly influenced by oil shipments. Trade with the Caribbean Area represented far less than 1% (1.008%) of its total trade with all countries while exports to the Area typically accounted for about 1% of its total exports. Special note should be taken of the consistently huge gap between exports and imports with Mexican imports from the other countries of the Area falling by over 92% over the period.

The Dominican Republic's imports from and exports to the Area, excluding Mexico, accounted for between 1.1% - 1.4% of its total trade in the 1983-5 period. When Mexico is included the level was in the range of 6% - 8.5%. In addition to petroleum it imports motor vehicles and a limited range of manufactured goods from Mexico. Its trade with the other countries involves mainly re-exports of manufactured goods and petroleum products to Haiti and exports of food items to Jamaica; and also imports of food items and manufactured goods from Haiti and Jamaica.

Jamaica imports a significant portion of its petroleum from Mexico and Trinidad and Tobago - its major item of trade with the Area. However, trade with Trinidad and Tobago involves a wide range and significant volume of manufactured goods including consumer durables. There has been a steep decline in this trade in the 1984-86 period due to the breakdown of payment arrangements and Jamaica's foreign exchange difficulties.

In the 1983-87 period Jamaica's trade turnover with the countries of the Area accounted for between 3.0% - 9.0% of its total trade with all countries, with imports consistently exceeding exports - largely reflecting the imbalance in trade with Mexico.

TABLE L.III: MEXICO'S TRADE WITH CUBA, DOMINICAN REPUBLIC
JAMAICA, TRINIDAD & TOBAGO

COUNTRY	1983		1984		1985		1986		1987	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
CUBA	20,911	35,499	12,952	112,319	2,317	199,081	2,049	45,869	1,249	79,241
DOMINICAN REPUBLIC	1,634	151,816	1	147,680	--	101,795	16	111,234	61	132,480
JAMAICA	--	62,626	13	15,955	24	50,144	37	10,297	366	61,061
TRINIDAD & TOBAGO	n.a	n.a	n.a	n.a	n.a	n.a	10	295	4,687	1,302
TOTAL	22,545	249,941	12,965	275,934	2,341	271,040	2,102	167,965	1,676	274,092
% of Total imports and exports with all countries							.002	1	0.001	1.3

SOURCE: DIRECCION GENERAL de ESTADISTICA SECTORIAL INFORMATICA,
SISTEMA de ESTADISTICA de COMERCIO EXTERIOR, MEXICO.

TABLE LIV: DOMINICAN REPUBLIC'S TRADE WITH JAMAICA, HAITI,
TRINIDAD & TOBAGO AND CUBA

COUNTRY	1981		1982		1983		1984		1985	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
JAMAICA	2,119	4,749	1,686	212	3,145	1,963	2,800	2,642	1,456	526
HAITI	537	5,937	2,433	5,454	11,028	5,420	10,585	6,339	5,935	5,623
TRINIDAD & TOBAGO	2,479	752	1,025	1,775	1,606	11,843	561	6,450	1,319	7,002
CUBA	1	--	63	--	17	--	2	--	n.a.	n.a.
TOTAL	5,135	12,438	5,207	7,441	15,796	9,226	13,948	15,431	8,710	13,151
% of total imports and exports with all countries	5	1	4	1	1	1	1	2	.7	1.8
MEXICO	n.a.	n.a.	n.a.	n.a.	151,816	1,634	147,660	.1	101,795	1
TOTAL	5,135	12,438	5,207	7,441	167,612	10,860	161,668	15,432	110,505	13,151
% of Total imports & exports with all countries					13.1	1.4	12.9	2	8.5	1.8

SOURCE: DIRECCION GENERAL de ADUANAS y OFICINA NACIONAL de
ESTADISTICA, DOMINICAN REPUBLIC

TABLE LV: JAMAICA'S TRADE WITH MEXICO, TRINIDAD & TOBAGO,
DOMINICAN REPUBLIC, HAITI AND CUBA - 1983-87 (B\$ 000)

COUNTRY	1983		1984		1985		1986		1987	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
MEXICO	52,626	--	15,955	13	50,164	24	10,297	37	61,061	366
TRINIDAD & TOBAGO	29,447	57,238	24,119	31,520	33,000	15,397	18,949	15,900	37,899	17,607
DOMINICAN REPUBLIC	1,987	2,371	7,635	1,922	950	993	694	1,318	1,207	849
HAITI	60	847	337	798	32	1,104	127	1,064	251	1,137
CUBA	26	73	--	144	5	247	5	243	--	184
TOTAL	94,646	60,529	48,046	34,399	84,151	17,765	--	--	100,416	20,143
% of total imports & exports with all countries	8		4.3		6.1		3.0		6.2	

SOURCE: STATISTICAL INSTITUTE OF JAMAICA

5.3 TRADE IN NON-FERROUS METALS

Trade in nickel and aluminium among the countries concerned is insignificant in relation to the overall production of these metals in the Area. In the case of nickel, trade is confined to exports of sinter and nickel oxide by Cuba to Mexico.

Data in Table XIII VIII above indicates that the volume of these exports, particularly in recent years, is small by comparison to Cuba's total exports. In addition, Mexico's reported annual consumption in 1985 of 1,800 tonnes of ferronickel was met from outside the Area whilst the Dominican Republic exported all of its production to markets in Europe, North America and Japan. Industry experts⁽²⁵⁾ suggest that this situation is due to the non-tariff barriers imposed by the Mexican trade authorities, long term supply arrangements with Cuba and the value added taxes (15%) levied on imports of nickel. Of course, the area's producers do not possess the industries for manufacturing nickel products hence these are supplied by the USA and Europe as demonstrated in the figures on Mexican imports (See Table LII above).

Trade in aluminium is also extremely limited. Mexico is the sole producer of primary aluminium but imports some of its requirements as indicated earlier. It nevertheless exports a small volume of metal to regional markets. Its alumina requirements of over 120,000 tonnes per annum (based on metal production of 60,000 tonnes) is being met by imports from Alcoa's Point Comfort refinery in the USA. The operators of the smelter (Grupo Aluminio) have reported that this supply arrangement is covered by a long term contract with Alcoa, which expires in the early 1990s, but in any case is influenced by Alcoa's part ownership of the facility. Although Jamaica has the alumina capacity required to supply Mexico's requirements, the ownership arrangement of the Mexican industry is a significant obstacle to such a development.

Mexico's trade in aluminium products is conducted mainly with the USA and various South American countries while in the case of Jamaica it is restricted to the export of bars, rods, angles, slopes and finished structural parts to Trinidad and Tobago, Honduras, Guatemala and various Eastern Caribbean islands. Data on aluminium imports and exports by Latin American countries is set out in Tables LVI - LVII.

(25) Falconbridge Limited, Canada.

TABLE LVII: REGIONAL IMPORTS OF SEMI-MANUFACTURES OF ALUMINIUM (0000)

	1963		1964		1965		1966	
	Total	Total Region	Total	Total Region	Total	Total Region	Total	Total Region
ALADI								
ARGENTINA	8,591	755	--	--	n.a.	n.a.	5,450	1,500
BOLIVIA	2,518	--	671	493	n.a.	n.a.	n.a.	n.a.
BRAZIL	59,133	3	--	--	n.a.	n.a.	n.a.	n.a.
CHILE	15,697	7,233	--	--	n.a.	n.a.	9,054	2,845
COLOMBIA	11,977	4,816	--	--	11,254	4,592	n.a.	n.a.
DOMINICAN REPUBLIC	5,940	36	--	--	n.a.	n.a.	n.a.	n.a.
ECUADOR	9,375	780	8,194	2,710	n.a.	n.a.	n.a.	n.a.
MEXICO	84,284	6,577	--	--	68,450	11,115	n.a.	n.a.
PARAGUAY	1,075	902	868	680	n.a.	n.a.	n.a.	n.a.
PERU	5,807	877	--	--	n.a.	n.a.	6,100	1,553
URUGUAY	4,562	2,901	--	--	n.a.	n.a.	695	507
VENEZUELA	61,214	13	--	--	53,091	2,633	n.a.	n.a.
TOTAL	269,173	24,913	9,733	3,883	132,795	8,340	21,345	6,445
CACM								
COSTA RICA	10,198	4,214	6,311	3,514				
EL SALVADOR	4,953	707	6,372	147				
GUATEMALA	3,337	815	7,916	5,493				
HONDURAS	4,190	858	2,710	1,264				
NICARAGUA	1,700	1,072	3,610	1,503				
PANAMA	3,944	748	n.a.	n.a.				
TOTAL	28,313	8,414	26,921	11,921				
CARIBBEAN								
BAHAMAS	568	--	679	--	n.a.	n.a.		
BARBADOS	2,136	5	n.a.	n.a.	2,491	7		
BERMUDA	187	39	n.a.	n.a.	300	47		
DOMINICA	62	5	n.a.	n.a.	n.a.	n.a.		
JAMAICA	3,912	42	n.a.	n.a.	n.a.	n.a.		

TABLE LVII: REGIONAL IMPORTS OF FINISHED PRODUCTS OF ALUMINIUM (4000)

ALADI	1980		1984		1985		1986	
	TOTAL	TO REGION	TOTAL	TO REGION	TOTAL	TO REGION	TOTAL	TO REGION
ARGENTINA	14.685	2.437	--	--	--	--	2.529	381
BOLIVIA	596	259	1.336	719	--	--	--	--
BRAZIL	12.491	7	--	--	--	--	--	--
CHILE	9.784	2.647	--	--	--	--	13.149	6.623
COLOMBIA	9.129	1.841	--	--	8.110	5.781	--	--
DOMINICAN REPUBLIC	2.771	567	--	--	--	--	--	--
ECUADOR	1.305	291	597	228	--	--	--	--
MEXICO	26.750	191	--	--	21.136	20	--	--
VENEZUELA	19.117	7.928	--	--	6.366	621	--	--
PARAGUAY	3.103	2.829	1.682	1.598	--	--	--	--
PERU	3.457	246	--	--	--	--	4.514	748
URUGUAY	835	172	--	--	--	--	447	209
TOTAL	104,248	20,325	3,615	2,645	35,614	6,422	20,639	7,961

CACH	1980		1984		1985		1986	
	TOTAL	TO REGION	TOTAL	TO REGION	TOTAL	TO REGION	TOTAL	TO REGION
COSTA RICA	2.226	1,210	865	277	--	--	--	--
EL SALVADOR	832	762	515	310	--	--	--	--
GUATEMALA	1,775	742	6,713	3,975	--	--	--	--
HONDURAS	714	71	351	104	--	--	--	--
NICARAGUA	1,133	947	200	100	--	--	--	--
PANAMA	1,199	344	--	--	1,653	352	--	--
TOTAL	7,779	4,076	8,644	4,776	1,653	352	--	--

CARIBBEAN	1980		1984		1985		1986	
	TOTAL	TO REGION	TOTAL	TO REGION	TOTAL	TO REGION	TOTAL	TO REGION
BAHAMAS	2.955	--	4,188	1	--	--	--	--
BARBADOS	2.413	132	--	--	2,764	114	--	--
BELIZE	249	99	--	--	226	50	--	--
DOMINICA	308	146	--	--	--	--	--	--
JAMAICA	2.266	177	--	--	--	--	--	--
NETHERLAND ANTILLES	2.649	59	2.663	75	--	--	--	--
ST. LUCIA	505	271	--	--	--	--	--	--
TRINIDAD & TOBAGO	12,102	2,113	--	--	--	--	6,940	2,504

TABLE LVIII: REGIONAL EXPORTS OF FINISHED PRODUCTS OF ALUMINIUM (000)

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ALADI -----	1980		1984		1985		1986	
	Total	To Region	Total	To Region	Total	To Region	Total	To Region
ARGENTINA	2,619	458	--	--	--	--	4,195	3,942
BRAZIL	19,933	15,377	--	--	30,293	10,105	--	--
CHILE	530	--	--	--	--	--	767	582
COLOMBIA	1,510	624	--	--	810	753	--	--
DOMINICAN REPUBLIC	917	10	--	--	--	--	--	--
ECUADOR	321	321	781	781	--	--	--	--
MEXICO	8,382	5,455	--	--	29,311	875	--	--
PERU	358	357	--	--	--	--	51	51
URUGUAY	409	408	--	--	--	--	205	203
VENEZUELA	479	269	--	--	--	--	--	--
TOTAL	35,458	23,746	781	871	60,141	11,733	5,218	4,878

CACH -----	1980		1984	
	COSTA RICA	542	530	810
EL SALVADOR	1,898	1,896	493	491
GUATEMALA	422	422	522	520
HONDURAS	586	586	10	10
NICARAGUA	3	3	14	14
PANAMA	143	143	--	--
TOTAL	3,594	3,580	1,849	1,788

CARIBBEAN -----	1980	
	BARBADOS	1,942
BELIZE	n.a.	n.a.
JAMAICA	1,087	773
TRINIDAD & TOBAGO	58	55
TOTAL	3,097	2,749

SOURCE: UNCTAD

TABLE LIX: REGIONAL EXPORTS OF SEMI-MANUFACTURES OF ALUMINIUM (000 tonnes)

