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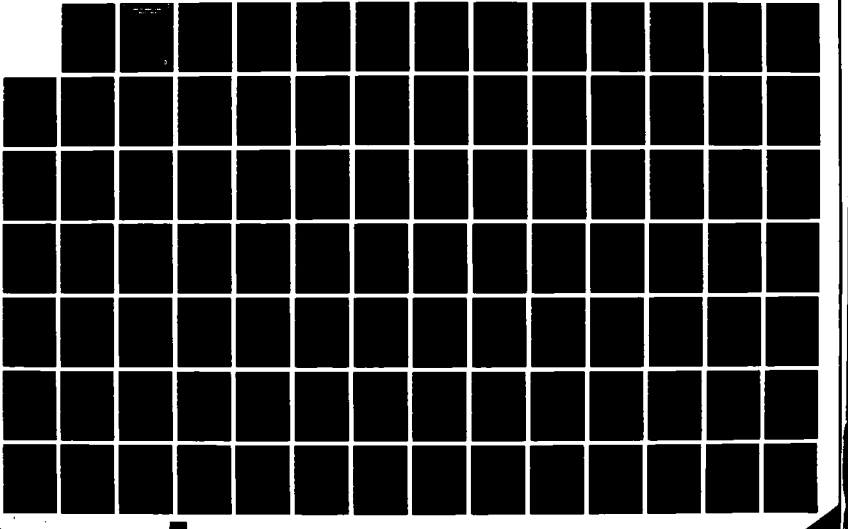

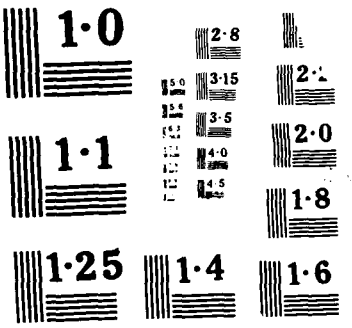
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Monterey, California

THESIS

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by

ALONSO SADER CASTELLANOS

DEC 1987

Thesis Advisor: ROBERT E. LOONEY

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The suggestion is made that Venezuela should expand its arms industries development programs in order to reduce imports, contribute to the economic growth, and increase its political and economic independence.

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Arms Production in Venezuela

by

Alonso Sader Castellanos
Commander, Venezuelan Navy
B.S., Venezuelan Naval Academy, 1985

Submitted in partial fulfillment of the
requirements for the degree of

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Author: _____
Alonso Sader Castellanos

Approved by: _____
Robert E. Looney, Thesis Advisor

_____
Roger D. Evered, Second Reader

_____
David R. Whipple, Chairman,
Department of Administrative Sciences

_____
James M. Fremgen, Acting Dean of Information
and Policy Sciences

ABSTRACT

This thesis examines the Venezuelan military expenditures pattern, the arms production experiences in Latin America and its possible causes, and the Venezuelan economic, military and production capabilities.

The suggestion is made that Venezuela should expand its arms industries development programs in order to reduce imports, contribute to the economic growth, and increase its political and economic independence.

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LIST OF TABLES

I. INTRODUCTION

Arms production and military sales have traditionally been subject of controversy and discussion. Their purpose and their political and social-economic costs have been centers of attention and objects of extensive and detailed studies in both producer and customer countries.

These studies--normally criticisms--have contributed to the better understanding of the arms-procurement and arms-production process. They have heightened perceptions that each nation has in respect to its own necessities.

Each country defends, and has the right to defend, the position it considers more important or advantageous to its citizens and particular interests. The constitution of each state establishes in express or implicit ways the obligation to protect the national integrity, to protect its scope of influence, and to defend its own interests in the ways they are best perceived by its leaders.

The protection of sovereignty and the defense of autonomy and independence are sensitive points of public opinion. They are decisive factors in the political process entailed in the acquisition of military equipment and arms systems.

Decision makers must look for alternative solutions for the acquisition of the military equipment required to

protect the national security policies for two basic reasons: the ever increasing cost of the arms systems in the world market; and the scarcity of financial resources to allocate among the other state necessities.

The purpose of this thesis is to explore the idea of developing an arms-production capability in Venezuela as an alternative way to acquiring the required armament and weapons systems in the international market.

In order to develop a logical argument, Chapter II reviews the Venezuela military expenditures in the last years and trends they may follow. Chapter III reviews the possible causes for and advantages of developing an arms production capability. Chapter IV explores the production experiences in Latin American countries and examines its common factors. Chapter V outlines the characteristics of the defence sector in Venezuela, its armed forces and its military industry. Finally, Chapter VI draws a numbers of policy implications and recommendations for defense production in Venezuela.

II. ARMS TRADE AND MILITARY EXPENDITURES

The definition of the National Security Policy, the allocation of the resources needed for the development of the national security policy, and the efficiency with which the resources are distributed or invested in the pursuit of the national security objectives are the main concepts involved in the understanding of military expenditures.

National security policy will be a response to the leaders' perception of the national objectives , threats to the country, recent conflicts, and assumptions about the international system and security alignments. Resource allocation will depend on (1) "the quantity of resources available now and in the future; (2) the proportion of these resources allocated to the national security purpose" [Ref. 1]. Finally, the efficient use of the resources allocated for the pursuit of the national security policy in the case of the military objectives will depend on dividing them efficiently among strategies, tactics, forces, and equipment.

Because of the complexity of the factors involved, it is always difficult to measure the actual defense needs of a country. Given that difficulty, it is traditional for the perception of national security needs to be measured in terms of how much money is allocated for defense.

It is generally assumed that a country which devotes more resources to developing a military force is more committed to its defense . However, "a country's military expenditures," the U.S. Arms Control and Disarmament Agency points out, "are not necessarily representative of military capability. They do not define a country's efficiency or allocation of expenditures or 'whether the quantity and quality of forces supported by them serves national purposes."[Ref. 2].

It is within this scenario that this chapter analyzes Venezuela's military expenditures and arms trade.

A. MILITARY EXPENDITURES

In analyzing Venezuela's military expenditures we shall review the following parameters:

1. Military Expenditures:

Representing the monetary value of the resource allocation in pursuit of the development of a military capability. These include:

"(a)Compensation of military and civilian personnel, including reserves;

(b) Procurement of equipment;

(c) operation and maintenance;

(d) Construction of military facilities;

(e) Research and development."[Ref. 3]

This value is affected, as stated before, by the amount of resources available, the deflator and other conversion rates used in the original data and, by itself, it does not represent the country's defense effort. However the rate of growth during a given period represents the tendency of the effort.