ALADI	1975	1980	1985
ARGENTINA	0.1	7.9	15.5
BRAZIL	0.5	8.0	30.1 a/
CHILE	0.1	0.1	0.1
COLOMBIA	0.3	0.1	0.1
ECUADOR	0.0	0.2	0.1 b/
MEXICO	0.4	0.6	2.5 a/
PERU	0.1	0.1	0.2 b/
URUGUAY	0.0	0.0	0.2
VENEZUELA	0.2	37.2	n.a
TOTAL	4.1	58.5	52.1

a/ - 1985

b/ - 1984

SOURCE: UNCTAD

TABLE LX: REGIONAL EXPORTS OF SEMI-MANUFACTURES OF ALUMINIUM (\$000)

	1980		1984		1985		1986	
	Total	To Region	Total	To Region	Total	To Region	Total	To Region
ARGENTINA	16,080	4,311	--	--	--	--	18,679	1,927
BRAZIL	20,209	14,473	--	--	52,111	22,002	--	--
CHILE	182	120	--	--	--	--	140	137
COLOMBIA	641	637	--	--	242	241	242	241
ECUADOR	--	--	179	179	--	--	--	--
MEXICO	1,550	666	--	--	3,983	576	--	--
PERU	67	66	--	--	--	--	13	13
URUGUAY	47	47	--	--	--	--	938	873
VENEZUELA	65,592	--	--	--	--	--	--	--
TOTAL	104,363	21,273	179	179	56,336	22,821	20,012	3,141

CACH

COSTA RICA	410	382	5,248	2,832
EL SALVADOR	11,299	11,265	10,922	10,896
GUATEMALA	135	151	851	851
HONDURAS	n.a	n.a	20	20
PANAMA	n.a	n.a	n.a	n.a
TOTAL	11,897	11,798	17,041	14,599

	1980		1982		1985		1986	
	Total	To Region	Total	To Region	Total	To Region	Total	To Region
CARIBBEAN								
BARBADOS	19	19	--	--	12	--	--	--
JAMAICA	1,451	1,450	1,296	1,292	--	--	--	--
TRINIDAD & TOBAGO	7	7	--	--	--	--	63	42
TOTAL	1,477	1,476	1,296	1,292	12	--	63	42

SOURCE: UNCTAD

6.0 COMMERCIAL RELATIONS BETWEEN THE CARIBBEAN, MEXICO AND SOUTH AMERICA

6.1 OVERVIEW

It is estimated that total trade between the Caribbean Area (including Mexico) and South America amounted to over US\$2 billion in 1985 (27). Mexico's trade accounted for approximately half of this total (\$980 million) followed by the Dominican Republic (\$395 million), Cuba and Jamaica. Tables LXI-LXV set out the available individual country data on trade with South America. Overall, trade was in balance in 1985 although individual countries maintained large surpluses or deficits.

The countries of South America together with Mexico and the Dominican Republic (as an observer) participate in the Latin American Integration Association (ALADI) which is intended to operate as a common market. Imports from member countries of the Association are subject to preferential tariffs. In addition, payments and credit arrangements between them are governed by a multi-lateral clearing system (Santo Domingo Agreement).

Petroleum is the single largest item traded between the groups, Venezuela being the major supplier to Jamaica and the Dominican Republic. In fact, petroleum products accounted for over 90% of the Dominican Republic's imports from Venezuela and close to 100% of Jamaica's. However, trade by the ALADI countries with Mexico and Cuba involves a much wider range of goods including mineral commodities, machinery and equipment, consumer durables and food.

6.2 TRENDS IN TRADE BETWEEN THE CARIBBEAN AREA AND SOUTH AMERICA

Indications are that the overall volume of trade between both groups has increased steadily during the 1980s although with significant fluctuations in some cases. Nevertheless, the Area's trade with South America continued to represent a relatively small proportion of its total trade with all countries.

(27) Inter-American Development Bank, INTAL.

TABLE LXI: MEXICO'S TRADE WITH SOUTH AMERICA (US \$ '000)

COUNTRY	1985		1987	
	IMPORTS	EXPORTS	IMPORTS	EXPORTS
ARGENTINA	156.076	112.387	45.221	169.376
BRAZIL	144.946	175.567	165.511	164.071
CHILE	9.739	24.896	6.121	45.161
PARAGUAY	384	515	643	799
URUGUAY	7.852	54.017	9.251	83.717
BOLIVIA	1.801	711	893	1.437
COLOMBIA	10.576	109.848	3,738	136.932
ECUADOR	9.135	58.223	7.689	70.003
PERU	1.986	33.402	28.682	50.935
VENEZUELA	8.676	55.105	4.921	85.104
	351.194	634.675	371.570	807.537

% of total imports 3.2 3.3
and exports with all
countries

SOURCE: DIRECCION GENERAL DE ESTADISTICA SECTORAL INFORMATICA
SISTEMA DE ESTADISTICA DE COMERCIO EXTERIOR, MEXICO with all
Countries

TABLE LXII: DOMINICAN REPUBLIC'S TRADE WITH SOUTH AMERICA (US\$ 000)

COUNTRY	1981		1982		1983		1984		1985	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
ARGENTINA	682	--	1,008	--	6,170	4	19,502	--	16,446	--
BRAZIL	21,612	6,164	14,994	--	20,131	--	21,537	--	22,514	3
BOLIVIA	2	--	--	2	1	2	--	--	--	--
COLOMBIA	6,093	1,183	3,844	323	5,075	237	4,442	293	15,039	429
CHILE	2,846	662	4,468	6	5,213	5	4,255	--	5,253	4
ECUADOR	40	--	9	23	8	4	13	4,081	54	67
PAPRAGUAY	--	--	101	--	--	--	8	--	135	--
PERU	58	4	134	118	219	25	300	--	784	164
URUGUAY	70	126	58	34	17	125	43	--	16	13
VENEZUELA	356,450	71,373	221,045	19,785	268,844	3,689	332,726	12,950	332,250	1,810
TOTAL	287,853	79,512	245,661	19,785	305,678	4,091	382,826	17,512	392,491	2,490
	13.9		13.1		15.0		18.8		19.5	

% of total imports
and exports with
all countries

SOURCE: DIRECCION GENERAL de ADUANAS y OFICINA NACIONAL
de ESTADISTICA, DOMINICAN REPUBLIC

In the case of Mexico, trade increased by over 92 between 1980 and 1987 with the surplus widening to \$530 million. Exports from Mexico included a wide variety of metals and industrial minerals such as manganese, mercury, zinc, asbestos and diatomite with Brazil, Argentina, Colombia, Uruguay and Venezuela being the major trading partners. The Dominican Republic's trade increased absolutely and relatively over the 1981-85 period although declines, chiefly related to oil imports, were experienced in 1982 and 1983. Venezuela, Brazil, Colombia and Argentina are its major partners with trade involving a growing range of manufactured goods including motor vehicles, consumer durables and machinery and equipment.

The decline in Jamaica's trade with South America is due to the fall in oil imports (quantity & prices). Mining is its main export to the grouping. Cuba has recorded a tremendous expansion in its trade in the 1981-1985 period with Argentina being its major partner accounting for 85% of the total. This expansion is due to the restoration of normal relations, including bilateral trade agreements with a growing number of the South American countries.

TABLE LXIII: JAMAICA'S TRADE WITH SOUTH AMERICA (US\$ 000)

COUNTRY	1983		1984		1985		1986		1987	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
ARGENTINA	970	--	676	--	341	--	1,061	--	3,225	--
BRAZIL	12,445	10,834	9,154	6,941	6,409	--	12,587	2,847	21,753	3,564
COLOMBIA	1,195	--	21,517	260	6,249	451	2,822	64	1,273	--
CHILE	164	--	69	--	68	1	78	--	144	--
ECUADOR	--	--	5,087	44	8,902	46	26,961	1	24,610	--
PARAGUAY	--	940	--	242	--	--	--	--	--	--
PERU	27	--	110	--	59	--	115	--	82	--
URUGUAY	--	--	367	--	186	--	56	--	--	--
VENEZUELA	139,133	6,290	94,212	--	139,013	498	75,756	2	48,978	175
TOTAL	153,914	18,064	132,292	7,487	161,727	4,091	121,436	2,874	90,065	3,739
% of total imports and exports with all countries	9.0		7.3		9.7		8.0		5.6	

SOURCE: STATISTICAL INSTITUTE OF JAMAICA

TABLE LXIV: CUBA'S TRADE WITH SOUTH AMERICA (000 PESOS)

COUNTRY	1981	1982	1983	1984	1985	1986
PERU	14187	1693	7514	12879	2977	11951
ARGENTINA	17982	12598	83170	147636	193706	163896
VENEZUELA	1650	1879	7809	9476	13585	12234
OTHERS	2293	8524	16226	650	2695	4314
	36012	24894	114719	170661	212963	192194
% of Total Trade with all countries	.004	.002	.01	.01	.02	.01

SOURCE: ANUARIO ESTADISTICO DE CUBA, 1986
COMITE ESTATAL DE ESTADISTICAS

TABLE LXIV: TRINIDAD AND TOBAGO'S TRADE WITH SOUTH AMERICA TTA(000)

COUNTRY	1981		1982		1983		1984		1985
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
ARGENTINA	6,932	2,730	27,115	131	8,786	472	9,474	6	15,806
BRAZIL	51,657	29,345	93,062	11,843	109,299	3,524	128,513	15,735	94,921
COLOMBIA	61,471	10,505	72,625	89,544	47,302	3,196	15,705	3,696	8,127
VENEZUELA	29,736	13,196	31,864	29,945	21,488	5,044	22,107	3,481	37,038
OTHER	15,938	23,447	164,527	91,262	64,916	24,309	9,252	10,216	56,150
TOTAL	175,734	79,223	389,193	222,725	251,791	36,545	185,051	33,134	212,042
% of total imports and exports	1.5		3.76		2.4		2.2		3.3

SOURCE: OVERSEAS TRADE 1985, PARTS B & C.
CENTRAL STATISTICAL OFFICE, REPUBLIC OF TRINIDAD & TOBAGO

Brazil, Colombia, Argentina and Venezuela are Trinidad and Tobago's main trading partners in South America. Imports of iron ore for its iron and steel plant account for a large percentage of trade with Brazil but food and manufactured goods are also important items. Petrochemicals are the largest category of exports to Brazil and other ALADI countries.

6.3 TRADE IN NON-FERROUS METALS

Trade in nickel and aluminium is not a significant aspect of the overall trade between the groups. In fact, available information indicates that virtually no trade exists in nickel between South America and the Caribbean Area.

Tables LVI - LX, as indicated earlier, present data on regional imports and exports of semi-manufactured and finished aluminium products. Based on this limited information it appears that Brazil is the largest regional exporter of semi-manufactured aluminium products to other South American, Central American and Caribbean countries followed by Argentina, El Salvador, Mexico and Jamaica. In respect of finished products, Brazil is the largest exporter followed by Mexico. Given the expansion in downstream fabrication facilities planned and also being implemented by Venezuela, especially in the automotive line, it is expected that this country will eventually become a leading supplier of finished and semi-finished products to the Caribbean Area and to other South American countries.

In respect of primary aluminium, Venezuela is the largest exporter, shipping mainly to Mexico and the Dominican Republic. Alcasa of Venezuela is presently involved as a minority shareholder in a rolling mill and foil products facility in Costa Rica. This plant's output is mainly directed at the US market but also supplies the domestic and other Central American markets. The company (28) has indicated its intention to establish other joint-venture fabricating facilities in the Dominican Republic, Puerto Rico and possibly Jamaica in order to expand its trade with regional markets and facilitate exports to North America and Europe under the various preferential tariff arrangements.

In respect of trade in bauxite and alumina it was earlier indicated in Section 3.1, Table XXVIII and Section 3.1 (b), that Jamaica (alumina only), Suriname and Guyana have supplied alumina and bauxite to Brazil and Venezuela through INCO intercompany transactions and more recently, through government-to-government arrangements.

With the commencement of bauxite production in Venezuela and the plans for expanded production of alumina in both Venezuela and Brazil, the volume of trade in these commodities may decline (See Table XXVIII) in the short term. On the other hand, the massive aluminium smelter expansion projects being implemented in Venezuela are likely to generate a demand for imported alumina in the medium term and hence provide some market opportunities for

(28) Discussions between executives of INCO and Alcasa, July, 1988.

Caribbean bauxite and alumina producers. This has already begun with a Venezuelan 1.1 mmt supply agreement for bauxite from Guyana. The Brazilian government-owned aluminium producers are also likely to export alumina in the early 1990s to make up anticipated deficits indicated in Table LXVI below.

TABLE LXVI: Projected Brazilian Government-owned Alumina:Aluminium Capacities 1991-1995 (TMT)

	1991	1992	1993	1995
Aluminium	632	632	692	790
Alumina Requirement	1264	1264	1384	1560
Alumina Production*	1020	1020	1020	1020
	-244	-244	-364	-540

*Assuming Alunorte Alumina Plant capacity of 500 t.a.t.

SOURCE: JBI.

The likely alumina deficits in Brazil and Venezuela are expected to develop against the background of some idle alumina capacity in both Jamaica and Guyana. In the case of Jamaica, alumina capacity utilization is presently just over 50% (1.6 m tonnes out of total capacity of 3.0 m) although capacity utilization is slated to rise dramatically by early 1989 with the re-opening of the shuttered Alpart plant. Nevertheless, some excess capacity is expected to remain in the early 1990s. In Guyana, the country's only alumina plant, of 300,000 tonnes capacity, has been closed since 1982 although the government is actively seeking to rehabilitate it. Feasibility studies have been conducted by various groups including Reynolds and Hydro Aluminium of Norway. The Brazilian government has also pledged assistance (including credit) for the restarting of the plant [29].

Given the debt problems of the Region, the resulting capital shortage, the extremely high cost of new alumina capacity and the cost competitiveness, especially of the Jamaican bauxite/alumina sector it appears that considerable production complementarities between the Caribbean and South America exist in the alumina field. These complementarities could extend to fabricated products as well given the Caribbean Area's advantage in labour cost and its access to preferential trade arrangements with North America through CBI and CARIBCAN and with the EEC through the Lomé Convention. The operation of tolling or equity arrangements involving alumina, aluminium and fabricated products could provide a basis for exploring these complementarities. The issues surrounding such arrangements and the details of alumina and aluminium production will be discussed in Section 6.0.

[29] Metals Week 5/9/88, Metal Bulletin 20/9/88.

TABLE EXHIBIT 10 - TRADE WITH USA, JAPAN AND EUROPE (US \$)

	1982		1983		1984		1985		1986		1987	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
USA	10,743.1	8,969.3	12,981.1	5,519.6	13,704.1	7,315	13,145.0	8,633.1	10,551.7	7,385.8	13,322.4	7,675.7
JAPAN	1450.3	854.5	1,535.2	372.7	1,905.0	518.5	1,719.5	734.8	1,057.8	684.3	1,348.9	795.4
EUROPE (EEC & EFTA)	2,825.4	2,666.6	2,555.9	1,371.9	2,920.2	1,676.2	2,324.4	1,845.9	2,288.9	2,195.9	3,120.5	2,326.0
TOTAL	15,918.9	12,490.4	17,072.2	7,264.2	18,529.3	9,509.7	17,189.4	11,213.8	13,998.4	10,266	17,792.9	10,997.1
% of total imports and exports with all countries	77.1		78.9		79.1		81.4		80.3		87.6	

SOURCE: DIRECCION GENERAL de ESTADISTICA SECTORIAL INFORMATICA,
SISTEMA de ESTADISTICA de COMERCIO EXTERIOR, MEXICO

7.0 MAIN COMMERCIAL FLOWS OF THE CARIBBEAN AREA (INCLUDING MEXICO) WITH THE USA, JAPAN AND EUROPE

7.1 OVERVIEW

The USA, Europe (EEC & EFTA) and Japan represent the largest trading partners of the countries in the Caribbean Area, except Cuba, with the USA being the single largest followed by Europe.

TABLE LXVIII: CUBA'S TRADE WITH WESTERN EUROPE AND JAPAN (000 pesos)

COUNTRY	1981	1982	1983	1984	1985	1986
Europe (EEC & EFTA)	771,992	524,529	679,765	686,156	727,705	872,235
Japan	278,905	207,233	154,896	267,484	297,821	374,926
	1,050,897	731,862	834,661	953,640	1,025,526	1,247,161
% of total trade with all countries	11.3	7.9	7.1	7.5	7.3	9.7
Eastern Europe	6,879,005	8,500,456	9,743,211	10,452,609	11,631,112	10,364,007
% of total trade with all countries	73.7	81.2	82.9	82.3	82.9	84.3

SOURCE: ANUARIO ESTADISTICO DE CUBA, 1986
COMITE ESTATAL DE ESTADISTICAS

The data contained in Table LXVII indicate that in 1986 and 1987 nearly 90% of Mexico's overall trade was conducted with the USA, Europe and Japan. Jamaica, Trinidad and Tobago and the Dominican Republic averaged over 60%. Cuba's trade with Europe, the EEC and EFTA (Table LXVIII) has remained at about 1 billion pesos (US\$1.2 billion) per annum over the 1981-1986 period and in 1986 represented approximately 10% of its overall trade. Eastern Europe accounts for over 80%.

Trade between the groups is characterised by the flow of capital goods and consumer durables from the USA, Japan and Europe to the Caribbean Area and the export of primary commodities from the Area.

7.2 TREND IN TRADE BETWEEN THE CARIBBEAN AREA AND USA, EUROPE AND JAPAN

The volume of trade has been affected by the generally depressed level of the world economy in the early 1980s and the moderate growth rates of the mid 1980s as well as the drastic decline (currently at half of the 1985 level) in oil prices since December 1985.

The recession of the early 1980s resulted in a decline in exports of most of the primary commodities from the Area. The Dominican Republic and Jamaica were most severely affected by cut-backs brought about by the recession and experienced serious declines in the export prices and volumes of sugar, bauxite and alumina, ferronickel, silver and other commodities.

TABLE LXI: DOMINICAN REPUBLIC'S TRADE WITH
USA, JAPAN AND EUROPE - 1981

COUNTRY	1981		1982		1983		1984		1985	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
USA	593,713	741,341	469,657	385,408	438,353	503,643	407,646	625,977	452,786	508,569
JAPAN	82,397	15,135	64,596	5,983	55,032	6,973	58,621	15,146	78,357	13,229
EUROPE (EEC & EFTA)	140,245	191,970	145,058	166,864	155,453	131,935	124,767	99,955	139,483	92,260
TOTAL	805,455	948,450	79,521	558,253	648,838	642,551	591,034	741,078	670,626	614,058
% of total imports and exports with all countries	66.5		61.2		62.8		62.7		63.4	

SOURCE: DIRECCION GENERAL de ADUANAS y OFICINA NACIONAL
DE ESTADISTICA, DOMINICAN REPUBLIC

In the case of the Dominican Republic (Table LXIX) the value of exports to the USA, Japan and Europe declined by 41% between 1981 and 1982 and up to 1985 had not recovered to the 1981 level. Imports also fell by 26.7% between 1981 and 1984.

It should be noted that although the share of the Dominican Republic's trade accounted for by these areas has declined it still remains at over 60%. The USA's share fell to 47.4% in 1985 from over 50% in 1981 with the fall in the price and volume of sugar exports being mainly responsible. The present improvement in commodity prices, especially for nickel and silver, is expected to lead to the restoration of the levels of trade existing prior to the declines of the early 1980s.

TABLE LXX: JAMAICA'S TRADE WITH USA, EUROPE AND JAPAN 1983-87
US\$(000)

Country	1983	1984	1985	1986	1987
USA	728,706	697,930	667,416	680,301	843,398
Europe (EEC & EFTA)	372,579	266,998	258,740	313,363	418,553
Japan	50,423	41,469	88,152	42,706	57,666
	1,151,708	1,206,397	1,014,318	1,036,370	1,319,617
% of total trade with all countries	58.9	53.9	60.4	66.5	68.5

SOURCE: STATISTICAL INSTITUTE OF JAMAICA

Jamaica's trade with the USA and Europe (Table LXX) declined consistently between 1981 and 1986 largely as a result of the significant reductions in bauxite and alumina exports to these areas. Consequently, the proportion of the country's total trade accounted for by these areas declined to 58.9% in 1983 before recovering to 68.5% in 1987. This turnaround has been largely due to the recovery in the bauxite and alumina sector where export revenues in 1987 increased by approximately 36% over the 1985 level. It is expected that continued improvement in the aluminium industry, especially with respect to prices, will lead to further expansion of trade with these areas.

TABLE LXII: TRINIDAD AND TOBAGO'S TRADE WITH THE USA, JAPAN AND EUROPE \$ TT 1000

COUNTRY	1981	1982	1983	1984	1985
USA	6,739,352	6,544,391	5,786,035	4,706,473	4,656,756
Japan	483,319	641,599	600,066	510,410	358,859
Western Europe (EEC & EFTA)	2,522,620	2,702,709	2,120,841	1,756,233	1,474,065
	9,744,291	9,888,799	8,506,942	6,982,116	6,489,680
% of total imports and exports	59.1	60.1	72.0	71.1	72.2

SOURCE: OVERSEAS TRADE, 1985 - PARTS B&C.
CENTRAL STATISTICAL OFFICE,
REPUBLIC OF TRINIDAD & TOBAGO

Trinidad and Tobago has, perhaps, witnessed the greatest decline of all the Caribbean Countries in the level of trade generally and also with the USA, Japan and Europe. The figures in Table LXII show that the decline was in the order of 33% or US\$1,356 million between 1981 and 1985. The cut-back in petroleum exports was the overriding reason for this slump. The share of the country's trade accounted for by the USA, Japan and Europe increased from 59.1% in 1981 to 72.2% in 1985 indicating that the fall in trade with other countries was greater than that with this group. (In fact, within the CARICOM group, Trinidad and Tobago was the main casualty of the attempts by other member countries to divert trade to hard currency areas in the face of the debt crisis and payments deficits. In this respect, the trade with Jamaica declined by 60% between 1983 and 1986 before recovering significantly in 1987). The continued depressed level of petroleum prices and the extremely high proportion of export revenues derived from this single product will continue to adversely affect Trinidad and Tobago's external trade and its general economic prospects.

Mexico's trade with the USA, Japan and Europe declined by 11.5% between 1982 and 1983 but increased thereafter moving up by 16.7% between 1983 and 1985 before falling in 1986 by 14.6% to the lowest level for the 1980s. It recovered once again in 1987 growing by 18.6% to the highest level (current prices) for the 1980s. The decline in oil exports (value and volume) in

the mid and late 1980s has been the main factor responsible for the reduction in trade between Mexico and the USA, although non-oil exports increased by 43% in 1986, and also Japan oil exports declined by 44.7% in 1986, and Western Europe.

7.3 TRADE IN NON-FERROUS METALS BETWEEN THE CARIBBEAN AREA AND THE USA, JAPAN AND EUROPE

Trade in aluminium has been affected by the economic recession of the early 1980s and the changing loci of the industry which in turn has led to a reduction in the relative size of the US industry. In addition, economic difficulties, primarily the contraction of export revenues and the increasing percentage of these revenues absorbed by debt payments, have resulted in decreases in the imports and consumption of aluminium particularly in Mexico and Trinidad (See Tables VI, XXVII and XXXV), the major users in the area. Hence, overall trade in aluminium with the USA and to a lesser extent Europe has declined in recent years although Mexico, due to the increasing competitiveness of its industry, has increased its exports of primary aluminium to the USA in the same period.

Jamaica's declining export earnings have similarly adversely affected its ability to import aluminium products although some recovery was experienced in 1986 as indicated in Table LXXII below.

TABLE LXXII: JAMAICA'S IMPORTS OF ALUMINIUM PRODUCTS. (MT)

	1983		1984		1985		1986	
	Quantity	Source	Quantity	Source	Quantity	Source	Quantity	Source
Unwrought Aluminium	1454	Canada	804	Canada	860	Canada	1294	Canada-955
Wrought products*	380	USA - 177 UK - 99	594		239	Venezuela - 168 UK	18	
*bars, rods, angles, wire, plates:								
Sheets, strips	1197	USA - 242 Can. - 357	1651	USA 530 Can. 415 UK 369	936	UK 415 Can 202 USA 110	350	Canada - 220 USA 181
Aluminium foil	361	UK - 197	473	USA 164 UK 143	254	USA 127	309	Switzerland - 119
Tubes, pipes & fittings	65		65		96	USA - 79	51	
Structures	96	USA 48	134		116	USA - 115	59	
Cans, drums	129	USA UK	196	USA 124	174	USA 53 Can. 45	175	
Other Articles	81	USA	88		72	USA	78	
	3803		4015		2769		2514	

SOURCE: STATISTICAL INSTITUTE OF JAMAICA

Trade in aluminium related products with the USA, Canada and Europe, the principal purchasers of its bauxite, and alumina and also its major supplier of aluminium products, fell significantly in the mid 1980s. As indicated in Table XXVIII bauxite exports to the USA fell from 6.06 million tonnes in 1980 to 1.54 million in 1985 and alumina exports to North America and Europe declined from 1.939 million tonnes in 1980 to 1.485 million tonnes in 1985. It should also be noted that

the value of these exports also fell dramatically in the same period. Data in table LXXIII below demonstrate the large declines in revenues from the bauxite/alumina sector of Jamaica - a situation not unusual for Third World commodity producers and which underlines the sharp decrease (Table LXXIV) in the purchasing power experienced by developing countries generally.

TABLE: LXXIII EARNINGS FROM THE JAMAICAN BAUXITE/ALUMINA SECTOR
1980-87 (US\$m)

YEAR	EARNINGS
1980	326.9
1981	314.1
1982	385.7
1983	250.8
1984	232.6
1985	143.5
1986	175.0
1987	195.0 ^a

a - provisional

SOURCE: JBI

WORLD TRADE SUMMARY
 TABLE LXIIV: ANNUAL RATES OF CHANGE (%) IN VOLUME AND PRICES BY MAIN
 COUNTRY GROUPS IN 1985, 1986 AND 1987 (Forecast)

Country Group	1985	1986	1987
	Actual	Estimated	Forecast
World:			
Export Volume	2.3	4.0	3.0
Developed market-economy			
Export Volume	3.5	1.7	3.4
Terms of Trade	1.0	7.9	0.2
Purchasing power of exports	4.5	11.6	3.6
Import Volume	5.4	7.7	4.9
All developing countries:			
Export Volume	-0.8	10.0	1.7
Terms of Trade	-3.0	-23.2	-2.6
Purchasing power of exports	-4.0	-15.5	-0.9
Import Volume	-5.9	-7.9	-2.5

SOURCE: BASED ON TRADE AND DEVELOPMENT REPORT
 1987, UNCTAD

The general decline in trade between the Caribbean Area and the USA, Japan and Europe and specifically in aluminium related products has therefore left the Area with idle capacity in bauxite and alumina. The current trend towards increased demand for these commodities is likely to lead to reactivation of some of these facilities. However, this should not divert attention from the opportunities for regional co-operation which are discussed in Section B.0.