Table 2-1 shows the Venezuela Military Expenditures during the years 1971-1984. The data, for this and others tables, is expressed in millions of U.S. Dollars ($) and was taken from the U.S World Military Expenditures and Arms Transfers 1986 Report. The constant dollars are expressed in 1983 value, and the rate of growth is relative to the constant value.

TABLE 2-1

VENEZUELA MILITARY EXPENDITURES

YEARS	CURRENT	CONSTANT	GROWTH
1974	519	987	
1975	675	1172	18.74
1976	568	928	-20.82
1977	705	1087	17.13
1978	793	1131	4.05
1979	785	1036	-8.40
1980	747	903	-12.84
1981	721	807	-10.63
1982	1143	1196	48.20
1983	995	995	-16.81
1984	1067	1031	3.62

SOURCE: World Military Expenditures and Arms Transfer 1986.

Another factor that makes the analysis of the military expenditures difficult is determining the correct

amount to be expended in defense. How much is enough? Is the country expending too much or too little? The morale of the soldiers, the correct or efficient use of the resources, the internal political stability, geopolitical position, and the country's social and economic welfare are among other factors to consider when analyzing defense capabilities in order to determine the correct amount to be expended.

Since defense, by one definition, is the protection of a country against military actions by other countries, it seems logical to utilize comparisons as an effective way to measure the adequacy of the level of expenditures. Table 2-2 shows rates of growth of military expenditures in various regions of the world in the last decade in comparison with venezuelan rates.

TABLE 2-2

MILITARY EXPENDITURES RATE OF GROWTH

	74-79	80-84	74-84
World	2.3	3.5	2.9
Developed Countries	1.9	3.6	2.8
Developing Countries	4.1	2.8	3.5
Latin America	4.6	4.4	4.3
Venezuela	2.1	2.3	2.2

SOURCE: World Military Expenditures and Arms Transfer 1986.

As is shown in Table 2-2 the Venezuelan military expenditures rate of growth during the period 1971-1984 was less than that in other regions of the world.

2. Military Expenditures as Percent of G.N.P.

Representing the military expenditures as a percentage of the monetary value of all the final goods and services produced by an economy during a given period.

This value is widely used as representative of the military effort. However, as the government does not have control over the total of the G.N.P., and cannot know in advance what proportion of G.N.P. the budgeted military expenditures will be, this measure cannot be representative of the leaders' intentions with respect to the national defense.[Ref. 4]

In the case of the analysis of the Venezuelan military expenditures, Table 2-3 shows a comparison of military expenditures as percentages of the Gross National Product of the world during the period 1974-1984.

TABLE 2-3

MILITARY EXPENDITURES AS PERCENT OF G.N.P.

	74-79	80-84	74-84
World	5.70	5.84	5.77
Developed Countries	5.58	5.80	5.69
Developing Countries	6.17	6.12	6.15
Latin America	1.63	1.80	1.72
Venezuela	1.61	1.46	1.53

Source: World Military Expenditures and arms Transfer 1986.

The Venezuelan military expenditures as a percentage of G.N.P. was lower than those of other regions of the world. The United States Arms Control and Disarmament

Agency ranks Venezuela as 114 of 144 countries of the world for the year 1984.

3. Military Expenditures as Percent of C.G.E.

Representing the percentage of the central government expenditures devoted to the military effort. This measurement is more representative of the leaders' and the government's priorities and intentions in relation to the national defense objectives.

TABLE 2-4

MILITARY EXPENDITURES AS PERCENT OF C.G.E.

	74-79	80-84	74-84
World	21.58	19.78	20.68
Developed Countries	21.47	19.80	20.63
Developing Countries	21.92	19.80	20.86
Latin America	7.35	6.52	6.94
Venezuela	5.25	4.82	5.03

Source: World Military Expenditures and Arms Transfer 1986.

The Venezuela military expenditures as percentages of the Central Government Expenditures were far below what might be expected, and the United States Arms Control and Disarmament Agency ranked Venezuela as country 109 over 144 countries analyzed for 1984.

In analyzing military expenditures, questions can arise about the reasons for them and what direction they are taking. What are the factors that underline or determine the expenditures? Are they determined by threats to the national security from internal or external forces or by the simple availability of resources?

In a 1973 study of defense expenditures and military rule in Latin America, Schmitter concludes that the single best explanatory factor for the rise or fall of military budgets in individual countries was the performance in G.N.P. [Ref. 5]

Gertrude Heare found in a 1971 study of six leading military spenders in Latin America (Argentina, Brazil, Chile, Colombia and Venezuela) during the period 1940-1970 that absolute expenditures in constant price tended to rise as national economies grew, that expenditures jumped notably with internal conflicts, with periods of economic prosperity, or when there were specific attempts to catch up with lags in construction, pay scales, or equipment replacements. She also noted that military budgets decline in time of economic depression or hardship. [Ref. 6]

In 1986 Robert E. Looney in his book "**The Political of Latin America Defense Expenditures** : Case Study of Venezuela and Argentina", performed an analysis of the Venezuela military expenditures during the period 1950-1983 to determine the main factors underlining the decision of the resource allocation. By analyzing the military expenditures as a percentage of the G.N.P., C.G.E., and Central Government Revenues, and by introducing dummy variables in the regression equation to test for the effects of the oil-price increase and a possible structural shift associated with the different parties in the Venezuelan

government, he concluded that "while the increase in oil revenues has greatly facilitated the increase in the allocation to the defense sector, during the 1970s, that sector received relatively small allocations in the light of the amount of funds suddenly placed at the disposal of the government. Again, defense expenditures in the country appear to be quite stable, neither reduced in line with other government programs during periods of austerity, nor increased dramatically during periods of affluence"[Ref. 7]. By analyzing the defense expenditures of Peru, Mexico, Colombia, Ecuador, Brazil, and its possible effects he concluded "that Venezuela military expenditures have been determined largely by development internal to that country (oil revenues and increased Gross Domestic Product), with military expenditure patterns of regional countries affecting allocation for Venezuela defense marginally, if at all." [Ref. 8]

4. Summary

In summary, from the Venezuela military expenditures analysis, the following conclusions can be derived:

a. The Venezuelan military expenditures have been much less than could be expected when measured by the parameters of G.N.P., G.D.P., C.G.E. and compared with other countries or regions of the world.

b. The trend in Venezuela military expenditures trend has been determined more by internal factors, such as economic development than by external threats.

c. The Venezuelan military expenditures tend to be stable in relation to other Central Government Expenditures and are not greatly affected by fluctuations in the Government evenues.

B. ARMS TRADE

Another important factor in the analysis of the Military expenditures is the analysis of the Arms Trade in its absolute value, as a percentage of total military expenditures and in proportion to the total imports of the country.

1. Arms Import /Export.

Representing the monetary value of the arms trade in the international market. As in the case of the analysis of the military expenditures the value of the imports by itself does not tell us much about the country's intentions as does the rate of change that the value is having. In the analysis of the rate of growth in the Venezuelan case we find that during the period 1976-80 the average rate of growth was 33.5 % and, that during the period 1981-85 was 118.4 %, representing a dramatic change if we remember that during the same periods the military expenditures rate of growth were of 2.1 % and 2.3 % respectability.

2. Arms Imports/Total Military Expenditures.

Representing the proportion of the total military expenditures devoted to arms imports. During the period

TABLE 2-5

VENEZUELA ARMS TRANSFERS 1975-1985

YEARS	CURRENT	CONSTANT	GROWTH	IMPORT\EXPORT
1975	90	156		1.5
1976	60	98	-37.18	0.8
1977	100	154	57.14	0.9
1978	30	43	-72.08	0.3
1979	40	53	23.26	0.4
1980	130	157	196.23	1.1
1981	290	325	107.01	2.2
1982	250	261	-19.69	1.9
1983	50	50	-80.00	0.6
1984	360	348	596.00	4.9
1985	330	309	-11.21	4.0

SOURCE: World Military Expenditures and Arms Transfer 1986.

1975-1979 the average percentage of the military expenditures expended in arms imports was 9.4 % and during the period between 1980-84 the average was 23.65 %, which represents a marked increase in the importance of the arms imports.

3. Arms Import/ Total imports.

Representing the proportion of the total resources utilized for imports devoted to armament import. During the period 1975-80 the average proportion between arms import over total imports was of 0.79 % and during the period of 1981-85 the average was of 2.73 % which represent a notorious increase. Moreover, during the years 1984-85 the proportion increase for an average of 4.45 %.

TABLE 2-6

PERCENT OF ARMS IMPORTS ON TOTAL MILITARY EXPENDITURES

YEARS	TOTAL M.E	ARMS IMPORT	%
1975	1172	156	13.31
1976	928	98	10.56
1977	1087	154	14.17
1978	1131	43	3.80
1979	1036	53	5.12
1980	903	157	17.39
1981	807	325	40.27
1982	1196	261	21.82
1983	925	50	5.03
1984	1131	348	33.75

SOURCE: World Military Expenditures and Arms Transfer 1986.

On February 18, 1983, the Venezuelan government changed the parity relationship between the national currency, the Bolivar, and the dollar, establishing an exchange control and causing a clear change in the country's behavior with respect to imports. The total imports fell from an annual average of 14157.5 millions U.S. dollars during the period 1975-82, to an average of 8088.6 milliors U.S. dollars during the period 1983-85 representing a decrease of 42.8 % of the total imports. However the behavior of the arms import did not change, and during the same period the arms imports increased by a rate of 168.26 percent.

In the absence of any external or internal destabilizing factors the different behaviors can only be explained by the fact that Venezuela does not produce arms and the government wishes to continue with the policy of renewing or increasing the arms endowment of the armed

forces no matter what the economic situation of the country. This behavior is consistent with the preceding conclusion that the military expenditures tend to maintain a stable relationship with overall government expenditures.

4. Summary

From the analysis of the arms trade the following conclusions can be derived:

a. The change in the currency value did not affect the arms imports behavior.

b. The reduction in total imports make the arms imports more important in the overall foreign currency exchange of the country.

c. The country has increased its rate of arms imports while maintaining an almost constant rate of total military expenditures. Thus, we see, a smaller proportion of military expenditures in gross national product over time.

C. ALTERNATIVES

In general we can conclude that Venezuela military expenditures during the past decade have been stable, with a tendency to increase the arms-import expenditures more than to increase the total military expenditures. The economic conditions of the country have changed. The decreasing oil revenues and the ever-increasing needs that compete for the resources allocation, present the country leaders with very difficult decisions regarding the

military expenditures, where three main alternatives can be easily identified.

1. Decrease in the Military Expenditures

Venezuelan military expenditures are not likely to be reduced in the near future. Everybody would agree that the money expend in defense would be better allocated to in social and economic development in a perfect world where defense was unnecessary. Unfortunately, this is not the case. The political situation of Central America and the Caribbean, the ever-growing power of the Cuban Armed Forces, the territorial differences with Colombia and Guyana, and the necessity of maintaining an anti-guerrilla capability able to cope with the potential infiltration of the M-19 and F.A.L.C. revolutionary groups of Colombia, demand that Venezuela develop and maintain strong armed forces.

An argument for the use of the industrialized countries's umbrella-of-defense agreement implies that national interests of both protector and protected are the same. Often the interests may be similar or related, but will be interpreted and articulated differently. Also, such an agreement carries the potential for uninvited external interventions. Not only are the military forces of one's own nation symbols of sovereignty and independence, but more important, they are reliable and will better defend national interests as defined by national leadership. [Ref. 9]

Finally, a reduction of the already proportionally low military expenditures will constrain Venezuela's limited ability to ensure proper equipment maintenance and will constitute a limitation on its armed forces' combat effectiveness.

2. Reduction in Arms Imports.

Given the weakness of the Venezuelan national currency in the international money market and the increasing arms imports in absolute and proportional value, it seems logical to want to reduce the military imports in order to reduce the use of foreign currency. But, today's world of changing technology has greatly affected military requirements. The quality prevails over the quantity; efficiency and modernization are more important than numbers. Today war require highly sophisticated equipment, which can only be found in the international market. But, if the equipment is needed and can only be find in the international market, how can Venezuela reduce its arms imports? It seems clear that if a country does not have a production capability and wants to maintain its defense and military capability it needs to keep importing arms no matter the cost, and no matter the prevailing economic conditions.

3. Develop an Arms Production Capability.

The third alternative, and the objective of study in this thesis, is the possibility of developing an arms

production capability that could gradually substitute for the arms importation and eventually increase the country's defense capacity and contribute to its economic growth.

III. ARMS PRODUCTION IN LESS DEVELOPED COUNTRIES. WHY?

A. GENERAL

The changing role of the Less Developed Countries (LDC) in the international arms market, from importer to producers and, in some cases, to exporters has recently been the cause of several studies and is now one of the most discussed trends in arms transfers.[Ref. 10]

Many LDCs have initiated indigenous defense productions capabilities with degrees of self sufficiency which vary from developing maintenance and overhaul capacity to designing and manufacturing domestic weapons systems utilizing all domestic components. They have made a commitment to reduce the external or international dependence on arms suppliers. Table 3-1 show the value of arms production in the third world from 1950 to 1984 [Ref. 11] In it we can see that arms production was strongly limited during the 1950s. It started its growth during the middle of the 1960s, when the production value increased by a factor of five between 1964-69. The period of growth lasted along with the arms-trade increase until the beginning of the 1980s, when it stopped, probably because of the global economic crisis.