**3.0 ANALYSIS OF THE POSSIBILITIES OF RE-ORIENTING EXTERNAL
COMMERCIAL RELATIONS TO REINFORCE COMPLEMENTARITIES
WITHIN THE CARIBBEAN AREA THE LATIN AMERICAN REGION**

The decade of the 1980s has presented the Latin American Region with severe problems in the form of difficulties associated with debt payments, a significant fall in export revenues (due in large measure to the decline in oil prices), and the resulting decline in economic growth and the curtailment of economic development programmes. At the same time, however, changes in the structure of the world economy (induced by factors such as the increase in energy costs and especially in the loci of energy-intensive industries such as aluminium) have provided important opportunities for the future development of the Region. These opportunities can lead to far-reaching steps in regional co-operation if the appropriate mechanisms can be established to combine the bauxite and energy resources and the increasingly sophisticated industrial manufacturing capacity (primarily in Brazil, Argentina and Mexico) of the Region to take advantage of all the possible production complementarities and preferential trading arrangements.

**3.1 FACTORS ACCOUNTING FOR THE DOMINANCE OF THE USA, JAPAN AND
EUROPE IN THE ECONOMIC AND COMMERCIAL RELATIONS OF THE
CARIBBEAN AREA**

The fundamental aspects of the economic and commercial relations between the Caribbean Area and the USA and Europe were established during the periods of colonial rule in the respective territories. These relations, especially in the case of Europe, were structured around the exchange of goods and services on terms determined by the colonial powers, and maintained by various political and economic mechanisms which have resulted in unequal terms of exchange. Relations with the USA (except in the case of Cuba, Puerto Rico and Haiti, were largely determined by that nation's emergence in the 20th century as the major home of finance capital and the rapid development of TICS in a plethora of economic activities including mining, banking, manufacturing, agro-industry, petroleum exploration etc.

Following Japan's recovery from World War II and its speedy transformation into an industrial giant, it has also become an important source of finance capital and the base of huge conglomerates which have established transnational operations that now rival and in some cases outstrip, those of the USA and Europe.

As is well known, Cuba's economic and commercial relations with the USA have been severed since the early 1960s. Its relations with Japan have expanded in the 1970s and 1980s and as was earlier indicated trade with Western Europe, which is its second largest trading partner, has sustained moderate growth

over these periods. Of course, there are no subsidiaries of TNCs in the country and commercial relations are limited to trade and loan financing.

The continued dominance of the USA, Japan and Europe over the economic and commercial relations of the Caribbean and Mexico rests on several bases:

- a) the vast ownership stake of TNCs, especially, American and European, in the economies of the Area;
- b) the dependence of the Area on the markets of these metropolitan areas for minerals, agricultural and raw materials exports;
- c) the underdevelopment of the Area's capital goods industries and its reliance on the technology of these areas;
- d) the powerful financial links established by the banking system of these countries, mainly USA and Europe, in the Area and the activities of the international and bilateral lending and development agencies such as the IMF, IBRD, US EXIM Bank, USAID, CIDA, ODA etc.
- e) the debt crisis which emerged in the 1970s and has escalated in the 1980s.

The importance of the factors outlined above can be demonstrated by examining data on the ownership of mining and other industries in the Third World (30), the patterns of trade between the countries under study, the network of the international banking system and the size and composition of the foreign debt of developing countries. Data on the ownership stake of North American TNCs in the Latin American Aluminium and Nickel Industries on a country by country basis was presented in Tables XIV and XIII. Changes in the size of TNC ownership in the Jamaican bauxite and alumina sector and the impact on the sector was described in detail in Sections 3.1.1(a) and 3.1.1(b).

The dangers of the economic dependence of the Area has been the subject of extensive research by several Caribbean and other scholars. The formation of CARICOM and various attempts by some regional leaders to diversify economic relations have not, to date, resulted in any dramatic change in the status

[30] Financial Aspects of the Copper and Aluminium Industry, Magnus Ericsson, First Consultation on the Non-Ferrous Metals Industry, Budapest, December 1987.

9.2 RECENT TRENDS AFFECTING ECONOMIC AND COMMERCIAL
RELATIONS OF THE CARIBBEAN AREA.

As earlier indicated, the economic recession of the early 1980s, the debt problems in Latin American countries generally and the slump in oil prices and exports have severely strained the economies of the Area [31]. The total foreign debt of the Latin American Region increased from US\$127 billion in 1978 to US\$410 billion in 1982. This development resulted in a net transfer of US\$22 billion from Latin America in 1982 alone [32]. These adverse factors have brought about a general decline in economic growth with consequential cuts in production, consumption, and trade. Trade data in Tables LIII-LV clearly indicate that exports and imports between the countries have declined over the period although there has been some recovery in the mid 1980s.

The countries of the Area, including Mexico are presently operating at reduced levels of economic activity in several important industries. These range from petroleum to agro-industry where the dependence on export markets in the USA, Japan and Europe is to some extent reinforced by the debt crisis and shortfalls in hard currency earnings.

The existence of idle capacity in some mining and manufacturing industries in the Area is likely to continue for some time, even in the face of recent strong economic performance by the OECB countries, as a consequence of:

- a) the declining intensity of raw material input per unit of output in manufacturing industries;
- b) maturation of some metal markets and hence lower growth of consumption;
- c) the worldwide over-capacity in some industries.

The negative developments in the economic and commercial relations of the Area vis-a-vis the USA, Japan and Europe has also influenced these relations with other countries generally and severely tested the integration movements in CARICOM and ALADI.

Hard currency shortages and the consequential move by some member countries to divert trade away from CARICOM to third country markets as well as the absolute decline in the export capacity of others has resulted in the reduction of trade within the grouping and the breakdown of the Caribbean Multi-lateral Clearing Facility (CMCF) which had been established to promote intra-regional trade. Data contained in table LV shows the decline in trade between Jamaica and

[31] Trade and Development Report, 1987, UNCTAD.

[32] Caribbean Development Bank, Inter-American Development Bank.

Trinidad and Tobago over the past 4-5 years and is symptomatic of the general situation in the grouping. Table LXXV below shows the dramatic decline in CARICOM trade after 1983.

TABLE LXXV: CARICOM TRADE: 1980 - 87

COUNTRY	1980	1981	1982	1983	1984	1985	1986	1987 P
TRINIDAD & TOBAGO	229.2	236.3	226.9	200.2	204.0	243.2	127.6	126.0
JAMAICA	57.9	57.7	78.4	97.2	52.9	40.6	42.3	45.7
BARBADOS	42.9	49.4	58.9	60.3	50.3	35.3	29.2	26.7
G.E.C.S.	33.1	51.3	34.5	74.0	74.2	72.9	74.0	74.0
GUYANA	48.2	59.3	46.4	32.1	26.5	24.0	24.0	24.0
BAHAMAS	9.59	5.1	1.2	22.8	17.4	9.5	9.0	9.0
BELIZE	5.0	3.0	7.2	9.3	6.9	3.2	1.4	2.0
TOTAL	415.09	471.1	453.4	495.9	432.3	429.0	306.5	307.4

P-Provisional

SOURCE: CARIBBEAN DEVELOPMENT BANK, 1988.

Mexico's commercial relations with Caribbean countries are limited to its exports of petroleum - the value of which has declined in response to the fall in oil prices. In the case of Jamaica, however, this has been more than compensated by an increase in volume during the 1987-88 period. The San Jose Accord on the terms of oil supply by Venezuela and Mexico to Caribbean countries offers some concessions on the payment terms with approximately 33% of the value of payments in a given year being available for financing of long term development projects at concessional interest rates. Mexican imports from these countries is negligible due partly to the similarity in the available export commodities and the uncompetitiveness of Mexican manufactured goods. This latter is a result of the import-substitution oriented nature of such of Mexican manufacturing industry. This is changing rapidly, however, with the creation of export zones in several areas of the country adjacent to the US border and the rapid rise in non-oil exports noted in Section 7.2.

The situation in the aluminium and nickel industries has been mentioned earlier in Sections 3.1 and 3.2. The Area possesses significant idle capacity in bauxite and alumina with Jamaica, Guyana, Suriname, the Dominican Republic and Haiti producing oil well below installed capacity or not at all. Attempts have been made before and during the recession of the early 1980s to find new markets for these products (especially by

Jamaica, Guyana and Suriname) and arrangements have been implemented with the USSR, Venezuela etc. However, USA and European markets still remain dominant (See table (XVII)).

Nickel production has been increasing in the last 18 months in response to the recovery of consumption worldwide. Production in the Dominican Republic (See Table XVII) is approaching full capacity and as mentioned earlier exports are tied to markets in the USA, Europe and Japan. No significant attempts have been made to supply regional markets although these are generally in a depressed state at the present time.

The Cuban industry has been recovering (See Table XVII) from the depressed market conditions as well as technical problems. The new facilities at Punta Gorda when fully commissioned should place it in a good position to significantly expand production. Cuba has traditionally maintained long term supply arrangements with Mexico and will perhaps extend these to other regional markets in line with increasing diplomatic and trade ties with these countries (See Table LXIV).

8.3 OPPORTUNITIES FOR THE RE-ORIENTATION OF ECONOMIC AND COMMERCIAL RELATIONS TO REINFORCE COMPLEMENTARITIES

The contraction in worldwide economic activity in the early 1980s and the recession in the mineral industries have presented significant opportunities for the re-orientation of commercial relations in these industries and the diversification of export markets generally. These opportunities are based on the restructuring of production internationally and the changing loci of some of the major industries concerned [33]. In the aluminium industry the major TNCs have indicated their intention to concentrate more of their activities in the higher, value-added, areas and to diversify into engineered materials. The relatively high cost of energy in some of the major traditional alumina and aluminium producing areas has also impacted significantly on the competitiveness of these areas and presented new opportunities for energy surplus regions. These industry developments together with the general economic difficulties in the early 1980s have forced a re-examination of existing economic and commercial relations by Latin American countries [34].

[33] The Changing Geography of Bauxite Production and its Impact on the World Aluminium Industry. C. E. Davis. Metals Bulletin Aluminium Congress, 1982.

[34] Latin American Integration at the end of the Eighties - achievements and failures. Juan Mario Vacchino, Director of INTAL, May 1988.

**8.3.1 POSITIVE INFLUENCES ON FUTURE REGIONAL CO-OPERATION
INITIATIVES**

The important factors underpinning the new opportunities are identified as:

- a) the existence of underutilized bauxite and alumina production capacity (See tables VII and IX) in the Caribbean Area coinciding with the expansion of smelter capacity in Venezuela [35] and Brazil [36] and the availability of idle fabricating facilities primarily in Mexico (See Tables XI and XII);
- b) the comparative advantages over Latin America enjoyed by the Caribbean Area in bauxite and alumina production as illustrated in Table LXXVI and by Venezuela and Brazil in aluminium: [37]

[35] 'Aluminium' by Aluminium - Verlag GMBH, 1988; Light Metal Age, December 1986; NBM Aluminium Supplement, November 1986.

[36] Synthesis of the Brazilian Economy, Gabriel Gabeira Luis, Rio de Janeiro CNC, 1987; Economist, April 25, 1987; South Magazine, July 1987; Metals Week, October 24, 1983; Mining Magazine, January 1983;

TABLE LXVII: Production Cost Data for Bauxite and Alumina for Selected countries, 1986

Country	(US\$ per tonne)	
	Bauxite (a)	Alumina (c)
Guinea	31.1	118
Brazil	26.0	130
Jamaica	24.5	114
Venezuela		132
Guyana	22.0	N/A
Suriname	28.0	140
Australia(b):		102(d)
Meica	18.0	
Gove	17.6	

- (a) Net F.O.B. cost to purchasers including interaffiliate transactions.
- (b) After allowing for quality differences.
- (c) Variable cost plus ocean freight (where relevant).
- (d) Gove.