TABLE 3-1

VALUE OF PRODUCTION OF MAJOR WEAPONS IN THE THIRD WORLD

1950-1984

YEARS	INDIGENOUS	LICENSED	TOTAL
1950	2.00	1.00	2.00
1951	4.00	1.00	4.00
1952	2.00	1.00	3.00
1953	4.00	1.00	5.00
1954	3.00	-----	3.00
1955	6.00	-----	6.00
1956	2.00	1.00	3.00
1957	17.00	1.00	18.00
1958	22.00	1.00	23.00
1959	26.00	-----	26.00
1960	11.00	-----	11.00
1961	9.00	8.00	17.00
1962	10.00	10.00	20.00
1963	10.00	30.00	40.00
1964	16.00	24.00	50.00
1965	33.00	34.00	67.00
1966	24.00	51.00	75.00
1967	52.00	103.00	105.00
1968	71.00	147.00	218.00
1969	68.00	163.00	252.00
1970	92.00	182.00	274.00
1971	106.00	211.00	317.00
1972	184.00	243.00	427.00
1973	276.00	265.00	541.00
1974	357.00	274.00	632.00
1975	349.00	298.00	648.00
1976	371.00	448.00	820.00
1977	382.00	453.00	834.00
1978	432.00	340.00	772.00
1979	482.00	453.00	935.00
1980	470.00	510.00	980.00
1981	673.00	542.00	1215.00
1982	589.00	408.00	997.00
1983	602.00	569.00	1170.00
1984	635.00	512.00	1147.00
Total	6390.00	6317.00	12707.00

SOURCE: SIPRI

The numbers of producer countries also increased. During the 1950s only a few LDCs were involved in production efforts. Those included Argentina, Egypt and in lesser degree Colombia, India and North Korea. [Ref. 11] In 1984, 47 countries were to some degree armament exporters.[Ref. 12]

The development of an arms-production capability requires a large capital investment, technology difficult to obtain, and human resources which could, perhaps, be better used in social and civil development. When it depends on the government, as in the Venezuelan case, the military production can have a political cost.

It has been argued that the money spent in defense could be better used for others purposes. President Eisenhower said:

> " The cost of one modern heavy bomber is this:
> -A modern brick school in more than 30 cities
> -It is two electric power plants, each serving a town of 60.000 population.
> -It is two fine, fully equipped hospitals.
> -It is some 50 miles of concrete highways."
> [Ref. 13]

B. THE CAUSES.

If the development of an arms-production capacity is so difficult and the related cost so high, why are so many countries developing such capacity? There is no single answer to this question, however some of the reasons that can be argued are:

1. Substitution of Arms Imports.

The substitution of arms imports is the first reason for developing arms-production capabilities. It is based on economic, political and, military considerations.

a. In the Economic Area.

In the economic area the following reasons can be used to explain the desire for developing an arms-production capability:

(1) The ever-increasing price of arms in the international market.

(2) The negative effect of the arms-transfer cost in the balance of payments.

(3) The almost always obligatory use of foreign currency in the transaction and its implicit cost in the monetary exchange.

(4) The opportunity cost of the arms transfers in terms of economic growth, employment, etc.

b. In The Political Area.

In the political area the following reasons can be use to explain the desire for developing an arms production capability:

(1) To avoid the political influence of the producer countries.

(2) To avoid the necessity of the political compromises or alliances required to obtain the opportunity to buy arms from a producer country.

c. In the Military Area.

In the military area the following reasons can be used to explain the desire of developing arms-production capabilities:

(1) To avoid military dependence.

(2) To avoid the influence of other countries military forces.

(3) To have the equipment designed to the specific requirement and by citizens of the country.

(4) To maintain the levels of security classification.

(5) To simplify the logistic chain.

2. <u>To Reduce the Dependence on Outside, Unpredictable and Often Unreliable Suppliers</u>.

Other important reason for developing an arms production capability can be seen in the reduction of the dependence on outside, unpredictable and often unreliable suppliers.

"Governments procure armaments essentially for three purposes: To enhance the national security, to promote regimen stability, and to expand the economic growth." [Ref. 14] In order to be able to accomplish those objectives of arms procurement, the country must deal with an armament supplier that is reliable and dependable. This is not always the case. It seems that the buyer-supplier relationship is different during peace time from what it is during war time.

During peace time the relationship is normally one of bilateral government-to-government agreements, where the buyer or recipient can choose to obtain arms from the government itself or through many of the government sources. In time of war the situation is different and varies according to the nature and duration of the conflict. Stephanie C. Neuman, in analyzing the arms trade in nine (9) recent wars stated "as a rule, long wars have a disruptive impact upon pre-war bilateral supplier-recipient relationship. Here the change is norm rather that exception. For example, of the four LDCs that have waged conventional battles lasting two years or more, all have altered their pattern of procurement because of superpower resupply restrictions." [Ref. 15]. An example can be seen in the Iran- Iraq war, where both contending countries did change their main suppliers.

In short wars the situations have not been different. The arms embargoes are a common restriction faced by a LDC when enter in war. That was the case during the Falkland/Malvinas War when Argentina faced an arms embargo from all the European Countries during the conflict.

3. To Help the Development of an Industrial Base

A third reason for developing an arms production capability is to strengthen the industrial base of the country.

The complexity of an arms system requires in its production a structure with different levels of technology. It involves a complex hierarchy of contractors, subcontractors and vendors. A single firm can be contractor on one part and subcontractor in other. The first contractor will produce major assemblies, such as firing systems, the second level will produce electronic black boxes and so on.

Due to economies of scale, one characteristic of Third World industry is having a production rate below the design, capacity or having " slack capacity." The decision to develop an arms-production capability within the country should help the industry by using this slack capacity, and should motivate the development of other industries.

4. To Increase the Country's Political Independence

Another potential benefit of the developing of an arms production capability is the increase in political independence.

Arms transfers are instrument of foreign policy. Former Secretary of State, Cyrus Vance, in his 30 June 1977 report to Congress summarized the uses of these instruments as follows:

" To support diplomatic efforts to resolve major regional conflicts by maintaining local balances and enhancing our access and influence vis-a-vis the parties;
To influence the political orientation of nations which control strategic resources;
To help maintain regional balances among nations important to us in order to avert war or political shifts away from us;

To enhance the quality and commonality of the capabilities of major allies participating with us in joint defense arrangements;

To promote self-sufficiency in deterrence an defense as a stabilizing factor in itself and as a means of reducing the level and automaticity of possible American involvement;

To strengthen the internal security and stability of recipients;

To limit Soviet influence and maintain the balance in conventional arms;

To enhance our general access to and influence with government and military elites whose political orientation counts for us on global or regional issues;

To provide leverage and influence with individual governments on specific issues of immediate concern to us;

To secure base rights, overseas facilities, and transit rights to support the development and operations of our forces and intelligence systems." [Ref. 16]

President Reagan's position related to arms transfer can be summarized through this quotation: "The United States views the arms transfer of conventional arms as an essential element of its global defense posture and as an indispensable component of its foreign policy." [Ref. 17]

Soviet strategy and political motives for arms transfer could be easily the same, with the additional motive for the Soviet leadership of penetrating traditional regions of U.S. influence [Ref. 18]. The British posture is that its arms-sales programs promote a basic principle of the United Nations. "The right of each state to ensure its own sovereignty and defense." [Ref. 19]

Some author have said that French arms sales are solely directed and compelled by domestic economic consideration [Ref. 20]. But, Edward Kolodziej has insisted it would be a mistake to argue that French arms sales are

entirely for economic motives. "French arms transfer behavior reflect a more basic demand for an independent arms-production capability as a means by which to provide some maneuver and leverage in bargaining with other states, particulary superpowers." [Ref. 21]

In general, arms trade is a source of political influence, and developing an arms production capability should reduce the arms imports and with that, the political influence of the foreign countries.

5. To Generate Economic Benefits

A further potential reason for developing an arms production capability is that of the economic effects. While common sense would seem to indicate increased defense expenditures are likely to harm a LDCs, development efforts, economic theory does not provide any clear prediction of how the net impact of an increase in the military burden would influence growth, development, or welfare.

Classical theory, for example, will predict, on the basis of resource allocation, that an increase in defense will decrease in investment and or civilian consumption and thus reduce growth and welfare [Ref. 22]. An increase in military burden would, in this situation, have to be justified on the basis of other social-welfare gains, such as an increment in collective security. Keynasian theory on the other hand, implies that in the presence of inadequate

effective demand, the operation of the income multiplier would imply an increase in national product, resulting from additional defense expenditures; thus, there are purely economic rationales for increased military spending. More specifically, for economies operating with substantial excess capacity, additional demand and output from expanded military expenditure will increase capacity utilization, thereby increasing the rate of profit and possibly accelerating investment. Whether, in the short or long run, the former or latter effect dominates will determine the final outcome of defense on growth.[Ref. 23]

Among others, Rothschild, Benoit, Frederiksen and Looney, Lim, Deger and Sen, and Leontief and Duchin have examined various aspects of the defense-growth debate. Rothschild, who considered the pattern of rank correlations across growth, exports, and military spending for fourteen OECD countries over 1956-69, concluded cautiously that increased military spending tends to reduce exports and to lower economic growth.[Ref. 24] Benoit used data for forty-four less developed countries pertaining to the period 1950-60 and employed a specification that included investment, defense spending, and foreign aid. He found a strong positive association between defense spending and growth of civilian output per capita.[Ref. 25]

Frederiksen and Looney also specified an equation including investment and defense outlay as regressors, but

they made a distinction between resource constrained and unconstrained LDCs. Using data for a fairly large cross sectional sample pertaining to the period 1960-78, they concluded that increased defense spending helped economic growth in the resource-rich cases, but not in the resource constrained LDCs.[Ref. 26] Lim examined, within the framework of the Harrod-Domar model, a sample of fifty-four countries for the period 1965-73 and concluded that higher defense spending hurt economic growth [Ref. 27].

Deger and Sen reported that econometric evidence for India indicates that claims about the positiv effect of military expenditure on economic growth are exaggerated and that the economic spinoff from defense to development is weak [Ref. 28]. In an input-output framework, Leontief and Duchin have concluded that evidence presented by them "suggests that virtually all economies are able to increase total output and per capita consumption as they progressively reduce their military spending".[Ref. 29]

Clearly, the diversity of these results and those of other similar studies is rather disquieting. These mixed empirical findings have led Stephanie Neuman to conclude that "despite the volume of writing on the subject, we still do not know whether there is a causal relationship between military expenditures and development, much less what the relationship is."[Ref. 30] In a similar vein, Gavin Kennedy observed that for the less developed

countries during the 1960s there was "no obvious relationship between growth rates and percentage allocated to defense." He argued instead that the relationship between military expenditures and economic growth will "depend on circumstances" and will "not follow some general law applicable to all times and places."[Ref. 31]

As some analyst have already noted, the search for universal patterns to all places and time are likely to be disappointing.[Ref. 32]

Robert E. Looney defined as the main limitations of the previous research on the defense-growth controversy the following:

a. The treatment of developing countries as a rather homogeneous group for examining the defense growth relationship.

b. The lack of analysis of the manner in which the interaction of indigenous arms industries and increased defense burdens impact on various macroeconomic facets, to determine the overall net impact on growth.

He also pointed out that, where there is excess capacity, it is clear enough that spending on arms and military personnel will add to aggregate demand and thus growth. In most poor countries where there is little sophisticated industry and no domestic arms production, the demand injections from spending on military equipment will probably leak to suppliers abroad. However, the presence of

an indigenous arms industry should help internalize the impact of military expenditure on demand and hence growth.

And then, when testing the impact of military expenditures on overall growth over 1970-1982 period, he conclude that:

a. For the total sample, the military burden was statistically insignificant in effecting growth. The only statistically significant variables were the growth in investment and expanded government deficits, which possibly impacted on the overall growth.

b. When the Third World countries are examined as sub-groups, it can be seem that for the arms producer, the growth of investment was also a major determinant of overall growth. The military burden did, however, provide a stimulus to growth over and above that provided by the expanded investment. The results for the non-producers show overall growth to be a function of the overall growth on investment and, negatively to the average military burden.[Ref. 33]

It seems logical to conclude, after reviewing the different postures related with the economic effects of military expenditures, that having an arms production capability will produce favorable effect in the economic growth, or at least will help to minimize most of the adverse impact on economy often associated with increased military burden.