SOURCE: IBA, JBI, I.A.D.B., Resource Strategies Inc. U.S.A.

c) preferential trading arrangements enjoyed by the Caribbean countries with the USA (CBI), Canada (CARIBCAN), EEC (Lomé) and the changing approach by the USSR and other Eastern European countries to industrial organization and their increasing abandonment of autarchic models of development;

d) the comparative advantages of Latin American countries in the production of raw material inputs for the alumina and aluminium sectors (caustic soda, petroleum coke) - enhanced by the declining level of investment by extra-regional producers of these products;

- e) the dilution of TNC ownership and control at the primary stages of the industry and the consequential reduction in investment in Third World producer countries in favour of increased concentration on downstream activities [38]. The increasing role of the state sector of the various regional producers in the industry will likely remove the obstacles to co-operation which were presented by the TNC's complete dominance in the past;
- f) the increasing capacity of the larger regional economies to produce capital goods required by the industry (in the case of Brazil 95% of mining equipment and 90% of machinery and equipment for refineries and smelters are produced locally [39] and the growing collaboration between regional countries in joint-venture projects in capital goods industries (Latin Equis - Brazil, Mexico and Argentina);
- g) the increasing competitiveness of manufactured goods produced in the Region vis-a-vis similar goods imported into the Region from third country producers as a result of exchange rate adjustments, the transformation of uncompetitive import substitution industries and the adoption of export-led development strategies;
- h) the increased sophistication of counter-trade and other payment mechanisms in international trade as well as the increased use of multi-lateral and bi-lateral reciprocal credit agreements [40], clearing facilities such as the multi-lateral clearing system of ALADI (Santo Domingo Agreement), CARICOM, (CMCF); and
- i) various joint-venture projects and tolling agreements based on the offtake of products. Specific provisions and regulations on counter-trade have been adopted by several regional countries including Bolivia, Colombia, the Dominican Republic, Ecuador, Guatemala and Nicaragua. Other countries such as Brazil, Jamaica and Uruguay, in recognition of its role in trade creation, have been using this

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- [38] Financial Aspects of the Copper and Aluminium Industry, Magnus Ericsson, First Consultation on the Non-Ferrous Metals Industry, Budapest, December, 1987.
 - [39] CVRD MRN, Brazil.
 - [40] Exchange Arrangements and Exchange Restrictions, Annual Report, IMF, 1987.

instrument extensively since the beginning of the 1980s as a result of the intensification of the debt crisis and the shortage of hard currency arising from the decline in export revenues.

8.3.2 OBSTACLES TO THE DEVELOPMENT OF REGIONAL CO-OPERATION

The positive factors however, have to be assessed against the background of major difficulties experienced in the attempts at regional co-operation - both within CARICOM and ALADI. These difficulties revolve around the following:

- a) the secondary role of integration in national development policy, the disparities in the content of economic policies and the problems of harmonising the plans of various governments [41];
- b) the differing capacity of participating countries to take advantage of trade and production opportunities and the difference in economic size and level of development;
- c) insufficient development of physical infrastructure and transportation between regional countries (the decline in the activities of NAMUCAR, the regional shipping line is an example);
- d) the low level of participation and co-ordination by entrepreneurs and business associations, workers organizations and other groups in supporting moves towards regional co-operation;
- e) the shortage of medium term capital necessary to expand export credit due to stagnation in economic growth, the constraint of liquidity shortages on the expansion of trade credits as a result of the debt crisis and the continuing challenge of devising suitable payment mechanisms;
- f) the limitations arising from the political conditions of the various countries and as far as the English speaking Caribbean is concerned, the cultural barriers to Spanish America developed during colonialism;

[41] Latin American Integration at the end of the Eighties - achievements and failures, Juan Mario Vacchino, Director of INTAL, May 1988.

- e) the lack of co-ordination in tariff systems especially between ALADI and CARICOM countries and also the weaknesses in the process of harmonising tariffs (more particularly as these are often used for revenue purposes and not as instruments of trade policy) within each trading group; and
- n) export orientation to hard currency markets to meet debt payment requirements.

In response to the difficulties posed by differences in the level of economic development and economic policies and the inertia impeding the long range institutionalization of credit and currency arrangements and the harmonisation of tariff arrangements, regional co-operation schemes have been developed on the basis of 'accords by pairs or groups' [42]. This approach has developed as a pragmatic response to the diversity of economic policies and the failures in harmonising these policies in the ALADI grouping of ten countries. The EEC evolved in a similar manner with the BENELUX grouping preceding the six-country common market.

Argentina/Uruguay, Brazil/Uruguay, Brazil/Mexico, Argentina/Brazil, Mexico/Uruguay Accords have been established covering trade, payment arrangements, and joint-ventures. The Argentina/Brazil Accord emphasises joint-venture industries to exploit complementarities and is open to participation by other ALADI countries. This approach is manifested in projects for the joint production of automobiles and also in the formation of Latin Equip a joint Argentina/Brazil/Mexico project [43] to produce machinery and equipment.

It is noteworthy that the various Accords referred to emphasise the need for a gradualist and selective approach to economic integration. The selective harmonisation of tariffs has been accorded high priority as have also mechanisms for addressing trade imbalances.[44]

8.4 SPECIFIC AREAS OF POSSIBLE PRODUCTION COMPLEMENTARITIES IN THE NON-FERROUS INDUSTRY OF THE CARIBBEAN AREA AND LATIN AMERICA

8.4.1 POSSIBLE PRODUCTION COMPLEMENTARITIES IN THE ALUMINA INDUSTRY

Several areas of possible production complementarities exist in the aluminium industry of Jamaica, Mexico and Venezuela. Factor endowments (abundant bauxite and energy resources) have important bearing on the possible areas but some of the

[42] Latin American Integration at the end of the Eighties - achievements and failures. Juan Mario Vacchino, Director of INTAL, May 1988.

[43] Inter-American Development Bank.

[44] Latin American Integration at the end of the Eighties.

particularities of the present stage of development in the worldwide industry and the conditions in the Region are also extremely important. The areas identified in this study are:

1. alumina and ingot production;
2. semi-fabricated and fabricated goods production;
3. caustic soda production;
4. petroleum coke.

8.4. 1 (a) ALUMINA AND INGOT PRODUCTION

The Venezuelan aluminium smelters are recognized by industry experts as being the cheapest producers at the present time. This is due largely to the extremely competitive cost (6 mills compared to the worldwide average of 15) [45] cost of electric power supplied by the Guri hydroelectric scheme. On the basis of the wide differential in operating cost vis-a-vis US and European smelters, due largely to this cheap energy, and the large capacity still available, the Corporacion Venezolana De Guayana (C.V.G.) has developed a long term development plan geared to increasing smelter capacity from the present 435,000 tonnes to over 1 million tonnes by the early 1990s and to 2 million tonnes by the year 2000.

Present indications are that equity and loan financing arrangements (including debt/equity swaps) have been finalised for four smelter projects: Alusur (120,000 tonnes capacity to come on stream starting in 1990 and owned by CVG, SURAL and Nicobar); Alisa (capacity of 100,000 tonnes with production commencing in 1990); Aluvana (360,000 tonnes capacity to be jointly owned by CVG, VIF and Italmontali); and Alamsa (180,000 tonnes capacity to be jointly owned by CVG, Austria Metall and Pechiney with the start-up of production by 1992).

Doubts have been expressed in some quarters as to the capacity of Venezuela to undertake these projects simultaneously. It appears from public announcements and other well-informed sources [46] that the financing and engineering inputs can be met. However, the infrastructural requirements (ports etc.) to handle this volume of anticipated activity may be more difficult to put in place within the stated time framework.

Importantly, the plan proposes a fully integrated industry and to meet the alumina and bauxite requirements of the expanded smelter capacity. CVG is proposing to raise the capacity of the Inter-Alumina refinery to 2 million tonnes from the present 1.3 million and to establish bauxite capacity of 3 million tonnes by the mid-1990s. The choice of expanding alumina capacity

[45] Third Arab Aluminium Conference, Dubai, 1987.

[46] On the spot visits by JBI officials and other industry personnel in the period July-October, 1988.

further to 3 million tonnes or to report the additional 1-2 million tonnes, which will be required on the basis of the smelter projects being planned, is still being considered by CVG [47].

Based on the available (mid 1983) production cost data for bauxite and alumina operations in Jamaica, (average of \$24.50 and \$114.00 operating costs per tonne respectively) and similar for Bauxiven and Inter-Alumina (average of \$30.00 and \$132.00 per tonne respectively), it is clear that Jamaica possesses a significant comparative advantage in the production of bauxite and alumina. This is even more pronounced if capital charges for bauxite production (Jamaica US \$ - /tonne, Bauxiven ca. US \$120 / tonne) are included. Thus the fact that the Jamaican capacity is already in place is an important consideration.

The terms of oil supply under a joint venture / tolling arrangement could, of course, place Jamaica's operations at a further significant advantage and strengthen the case for specialization in the production of alumina. Similar arguments apply to bauxite production in Guyana from which Inter-Alumina is already purchasing bauxite.

Jamaica's near total dependence on imported fuel for the economy as well as for the bauxite and alumina sector prohibits it from directly smelting its alumina and therefore any downstream participation must be contemplated on the basis of joint-venture or tolling arrangements in smelter operations located elsewhere. Possible joint-venture tolling partners include Venezuela, Mexico, US operators and Trinidad & Tobago in the unlikely event, in the latter case, that the capital resources could be mobilised. Arrangements with Venezuela could involve the exchange of alumina for inoot which in turn would be processed in jointly owned fabrication facilities for domestic regional markets and export to extra-regional markets. In the case of Mexico co-operation could involve the exchange of inoot, secured through alumina tolling arrangements, for fabricated products to meet domestic regional markets or for export to extra-regional markets.

In regards to Guyana and Suriname similar joint-venture/tolling arrangements could be considered for bauxite supply and possibly alumina-although ownership issues may pose some obstacles in respect of the latter.

These scenarios are based on the significant savings in time and capital resources and the comparative advantages which would be realized from regional co-operation. The possibility of these resources being used to improve the efficiency of regional production at all stages as well as to extend the overall participation in higher value-added downstream facilities demonstrates that the utilization of existing primary complementarities leads to secondary ones in an ongoing process of even greater integration. Of course, the savings realized and the stimulation of regional economies

arising from the socialization of production would also contribute to increasing regional consumption of aluminium thereby further strengthening the regional industry.

2.4.1 (b) SEMI-FABRICATED AND FABRICATED GOODS PRODUCTION

The Latin American Region has a capacity of 1.125 billion tonnes of semi-fabricated products (Section 2.1.3). Output of these products is consistently below full capacity and Mexico, in particular, has witnessed dramatic declines in capacity utilization since 1985 when the highest rate of 64% was achieved - the 1986 level was 36%. During the same period, Venezuela has been increasing its capacity and production by leaps and bounds with production increasing by 376% in the 1976-86 period (See Table XI) and capacity is projected to grow by 53% from the present level of 227,400 tonnes to reach 348,400 tonnes by 1990.

Given the presently idle capacity in Mexico of almost 100,000 tonnes which is spread over the range of products to be produced by Venezuela, the high capital costs involved in establishing new capacity (\$3,000 per tonne for rolling mill) [48], the availability of skilled labour at competitive rates in Mexico and the lesser importance of energy at this stage of production vis-a-vis smelting, important complementarities exist which suggest possible joint-venture projects for aluminium fabrication between these countries. These projects would be based on Venezuela supplying ingot to Mexico on a tolling or other basis with the product being exported to markets within and outside of the Region.

The savings in capital charges could amount to 15-20% of total production costs per tonne thus improving market competitiveness while stimulating regional demand and increasing the viability of the regional industry overall. Furthermore, the capital saved could be used instead to expand capacity in final goods production to compete with imported products, especially for the automobile industry, to improve the efficiency of alumina capacity in other regional countries (Jamaica, Brazil, Guyana) or to create new industries to produce other raw materials required by the industry generally - caustic soda, petroleum coke, aluminium fluoride, synthetic flocculants etc.

Consideration could be given to new capacity in semi-fabricated products in Jamaica, Dominican Republic, Trinidad and Tobago or other Caribbean territories benefitting from the CBI, Lomé or CARIBBEAN preferential regimes. Since the production of these items are not energy but labour intensive and given the competitive labour rates of these countries, it is logical that the creation of new capacity in line with the expansion in smelter capacity and metal production and the need to increase regional value added by expanding downstream activities, should be focussed on the Caribbean countries. As mentioned in Section 2.3, there are some signs that the Venezuelan industry

is already gearing in this direction with the equity participation by Alcasa in the Alunasa rolling mill facility (40% Alcasa and 60% Costa Rican private sector) in Costa Rica (49) and its plans for the establishment of other joint-venture fabricating facilities in the region, possibly in the Dominican Republic, Puerto Rico and Jamaica.

In the case of joint-venture projects between Venezuela and Jamaica, tolling and/or equity arrangements involving alumina supply in exchange for metal would ensure that conditions regarding value-added or local content are met. Production from such joint-venture facilities would of course replace present imports from the USA, Canada and Europe (See Table LXIII).

The major obstacles to the expansion of production to semi-fabricated products in Mexico would perhaps arise from the fact that the industry there is privately owned, in some cases by INCS, and consequently conflicts of interest may arise. This potential problem could be tackled by working firstly with the larger firms such as Grupos Aluminio.

On the Venezuelan side, the fact of state ownership should be an advantage in respect of actions involving trade and other economic policy. The joint-venture tolling arrangement types of co-operation proposed for Venezuela and Jamaica have developed beyond the stage of ten (10) years ago when such co-operation was first mooted. These types of arrangements are now widely practised in the industry by both the state and private sectors including the INCS (notable examples of consortia/ tolling arrangements exist in Brazil, Guyana, Australia, USA and Canada).

3.4.1 (c) CAUSTIC SODA PRODUCTION

The Regional alumina sector at the present annual production level of approximately 5 million tonnes, utilizes over 600,000 tonnes of caustic soda (roughly in a ratio of 10:1).

Except for Venezuela which presently produces 45,000 tonnes per annum and Brazil the Region is totally dependent on imports to meet its requirements for this important raw material.

Available data indicates that the only existing plan for additional production of caustic soda is by Pequiven of Venezuela which has announced a project to produce 134,000 tonnes per annum by 1991. On this basis the Region will still be facing a vast deficit in supply for the alumina sector.