6. To Development or Enforce National Prestige and Pride

"The symbolic importance of arms production programs cannot be overlooked."[Ref. 34] The capacity of producing the required arms system provides countries with national prestige and enhances their regional influence. The pride that Argentineans take in their locally produced tanks and aircraft, or the Brazilians' pride in their planes or ships is great and widespread. [Ref. 35] Arms-production capabilities are also developed for the status they confer externally, and for the prestige that results at home. In explaining the expanded emphasis on nuclear-energy resource in Brazil, a nuclear-energy administrator made this comment in Brazil's official military journal, A Defensa Nacional: "The Brazilian people need to be proud of their country for other, more serious reasons than football and carnival. International prestige is, evidently a national objective."[Ref. 36]

IV. ARMS PRODUCTION EXPERIENCE IN LATIN AMERICA

A. GENERAL

It is the purpose of this chapter to review arms production experiences in the less developed countries and more specifically in Latin America.

In order to better understand the process of developing an arms production capability, we shall review the characteristics of the Latin America producers, the definition and characteristics of the alternative ways for the obtainment of technology transfer and finally, the common factor in the productive countries.

In recent years, the less developed countries have been changing their behavior with respect to arms system acquisitions, going from total import to developing production capabilities with varying degrees of complexity and self sufficiency. Variations include:

"1. Maintenance and overhaul capability.
2. Domestic assembly under license of unassembled kits from major suppliers.
3. Coproduction, in which basic components are produced endogenously while major items such as engines and electronics are imported.
4. Modification of coproduced or unassembled weapons with larger proportions of domestically produced components incorporated.
5. Production of endogenously designed systems with minimum dependence on foreign components.
6. Domestically designed and domestically manufactured weapons systems utilizing all domestic components."[Ref. 37]

In the Appendix, Register of Indigenous and Licensed Production of Major Conventional Weapons in Latin American Countries, 1950-84, a list of the countries is provided in alphabetical order with the information about the weapon categories and characteristics, the year of production and, the origin of the design.

B. LATIN AMERICA PRODUCERS

1. Argentina

a. Background.

Argentina began its economic expansion in the second half of the 19th century, based largely on the production and export first of wool and then of meat. The boom attracted capital and labor from Europe, allowing Argentina to develop its infrastructure and an industrial sector which was first confined to light industries but later expanded to include heavy industries and domestic arms production. During World War I, the production declined but recovered significantly in the late 1920s. Economic growth was heavily dependent on the ability of manufacturing to expand, primarily by import-substitution policies. [Ref. 38]

The long period of civilian rule (starting in 1852 with the fall of General Rosos) was interrupted in September of 1930 by a military coup. The armed forces became a significant factor in the political and economic

process of the country. From 1930 until October of 1983, Argentina had 24 presidents, of whom 16 were generals and every elected government but two (Justo and Peron) was overthrown by a military coup d'etat. [Ref. 39] The military also played an important role in the development of heavy industry, including iron and steel.

From the beginning of 1930 until the outbreak of World War II, the public sector, on military lands, took over majority ownership of most defense related companies industries and services. The first military steel plant (Fabrica Militar de Aceros) was founded in 1935, and half a dozen other arms factories were constructed soon after. During World War II and owing to Argentina's neutrality, the United States imposed an arms embargo which promoted an indigenous production of arms. As early as 1943, the army officer corps became dedicated to "transforming Argentina into a regimented industrial society geared to glory and war." [Ref. 40]

In 1947 the embargo was lifted, and from the end of the 1950s to the mid 1960s the situation changed. The availability of cheap World War II surplus weapons and the reorientation of the economy away from state intervention and import substitution led to a decrease in production.

In 1966, the United States sharply reduced arms deliveries (after a military coup). The Argentinean government decided to turn to Europe for weapon purchases.

The "Plan Europa" was launched. Arms imports were to be accompanied by an inflow of arms production technology. Contracts were signed with French firms for ship and tank construction; with a Spanish-Swiss firm for the manufacture of machine-guns, ammunition and air-to-surface missiles; and with West German and British companies for work on warships. The "Plan Europa" was intended to utilize the existing arms-production capacities through transfers of technology from abroad. [Ref. 41]

Arms-production activities increased sharply when the military took power again in 1976. The military budget grew as a reflection of military aspirations in the area. Despite a strong preference for free market policies, the military government heavily invested in the state-run Argentine arms industry. Strategic interests outweighed economic considerations, and the military proceeded to develop an enormous military-industrial complex, including further development of its nuclear programme. [Ref. 42]

At the end of 1983, the military government lost power, discredited by the defeat in the Falklands/Malvinas War. The new government has introduced changes in military industries: control has been transferred to the civilian Defense Minister, and military officers have been replaced by civilian technicians in key managerial positions. [Ref. 43]

b. **Structure of Arms Production.**

The Argentine Army had the leading role in domestic arms production via the Direccion General de Fabricaciones Militares (DGFM). DGFM is a conglomerate founded in 1941. It runs 14 military factories scattered around the country that produce arms, communication equipment, chemicals, and steel, among other things. DGFM has a majority share in at least seven other companies in the steel, iron ore, petrochemical, timber and construction sectors, as well as significant shares in a further 10 companies, including the Bahia Blanca petrochemical complex, another petrochemical plant in La Plata, a ball-bearing plant (built at a cost of over $500 million), and Argentina's biggest steelworks. DGFM also supervises the aircraft industry run by the Air Force and the yards run by the Navy.[Ref. 44]

DGFM employs an estimated 40,000 people directly, and a further 16,000 work in associate companies. About one per cent of its employees are military officers, mainly engineers, and the rest are civilians. At the end of the 1970s annual turnover was reportedly more than two per cent of the country's GDP (or $2.2 billion in current dollars, including its associated companies).[Ref. 45]

Not all of the production in the Fabricas Militares is weapon-oriented. Much of the production of basic materials and pre-products is sold to civilian

customers and shipped on to the plants producing weapons as end-products. Argentina has a long tradition of military R&D, but its R&D policies have been inconsistent. In 1980, Argentina devoted about $530 million to total R&D. This fell to about $350 million in 1983. The share of funds for military scientific and technological research is unknown. The identifiable portion of military R&D has varied sharply. In 1978, 17.94 per cent of total R&D officially was for the Ministry of Defense, 0.20 percent for the Navy and 1.72 percent for the Air Force. In 1983, the official share of the Ministry of Defense was four per cent.[Ref. 46]

c. **The product.**

Argentina's arms industry has been able to produce a wide variety of arms systems. Appendix shows that major arms system produced by Argentina include 20 types of aircraft, nine armored vehicles, three types of missiles and nine types of ships. Table 4-1 shows the production of small arms and ammunition in Argentina and its sources of technology.

d. **Export and Policies.**

Argentina does not export arms on a large scale. Although Argentina's arms industry can be said to be technologically on a par with, for example, Brazil's, it has been devoted to national requirements rather than to attracting Third World buyers.

TABLE 4-1 PRODUCTION OF SMALL ARMS AND OTHER EQUIPMENT IN ARGENTINA

ITEM	MANUFACTURER	SOURCE	COMMENT
PISTOLS			
FN HP 9-mm	FM Domingo Matheu	FN (Belgium)	In production since 1969, standard weapon of army
[illegible] 1927 .45-cal	FM Domingo Matheu	Colt (USA)	Produced until 1966; exported to Bolivia
[illegible] .45	HAFDSA	Ballester (USA)	Produced around WWII
[illegible]			
[illegible] FMK-3 9-mm	FM Domingo Matheu	Indigenous	In production since 1971; formerly called PA3-DM
[illegible] 9-mm	FM Domingo	USA	Copy of US M3; in production between 1968 and 1971
[illegible] 9-mm	MANGO SALVA	Indigenous	Various models of all-steel design
[illegible]	[illegible]	Indigenous	Various models; in service with police, national guard and army
[illegible]		Indigenous	
[illegible]			
[illegible]	FM Domingo Matheu	FN (Belgium)	Nearly 125,000 produced by early 1930s; exported to Peru and Central America
[illegible]	FM Domingo Matheu	Indigenous	Developed from FN models; in production since 1951
[illegible]	FM Domingo Matheu	FN (Belgium)	About 5,000 produced between 1965 and 1970
[illegible]			
[illegible]	FM Domingo Matheu	FN (Belgium)	In production from 1969
[illegible]			
[illegible]	FM Domingo Matheu	Oerlikon (Switzerland)	Unconfirmed
[illegible]			
[illegible]	FM Domingo Matheu	Indigenous	In production since 1950 for police and paramilitary units
[illegible]	FM Domingo Matheu	Indigenous	Various types, including anti-tank
[illegible]			
[illegible]	FM [illegible]	[illegible] Hiss-Brandt (France)	
[illegible]	FM [illegible]	[illegible] Hiss-Brandt (France)	
[illegible]	[illegible]	[illegible]	Various types, [illegible] anti-tank [illegible]
[illegible]	[illegible]	[illegible]	Various [illegible]

TABLE 4-2

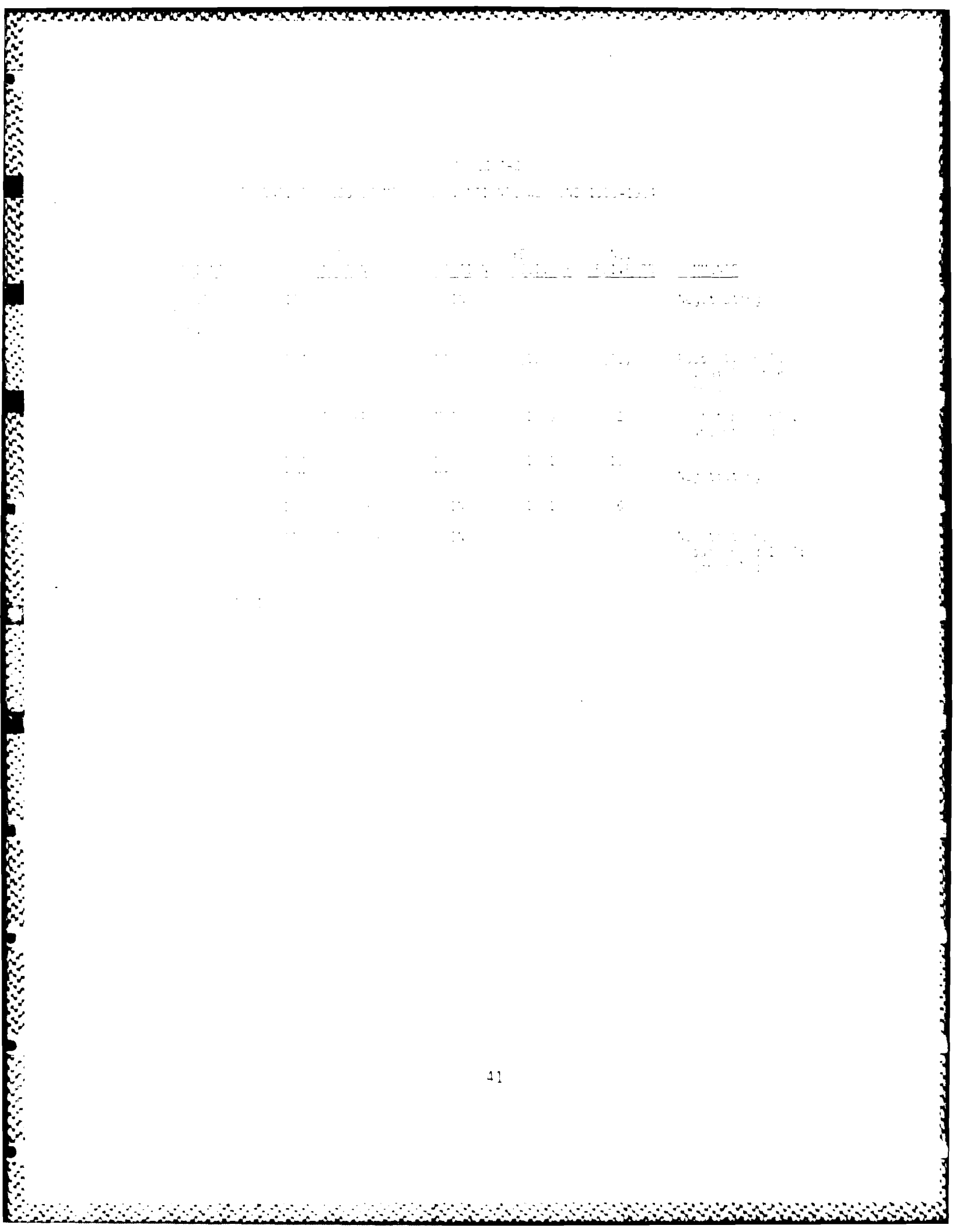
ARGENTINA SALES OF MAJOR CONVENTIONAL WEAPONS 1950-1984
(UNCLASSIFIED)

RECIPIENT	WEAPON DESIGNATION	DESCRIPTION	YEAR OF DELIVERY	NO. DELIVERED	COMMENTS
Central African Republic	IA 58 Pucara	COIN			Negotiating
Panama	TAM	MT	(1985)	(60)	Possibly including vehicles for resale
Paraguay	Mirage 5A-93	MBT	1966	2	Prototypes only; unconfirmed
Peru	TAM TAM	MT MT	1981	16	Negotiating
Uruguay	IA 58 Pucara	COIN	1981	6	
Venezuela	IA 58A Pucara	COIN			Negotiations suspended in 1982; unconfirmed

NOTE: SIPRI

The Argentine civilian government under Alfonsin is seeking to increase its foreign arms sales. It intends to establish an arms sales policy markedly different from the past. The government has granted substantial authority over foreign arms sales to the Foreign Ministry, rather than to the military or the Ministry of Defense. The government has also decided not to sell weapons that could have a decisive impact on active conflicts or aggravate regional tensions. While the civilian government is keen to shed more light on the activities of the industry, it also wants to boost its exports in order to lighten the debt burden. [Ref. 47] Table 4-2 show the register of export of major conventional weapons from Argentina, 1950-1984.