The Jamaican Government has previously investigated the feasibility of establishing of a caustic/chlorine complex but was unable to identify sufficient end-use industries for the chlorine which would be produced. The Solvay process was also

examined (50) but at the time (1985) caustic soda prices on the world market were significantly below the break-even price required by a plant of this type.

The large size and developed nature of the Venezuelan and Mexican petrochemical industries seem to provide the economic bases for caustic soda/chlorine facilities. The location, size and economics of the plants would be dictated by the scope of the industries which would utilize the chlorine and by the present environmental concerns surrounding its use.

The wild fluctuations in caustic soda production and prices (generated by the ups and downs of the chlorine market) have in the past and also in recent months seriously affected the alumina sector. It is important that over the long run, the Region takes steps to secure caustic soda for this sector especially in the light of smelter expansion plans in Venezuela and Brazil, and the efforts to raise alumina production in Jamaica. The joint-venture/tolling arrangement type co-operation earlier mentioned in respect of alumina and aluminium could be extended to include caustic soda projects by both Mexico and Venezuela.

In addition a large caustic soda/chlorine industry would spawn large chemical based industries thus expanding the sectoral complementarity horizontally.

8.4.1 (d) PETROLEUM COKE PRODUCTION

Petroleum coke (calcined petroleum coke) is the main ingredient used to manufacture carbon anodes for aluminium smelting, refractory furnace linings for the electro-refining of aluminium and other high temperature requirements and for battery carbon and carbon pencils.

Coke consumption in aluminium smelting is generally on the basis of 0.42 tonnes to 1 tonne of metal (51). Hence, Venezuelan requirements will rise to 420,000 tonnes in the early 1990s on the basis of its expansion plans. Mexico and Suriname are presently consuming 29,400 and 12,600 respectively. Given the economies of large scale production and the Region's sizeable petroleum industry the requirements for this product can be organized on a joint venture basis to utilize production complementarities and maximize economic efficiency taking into account all the factors including transportation. Alcasa is presently establishing a 140,000 tonne plant at Puerto Ordaz. The first phase of the project is expected to cost \$18 million. Expansion of this project could be geared to regional requirements and involve joint investment by other Venezuelan (VENALUM etc) and regional producers.

[50] JBI

[51] Various industry sources and reports of JBI.

**9.0 IDENTIFICATION OF THE MAIN ENTERPRISES/PRODUCERS WILLING
TO REINFORCE THEIR COMMERCIAL AND TECHNOLOGICAL
RELATIONS**

9.1 BACKGROUND

At a general level one of the important negative factors, identified by INTAL and earlier mentioned in Section 8.3.1, operating against regional integration is the low motivation of the business sector. This sector reflects the typical attitude of entrepreneurial classes in the peripheral nations of the international capitalist system [52] which regard the links to the metropole as of greater importance to their survival and development than those with developing nations in their geographical regions. This attitude is manifest in the low level of contact and business relations between the private sectors of regional countries, and in respect of the Caribbean and ALADI groups this is reinforced by cultural barriers.

To a large extent, therefore, commercial relations among ALADI countries and also between ALADI members and the Caribbean Area have been initiated at the level of governments and are mostly sustained by trade between state sector organizations. This limitation has greatly hampered the development of trade and other relations and future measures aimed at reinforcing economic and commercial relations between the grouping must include significant steps in addressing this problem.

Of course, it is also a fact that the more immediate areas for trade development tend to be owned and/or controlled by the state sectors and therefore progress in those areas have usually moved fairly rapidly. The petroleum and minerals sectors are significant examples of this tendency and hence co-operation by enterprises in the non-ferrous metals industries, particularly the state owned ones, is likely to receive more than the normal attention subject to the dynamics of the politics of the various countries.

9.2 MAIN ENTERPRISES/PRODUCERS IN THE ALUMINIUM INDUSTRY

Except for Mexico and Suriname, the industry in the Caribbean Area is either state owned, jointly owned by the state and INCS or in the case of the fabrication sector jointly owned by the state, INCS and local private interests.

In Venezuela, the state companies CVG and FIV are dominant forces in the industry although TNC holdings exist in Alcasa and is proposed for the new smelter projects. Local private interests are heavily involved in the fabricating sector and are to have equity stakes as well in the new smelter projects.

[52] Dependence and Transformation, C. V. Thomas

9.2.1 BAUXITE/ALUMINA SECTOR

The enterprises identified as willing to pursue commercial and technological relations in the bauxite/alumina sector are:

Jamaica - Jamaica Bauxite Mining (JBM) and
Clarendon Alumina Production (CAP);

Venezuela - Alcasa and VENALUM

As earlier indicated JBM and CAP are the state owned companies which are the joint venture partners in bauxite and alumina operations in Jamaica - JBM is the majority partner (51%) in two bauxite operations with a total capacity of 6.45 m tonnes, a 7% owner of the bauxite/alumina operations run by ALCAN and also has the option on alumina production not required by ALCAN. CAP is 50% partner in the JAMALCO bauxite/alumina operations with ALCOA. Through these partnerships JBM and CAP are in a position to supply significant volumes of bauxite and alumina for joint-venture/tolling arrangements. Given the massive expansion projects being undertaken by Alcasa and Venalum the scope obviously exists for major co-operative arrangements aimed at tapping the complementarities between the bauxite and alumina sector in Jamaica and the aluminium sector in Venezuela. The areas which could be covered by these arrangements were discussed in Section 8.4.

Such co-operation is the logical continuation of earlier efforts in the 1970s by Jamaica to establish joint-venture projects with Trinidad and Tobago, Guyana, Mexico and Venezuela. In light of the debt crisis and capital shortages being experienced by regional countries the impact of such projects could be even greater now than in the earlier period.

The enterprises mentioned have indicated, publicly and in official discussions, their interest in co-operating with regional producers in alumina supply arrangements and joint-venture fabrication facilities as described in Section 8.4.1 (b).

9.2.2 SMELTING AND FABRICATION

The new smelter and expansion projects planned by Venezuela will boost the Region's share of world capacity to 14% by 1995 up from 11.8% in 1987 [53]. On this basis, the Region will have the capacity to meet its requirements for ingot even assuming Mexican consumption of primary aluminium is restored to the 1985 peak level of 116,400 tonnes.

The enterprises identified as willing to expand their regional commercial and technological relations in aluminium smelting and fabricating are:

Venezuela - Alcasa and Venalum

Jamaica - JBM, BATCO and CAP

Mexico - Grupo Aluminio

The smelter projects involving Alcasa and Venalum as well as the new joint-ventures will raise Venezuela's requirement of alumina to almost 3.0 million tonnes by 1995. Given Jamaica's comparative advantage in bauxite and labour costs and also the relatively moderate capital costs involved in re-activating presently idle capacity, as discussed in Section 3.4.1 (a), it would be economically beneficial to both Jamaica and Venezuela if suitable supply arrangements could be developed on the basis of joint-venture and/or tolling arrangements. Alcasa and the Jamaican agencies have indicated their willingness and ability to enter into such arrangements for alumina supply and the establishment of fabrication facilities in the Caribbean Area. As earlier indicated the Dominican Republic, Puerto Rico and Jamaica are being considered by Alcasa following its joint-venture projects already implemented in Costa Rica and Europe. Venalum has also developed its own plans in this direction. The potential advantages of such schemes have been spelt out in Section 3.4.1 (b) [54].

Grupo Aluminio of Mexico, majority owners of the only local smelter, have indicated a willingness to consider proposals for a joint fabrication project. This is motivated by the current under-utilization of their capacity due to Mexico's present economic difficulties. The joint project would involve the transformation of Venezuelan ingot into fabricated and semi-fabricated products for export primarily to North America, Europe and the Latin American Region. As earlier mentioned, Mexico's idle capacity, competitive labour costs, and the highly competitive Venezuelan ingot would place such a venture in a favourable economic situation and save the capital resources which would otherwise be required for a new facility in Venezuela.

Future smelter and fabrication projects in the Region could also possibly be based on Trinidad's abundant natural gas resources and its access to preferential trading arrangements through CBI, CARIBCAN and Lomé. Looked at in isolation, the capital costs for a smelter and fabrication project including the electricity generation facilities are somewhat prohibitive especially in the present economic context of that country and the general capital shortage in the region. However the

[54] Alcasa officials have indicated this in official discussions with the JBI.

present recovery in prices and the projected medium-term shortage of metal are factors which have significantly improved the viability of such a project.

The National Energy Corporation of Trinidad and Tobago whose main function is to identify and develop industrial projects based on natural gas has indicated its willingness to review the project.

9.2.3 (a) REGIONAL TECHNOLOGICAL DEVELOPMENT IN THE BAUXITE/ALUMINA SECTOR

The technology of bauxite and alumina production in the Latin American Region is still dominated by the TNCs. However, significant progress has been made in Brazil and to a lesser extent in Jamaica in transferring know-how in terms of the operations of the alumina plants. Local technical staff now play significant roles in running these operations although R&D is still largely left up to the TNCs. Attempts have been made to establish the institutional framework for changing this situation.

The Jamaica Bauxite Institute (JBI) is perhaps the leading regional institution in the bauxite/alumina sector. This Institute possesses the Third World's and the Region's only alumina pilot plant and one of the better equipped bauxite laboratories. These facilities, which are described in Appendix 1, could be the basis for far-reaching research into bauxite processing and for the production by the sector of products such as gallium, special aluminas, rare earths and aluminized red mud solids (an absorbent for waste treatment). Joint research projects could include all the bauxite and alumina producers - Bauxiven, Inter Alumina (Venezuela) BICSA (Guyana) and JBM, TAP (Jamaica) and possibly also Suriname.

9.2.3 (b) REGIONAL TECHNOLOGICAL DEVELOPMENTS IN ALUMINIUM SMELTING

Some progress has been made in terms of developing smelter technology in the Region. Brazil, as was indicated in Section 8.3.1, is now able to manufacture 90% of smelter equipment and machinery (as well as 95% of bauxite mining equipment) and the local private sector owned Grupo Votorantim operates an integrated system. In Venezuela, Alcasa has been investing heavily in R&D on smelter technology and is far advanced in developing its own cell technology in collaboration with Reynolds International [55].

[55] MBM Aluminium Supplement, November 1988 Field visits too Alcasa by JBI officials. 1988.

10.0 ANALYSIS OF THE PRESENT MODALITIES OF COMMERCE IN THE CARIBBEAN AREA.

The analysis covers an examination of the following:

- a) payments arrangements between the countries of the group;
- b) credit mechanisms operated by the countries;
- c) banking and other financial relationships at the level of central and commercial banks;

All the countries of the Area have recognised the importance of developing payments, credit and other financial arrangements to facilitate regional integration and especially the promotion of trade flows. In fact, among developing countries, Latin America was the first region to establish payment and credit arrangements beginning with the Santo Domingo Agreement [56] of 1969, covering ALADI countries (and including the Dominican Republic). The CARICOM countries have also pursued such arrangements in the context of the drive to expand trade and economic relationships between member countries.

In addition to the multi-lateral arrangements various countries have also operated bi-lateral agreements which, although more flexible and simpler to manage, are limited in their impact on trade development.

10.1 COMMERCIAL ARRANGEMENTS IN THE CARICOM COUNTRIES

Following the creation of CARIFTA and subsequently CARICOM, these countries moved from the earlier payments arrangements that operated through extra-regional commercial banks to bi-lateral ones through the Intra-regional Payments (IRP) Scheme established in 1969 involving their central banks. With the advent of CARICOM and the stepped-up drive towards regional economic integration the Caribbean Multi-lateral Clearing Facility (CMCF) was established in 1977. The objectives of the CMCF as outlined in the agreement between its members were:

- a) to facilitate settlement on a multi-lateral basis of eligible transactions between participating countries;
- b) to promote the use of currencies of members in settling eligible transactions between the individual countries, thereby economising on the use of foreign exchange; and

[56] Regional Credit Arrangements of Developing Countries for Balance of Payments Support, UNCTAD/EDCD/127, November 1982.

c) to promote monetary co-operation among the participants and close relations among their banking systems, thereby contributing to the expansion of trade and economic activity within CARICOM.

The facility was suspended in 1983 in the face of prolonged balance of payments difficulties by some member countries and their inability to clear large outstanding debts.

The CMCF was operated by the Central banks of Barbados, Guyana, Trinidad & Tobago (which acted as the agent), Belize, Jamaica and the Eastern Caribbean Currency Authority (EEC) (now Eastern Caribbean Central Bank) as a payments and credit arrangement.

The credit limit of the facility was first set at US \$40 million but was increased in 1976 to \$80 million and further to \$100 million in 1980 (57). Settlements were done in US dollars on a six-monthly basis. Country credit limits were determined by: the volume of overall trade; volume of imports from regional countries; export earning capacity; ability to cover import bill from own resources; and the size of the economy. Eligible transactions included - approved transactions between regional exporters and importers, government-owned and sponsored regional institutions, as well as inter-governmental grants and/or loan payments and other governmental payments. Trade in petroleum was generally excluded although in one case this was permitted. Table LXXVII below sets out data on the payments and net settlements in foreign exchange under the Facility in the period 1977-80.

TABLE LXXVII: Total of Payments and Net Settlement of
CMCF June 16, 1977 - June 30, 1980
(US \$ million)

Period	Total Payments Through Facility	Net Settlements in Foreign Exchange	Settlement Payment (%)
June 16 - Dec. 31, 1977	125.2	10.7	8.5
1978	268.1	34.8	13.0
1979	322.5	39.8	12.3
June 1 - June 30, 1980	214.4	54.9	25.6

SOURCE: CENTRAL BANK OF TRINIDAD AND TOBAGO

(57) CARICOM multi-lateral Clearing Facility, Central Bank of Trinidad & Tobago, September 1980.

In the early period of its existence the Facility offered additional liquidity to members for financing intra-regional trade, effected economies in the use of foreign exchange as well as savings in the cost of conducting intra-regional trade. The settlement process is shown in Appendix 2.

Apart from the Clearing Facility the countries have operated bi-lateral clearing arrangements between the various central banks and with the suspension of the Facility these have now emerged as the primary payment mechanism and means of commerce. It is, however, recognized that with the present balance of payment situation of various members further progress in trade development in the region will depend on the availability of export credit and so the creation of a regional export credit body is under active consideration. The intention is that this body will operate on a similar basis to the Latin American Bank for Exports (BLADEX).

The region presently operates a (CARICOM) travellers cheque system with the cheques being denominated in Trinidad and Tobago currency.

In addition, the Eastern Caribbean currency is also accepted in Barbados but Trinidad and Tobago is no longer a party to that arrangement whereby the E.C. dollar was freely convertible in the two countries.

Commercial banking relationships are conducted largely through branches of North American and British owned transnational banks (TNBs) which still play a dominant role in the region. In the cases where locally owned (state or private) banks have been established, these also conduct their overseas business via the TNBs as there is as yet no regionally owned commercial bank which operates in more than one territory. This situation also applies to merchant banking and generally, there are no mechanisms in place for mobilisation of private capital on a regional basis except in limited areas (e.g. insurance).

The Caribbean Development Bank is the major regional institution concerned with the mobilisation of development capital. Its major focus has been the infrastructural and manufacturing sectors but it is increasingly turning attention to the tourism sector and providing structural adjustment loans in support of the shift by regional countries to policies of export-led growth.

The Bank is funded by CARICOM members as well as Canada, Venezuela and the USA and various multi-lateral lending agencies. Loans are primarily in US dollars and member countries' contributions and loan repayments are denominated in US dollars but payable in various currencies including the local currencies (original procedures modified in response to significant devaluations, since 1970s, of member countries' currencies).

Data on the total loans approved and the distribution by sector is given in Table LXVIII below.

TABLE LXVIII: Distribution of Loans Approved by Sector (Net), 1970 - 87 (US\$000)

<u>Sectors</u>	<u>Amount</u>	<u>% of Total</u>
1. Agriculture, Forestry and Fishing	34,047	5.82
2. Mining and Quarrying	4,447	0.76
3. Manufacturing	101,434	17.34
4. Tourism	22,037	3.77
5. Transportation and Communication	178,082	30.45
6. Power, Energy and Water	56,124	9.59
7. Social and Personal Services	45,921	7.95
8. Multi-sector and Other	17,191	2.94
9. Financing and Distribution	125,814	21.49
	584,997	100.00

SOURCE: Caribbean Development Bank, Annual Report 1987.

10.2 COMMERCIAL ARRANGEMENTS BETWEEN MEXICO AND CUBA, THE DOMINICAN REPUBLIC AND JAMAICA.

Generally, commercial relations between Mexico and the Caribbean countries are extremely limited with the exception of Cuba, the Dominican Republic and Jamaica. However, some initial steps were taken in the 1970s and 1980s to establish diplomatic contact and also to examine the development of trade links. In fact, Jamaica's relations with Mexico at the diplomatic and economic levels commenced in the late 1960s and were boosted in the 1970s by attempts, mentioned earlier, to establish joint projects in the aluminium industry. Mexico's emergence as a major oil producer in the mid-1970s was the basis for significantly increased trade in the 1980s.

Under the San Jose Accord, Mexico and Venezuela have emerged as the Caribbean's major suppliers of petroleum. The Accord provides concessionary payment terms for Caribbean and Central American countries' oil imports from these two sources and is viewed as an important line of credit which supports trade in petroleum whilst significantly easing the balance of payments problems of the oil importing countries.

Commercial transactions between Mexico and the Dominican Republic are covered by the multi-lateral clearing system of ALADI as both are members of the Santo Domingo Agreement. The Agreement was established in 1969 and provides for short-term financial support to ease temporary liquidity shortages. Subsequently, in 1981, it was expanded to incorporate medium-term financing for relieving balance of payments deficits or liquidity shortages arising from natural disasters. Payments are handled between the two Central banks on the basis of credit lines arranged between them. In addition to these payments arrangements and credit lines the goods traded between the two countries are subject to preferential tariffs. Similarly, transactions between Mexico and Cuba are covered by a reciprocal credit system. Economic and commercial relations between Mexico and the Dominican Republic and Cuba are promoted by the operation of Mixed Commissions which are authorised to promote trade and economic ties.

Commercial contact between Mexico and Jamaica is basically limited to the trade in petroleum. As earlier indicated this is governed by the San Jose Accord and payments between the countries are settled in freely convertible currency. A trade agreement signed between the parties in 1975 established a Mixed Commission, with the aim of promoting economic and commercial ties including the possibility of financial and banking agreements. Under the trade agreement, Mexico has extended lines of credit to the Bank of Jamaica for the importation of a specified range of goods. The derailment of proposed joint projects seriously retarded the development of commercial relations in the late 1970s and early 1980s.

Participation in the San Jose accord and the increasing utilisation of, what is for Jamaica, an important credit arrangement vis-a-vis oil imports has led to a gradual improvement in relations. Nevertheless, further developments of commercial links are hampered by the imbalanced nature of trade between the countries and the lack of developed policies geared to economic cooperation.

Long term arrangements for alumina supply, from Jamaica, for the Mexican aluminium industry, now dominated by local private interests, could, as earlier suggested, form the basis for strengthening these links. A large proportion of Mexican alumina requirements in the early 1990s could be met by the re-activation of idle capacity and from expansions planned by Jamaica; and would significantly boost trading relations by reducing present imbalances and eventually justify the establishment of clearing arrangements and other banking and financial relationships.

11.0 Exploration of new forms of commerce in the Caribbean Area that could avoid the use of hard currency

Generally, the balance of payments problems and the depletion of the hard currency reserves of Latin American countries during the 1980s has led to an increasing reliance on mechanisms of compensatory trade in order to sustain reasonable levels of economic activity. This approach has been applied on

a worldwide scale by developing and CMEA countries and it is estimated that counter trade amounted to over \$700 billion (58) in 1983.

Declining sales cash flow problems and experienced by several major industrial corporations in the recession of the early 1980s also generated increased interest by them in compensatory trade as a means of doing business with developing countries and also among themselves.

These developments have resulted in a greater sophistication (59) worldwide in devising new forms of commerce on the basic principle of compensatory trade whereby purchases are formally considered to offset sales.

The Latin American Region has witnessed rapid growth in compensatory trade in the face of great difficulties in exporting goods to generate needed foreign exchange, heavy foreign debt obligations and the inability to obtain new loans. An increasing number of countries including Argentina, Brazil, Colombia, Ecuador, Mexico, Peru, Uruguay, Venezuela, Costa Rica, Dominican Republic and Jamaica have resorted to this form of commerce both among themselves and in trade with governments and private companies in the western industrialized countries and in transaction with CMEA countries.

In the aluminium industry tolling and metal exchange arrangements have formed the bases for the resuscitation and restructuring of a significant number of aluminium smelters in the U.S.A. Furthermore, a growing number of new projects have secured commercial financing on the basis of guarantees linked to metal supply contracts. Such projects have been developed in Venezuela, Australia, Saudi Arabia and Canada.

11.1 Barter and Counter Trade arrangements involving Countries of the Caribbean Area.

Jamaica and Guyana have, in the 1980s, negotiated and operated contracts based on compensatory trade arrangements. In the case of Jamaica these have involved the US government, USSR and Chrysler Corporation and Guyana's arrangements have been with the USSR and other Eastern European countries.

Jamaica entered into its first counter trade arrangement with the US government at the end of 1981 under a contract to supply 1.0 m tonnes of bauxite. Under the arrangement 400,000 tonnes of bauxite was bartered for agricultural commodities and the remaining 1.2 m tonnes was exchanged for a combination of cash and excess stockpile commodities from the National Defence

[58] Trade without money: Barter and Counter Trade, Leo Welt, Law and Business Inc. and Counter Trade - Business Practices in Today's Markets by Leo Welt, Counter Trade and Barter, May 1984.

[59] Counter Trade in International Financing, Jacques Rostain, Counter Trade and Barter, Summer 1984.

Stochastic. The Department of Agriculture and the General Services Administration (GSA) were the implementing US agencies and Bauxite and Alumina Trading Company on the Jamaican side. The transactions valued at \$68.0 m were implemented over a six month period, March - September, 1982. Subsequently, a further barter agreement was implemented in 1983 with US government under which 1 million tonnes of bauxite was exchanged for agricultural commodities.

In addition to these arrangements, the Jamaican government also negotiated a bauxite supply agreement with the USSR providing for the export of 850,000 tonnes of bauxite per annum with 80% paid for by cash and the remaining 20% by the barter of industrial and other goods. Other arrangements of this nature were also concluded with Yugoslavia and Chrysler Corporation involving the supply of alumina for construction materials and motor vehicles respectively.

Apart from the schemes undertaken by Jamaica and Guyana several other Caribbean and Central American countries have been involved in barter and counter trade with several transnational companies and banks operating out of Puerto Rico. The Dominican Republic, Haiti, Panama, and Costa Rica have implemented a number of transactions involving the exchange of agricultural products, garments, art and hotel space in return for various equipment including microcomputers. Barter Systems International, which began operations in 1983 in Puerto Rico, specializes in this field and has been involved in barter deals in several countries (60).

11.2 Tolling and metal exchange arrangements in the aluminium industry.

Tolling and metal exchange arrangements have assumed increased importance in the 1980s as a result of increased capital costs in establishing new smelter projects and also as methods of utilising idle capacity thus lowering unit costs and avoiding the closure of otherwise uneconomic facilities. Prior to these developments the primary basis for tolling or metal exchange arrangements was to allow alumina producers without integrated smelter facilities to secure metal which is easier to dispose of and also capture some share of the value added in the conversion of alumina to primary metal. Traditionally, these types of arrangement have been operated between the INCS in Australia, USA, Canada and also by the USSR and Hungary. Available data shows that in the Western World tolling arrangements have increased significantly since 1983 and by 1986 had reached 1.196 m tonnes out of a total of 23.711 m tonnes of alumina. Table LXXIX below sets out the figures on tolled alumina for the 1983-85 period.

TABLE LXXXI: ALUMINA TOLLING AND TOTAL TRANSACTIONS
1983 - 1986

<u>Year</u>	<u>Tolling Alumina (%)</u>	<u>Total Transactions</u>
1983	763 (3.7)	21,243
1984	396 (3.6)	24,591
1985	530 (2.2)	23,855
1986	1136 (4.8)	23,711

SOURCE: IBA, JBI.

Presently there are five main types of tolling arrangements as follows:

1. transfers between related parties within national territory at prices based on costs of production;
2. transfers between related parties within national territory or across international boundaries at prices explicitly set by reference to market prices;
3. transfers between related parties across national boundaries which are not explicitly based on market prices but which are sufficiently related to market prices to satisfy national customs and taxation authorities;
4. long term (over 3 years) contracts between related parties or long-standing arrangements between unrelated parties which approximate to long term contracts;
5. contracts or arrangements between unrelated parties under 3 years' duration, but not in the nature of single cargo spot sales, except where these provide a major part of a smelter's requirements.

The major known tolling arrangements undertaken in the USA during 1985 and 1987 are summarised in Table LXXI below:

**TABLE LXXI: TOLLING ARRANGEMENTS REPORTED IN 1986 AND 1987
IN THE USA (short terms)**

<u>SMELTER</u>	<u>ALUMINA TOLLER</u>	<u>ALUMINIUM CAPACITY COVERED BY TOLLING ARRANGEMENTS</u>
1. Dallas, Oregon	Clarendon Limited	45,000
2. Ormet, Hannibal, Ohio	Clarendon Limited	90,000
3. Mt. Holly, South Carolina	Clarendon Limited	100,000
4. Columbia Falls, Montana	Norsk Hydro AS and BHP	130,000
5. Goldendale, WA	Norsk Hydro AS	119,000

SOURCE: IBA, TRADE JOURNALS

Information on the countries of origin and destinations of tolled alumina for the 1983-86 shows that Jamaica and Suriname are the Caribbean suppliers involved with Australia being the major country of origin and USA and Australia the major destinations. The statistics for the 1983-86 period are set out in Tables LXXII and LXXIII below.

**TABLE LXXII: ALUMINA TOLLING BY COUNTRIES OF ORIGIN
1983-1986 (000 short tons)**

YEAR	AUSTRALIA	JAMAICA	JAPAN	SURINAME	TOTAL
1983	593	60	90	--	843
1984	306	60	90	--	956
1985	440	50	90	--	590
1986	571	271	179	175	1196

SOURCE: IBA, JBI.

TABLE LXIII: ALUMINA TOLLING BY COUNTRY OF DESTINATION
1983-1986 (000 short tons)

YEAR	USA	CANADA	JAPAN	AUSTRALIA	INDONESIA	SHANA	TOTAL
1983	493	90	--	200	--	--	783
1984	566	90	--	240	--	--	896
1985	n.a	90	100	240	100	--	530
1986	621	90	89	n.a	100	236	1136

SOURCE: IBA, JBI.

It is clear from the above that the international aluminium industry has developed the techniques for successfully conducting trade between various companies by way of tolling arrangements. As was mentioned earlier this approach has also been extended to the financing of new projects such as the Becancour Project in Quebec, Canada whereby loan obligations are secured by metal exchange offtake agreements [61]. Jamaica has operated metal exchange arrangement with Alcan, Canada since the early 1980s under its share of alumina from the JAMALCAN joint venture in Jamaica is toll smelted in Alcan's smelter facilities in Quebec and the metal sold to Alcan. The terms are negotiated annually with reference to market prices for metal and the tolling ratio being determined by the actual operating costs at the relevant smelter. This arrangement is expected to expire in 1990.

11.3 Possible Credit and Payments Arrangements for Joint Projects in the Non-Ferrous Metals Industry

It is proposed that to raise the capital resources for the future expansion of the industry the major producing and possibly consuming nations in the Region should establish a development fund to promote joint projects at all stages of the aluminium industry - bauxite mining, alumina refining, aluminium smelting and fabrication. The fund would be financed by capital contributions from member countries in their respective currencies as well as contributions from extra-regional development banks.

Given the region's capacity to produce the capital goods required for the industry it is likely that over 90% of machinery and equipment would be supplied from regional sources hence minimising hard currency payments. The payments to these

[61] The Becancour Aluminium Smelter: A new pattern for successful joint ventures between Public and Private Sector Investors. Manley S. Schultz, Proceedings of Bauxite Symposium VI, March, 1986.

suppliers would be met from the resources of the fund and also with guaranteed contracts for metal offtake from the respective parties to the projects which the fund would be able to trade.

Of course, the payment for operating materials such as bauxite, alumina, and metals could be paid for by counter trade of other materials such as fuel oil and caustic soda as well as metal and fabricated products. It is envisaged that Mexico, Venezuela, Brazil, Argentina, and Jamaica would be the likely initial members of such a fund. Together they have control over the range of commodities needed as inputs, the capacity to produce the capital goods required, a sufficiently large market and existing production capacity in the aluminium industry to ensure that production and trade could be undertaken on a self-sustaining basis. The main features of these proposals can be summarised as follows:

Credit Arrangements

- development fund:

- (a) with contributions in local currencies from member countries;
- (b) risk capital from regional and extra-regional development banks;

- metal exchange agreements guaranteeing loan repayments with contracts for metal offtake (aluminium bonds);

- sourcing of capital goods for joint projects from regional suppliers on the basis of competitive bidding and reference to international prices;

Payment Arrangements

- operating materials to be paid for by tolling arrangements or counter trade in bauxite alumina, metal, oil, caustic soda and other commodities similar to present schemes undertaken by Mexico, Venezuela and Brazil with countries such as Iraq, Iran, Angola and Nigeria.

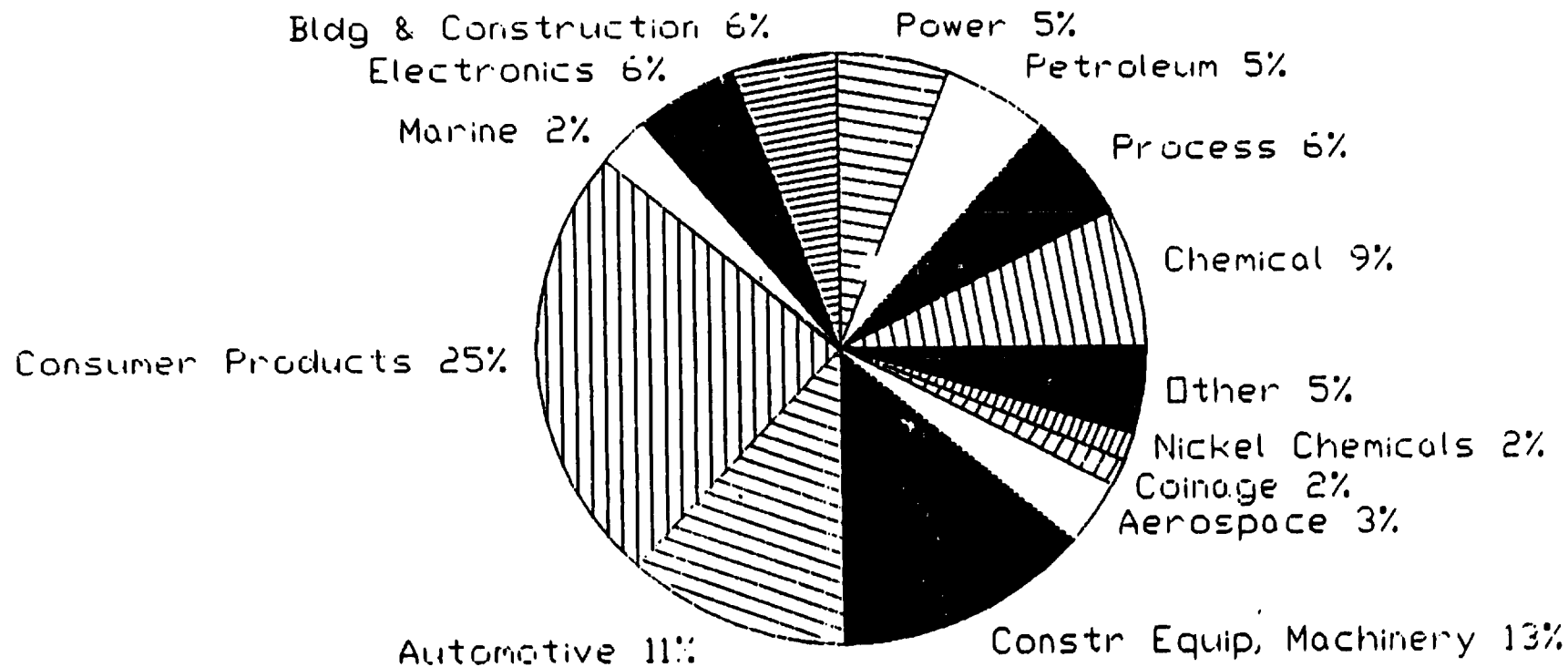
- operating materials could also be paid for under bilateral clearing arrangements, between participating countries geared to promote trade in manufactured goods not specifically related to the aluminium industry.

11.4 Conclusions

The Study has attempted to identify the scope for regional co-operation in the future development of the aluminium and nickel industry. It has pointed to several areas where production complementarities exist and can be exploited to the mutual benefit of the regional countries involved.

It is quite obvious that important obstacles exist to the joint production efforts and the expansion of trade proposed. An important task in addressing these problem areas will be the design of mechanisms to promote contact at all levels between business leadership, workers organizations and planning bodies in the respective countries. UNIDO and other multi-lateral agencies can play an important role in this regard by supporting further detailed studies which would address the intricate questions of joint venture projects and tolling arrangements, project financing, transportation, tariffs, barter and counter trade arrangements and so on.

WESTERN WORLD END USE OF NICKEL



Source Nickel Development Institute, Toronto, Canada

The Jamaica Bauxite Institute



The Jamaica Bauxite Institute is a research and monitoring organization fully equipped with the technical resources and expertise to provide a wide range of studies, experiments, tests and other services for mineral and soil-related industries.

Established in 1975, primarily to serve the bauxite/alumina industry on behalf of the Government of Jamaica, the JBI has developed a broad technical and economic base which makes it unique among institutions of its kind. The three largest Divisions — the Analytical Laboratories, the recently commissioned Alumina Pilot Plant, the only one of its kind in the developing world, and the Bauxite Reserves Division — boast the most modern equipment and are staffed with highly trained and experienced personnel. These include mining, chemical and civil engineers, chemists, geologists and mineralogists.

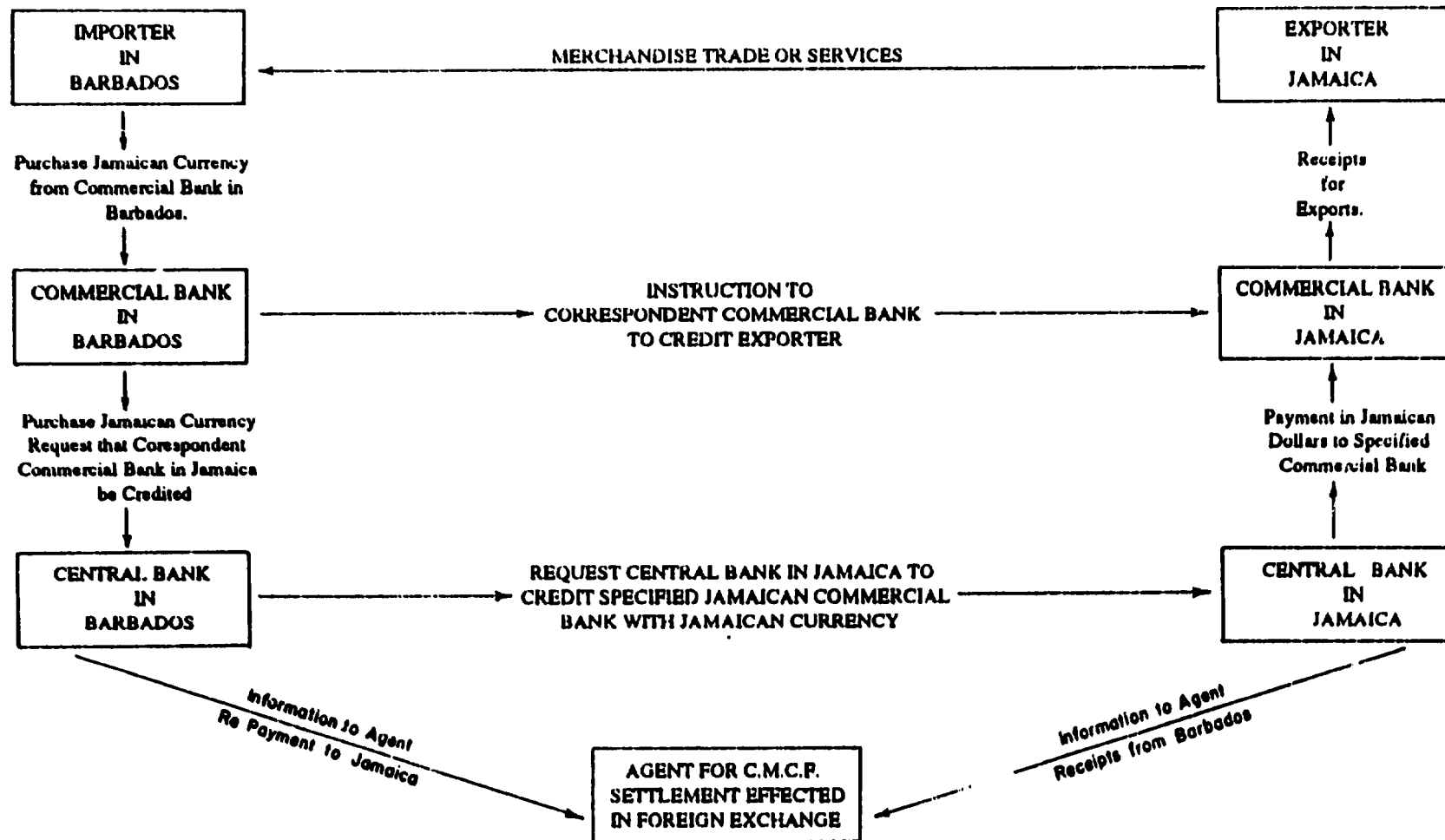
The JBI also maintains an Economics Division which undertakes research and monitoring necessary for the on-going evaluation of the bauxite industry both nationally and internationally.

In the ten years of the Institute's operations, its staff has become thoroughly conversant with and skilled in all aspects of modern bauxite and alumina technology. This technical expertise is buttressed by the invaluable experience gained in the area of international negotiations on behalf of the Government of Jamaica. The JBI has dealt with several countries and transnational corporations in establishing mining lease agreements, joint ventures and other partnership arrangements, levy/taxation regimes, technology transfer agreements and in the marketing of bauxite and alumina. Consequently, this Institute has developed the capacity for sound evaluation of such agreements.

We believe that this unique blend of expertise in our organisation can be of great assistance to other countries which are in the process of developing their bauxite and other mining industries.

Indeed, awareness of the capabilities of the JBI's technical facilities and the competence of its personnel has led increasingly to requests from both private and public sector organisations for assistance in bauxite exploration, processing technology and economic and strategic planning in the bauxite/alumina/aluminium industry. In recent years, the Institute has provided analytical services for a number of clients including those involved in the cement, glass and gypsum industries. With the completion in 1985 of a US\$5 million upgrading programme, the JBI has been able to expand significantly the range of services offered in the bauxite processing field as well as the agricultural and soil-related industries.

**GRAPHIC REPRESENTATION OF AN OPERATION THROUGH
THE CARICOM MULTILATERAL CLEARING FACILITY**



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