Since 1976 Argentina has increased its exports of light weapons, mainly to Central America and often in connection with military aid. Until mid-1982, when the Falklands/Malvinas War prompted a withdrawal of military personnel, Argentine military advisers played a major role in training and financing Nicaraguan and anti-Sandinista rebels. During the Somoza regime, Argentina delivered ammunition, grenades and bombs. According to military and government sources, in 1984 Argentina shipped $2.5 million worth of arms intended for Nicaragua's anti-Sandinista rebels to Honduras, including rifles, munitions and spare parts. [Ref. 48]



In April 1982, El Salvador received a cargo of arms from Argentina worth $17.2 million, including the Argentine FNFAL 7.62 automatic rifle and the FMK-3 sub-machine-gun. [Ref. 49]

2. Brazil.

a. **Background.**

Since its founding in the nineteenth century, the Brazilian military and its concept of defense (and development) have evolved organizationally and operationally. The military's perceived need to protect Brazil's borders, arising from an exaggerated fear of attack, justified the creation of the first powder and cartridge factories and the national arsenal after the Paraguay War (1864-1870), a territorial dispute involving Brazil, Argentina, Uruguay and Paraguay. [Ref. 50] Frank McCann, Jr. has traced to early 1900 the perception that Brazil needed an arms industry. This need was originally tied to demands for a steel industry not only on the basis of arms production but also because it could provide Brazil with other logistical and technological capabilities for national development.

In the 1930s, some officers believed that in order for an arms industry to develop, the country as a whole had to undergo broad industrial development; that is, it was impossible to have the former without having the latter. In line with this long-term mode of thinking, some

army officers became trained in professional and technological specialties earlier than their civilian counterparts became trained in the "market." During the 1930s and 1940s, military officers were sent abroad for training in oil drilling and refining. Other officers studied steel technology and telecommunications, while Brazil's Instituto Militar de Engenharia (IME) was producing graduates specialized in several fields which would later be useful for the arms industry. [Ref. 51]

During WWII, Brazil helped to defeat the Axis powers and in 1952 signed a defense pact with the U.S. which limited the threat of foreign invasion and enabled to acquire military equipment.

But, with the passage of time, Brazilians began to notice that they were not benefiting from the established "rules of the game." The United States provided equipment, but operators had to be trained at American military academies, according to American standards. There was also no effort made to transfer American military technology to Brazil. The Brazilian military also had difficulty keeping up with technological advancements in U.S.-supplied equipment. Brazilian attempts to maintain the costly equipment largely failed, creating a vicious and expensive cycle of dependence on the United States for spare parts and replacements. This only increased the burden of the national debt. [Ref. 52]

During the Vietnam War, the U.S. restriction on transfer of military goods produce a search for alternative source of arms in Europe and between 1967 and 1972, Brazil purchased large amounts of European-made arms and increased its dedication for developing its arms production capabilities.

The military government of President Carlos Castello Branco, (1964-1967), created the Plan of Industrial Mobilization in which a plan for the defense sector was created within two industrial advisory councils. The Federacao das Industries de Sao Paulo (FIESP) and the Grupo Permanent de Mobilizacion Industrial (GPMI). It thus embodied an alliance between a group of manufacturing industries in Sao Paulo and the army's Department of War Materiel. During this period of economic recession, the industrial sector was revived by the injection of government funds that the military requested for modernization of the industrial capacity. The new policy also included the creation of military research institutes and the creation of the political machinery needed to make the defense industry more competitive by facilitating the mechanism for acquiring of know how and subsidizing the industry.

During the presidency of General Costa e Silva (1967-1969) and during the period of the Brazilian "Economic Miracle," several enforcement of the industrial

policy were established and the period was characterized by the policy of import substitution and the development of new larger and more sophisticated weapons. In the desire to make the defense industry self-sufficient, to build an industrial and technological base, and to learn the penetration of foreign markets, more than 100 joint ventures coproduction agreement were started, and new legislation was approved.

The legislation covered four basic areas:

1. Reduction of taxes for industrial products and higher tariff on imported goods;

2. Reduction on prices on military goods destined for foregoing markets;

3. Credit for domestically produced military goods; and

4. Access to preferential financing by the government. [Ref. 53]

In 1977, as part of President Carter's human rights policy, the U.S. Congress imposed restriction on its aid to Brazil's military government on the grounds that it was violating human rights. President Ernesto Geisel, indignanant over the U.S. position unilaterally cancelled several agreements of military cooperation between the two countries. The military took advantage of the opportunity to further develop the modern arms-production capacity. The end of the U.S.-Brazilian military ties began the final stage of the development of an indigenous Brazilian defense

industry. According to the Stockholm International Peace Research Institute (SIPRI) statistics, in less than a decade, Brazil had leaped from zero arms export to export of about 2.3 billion in 1984. [Ref. 54] It is estimated that roughly 5% of total Brazilian export and about 35% of the total arms export are to so-called peripheral states.

b. **Structure of Arms Production.**

The boom in arms production in the 1970s and 1980s resulted from several sources and exhibited different characteristics in different sectors.

The arms industry in Brazil has a varying structure being the more important factor to mention its composition by state-owned industries and by highly influenced by the government, but private industries.

In the government part, the main component is the company IMBEL (Industria Brasileira de Material Belico) which is composed of the former state arsenals (except for the naval yard) and other state enterprises producing small arms and ammunition. The company was created in 1975 with the objective of streamlining, commercializing, and coordinating the state's arms production. This company also markets products of the private arms industries.

There are in Brazil many forms of mixed state and private capital, for example, via prescribed shareholding or via state institutions, such as the branches of the armed services, regional authorities, banks or regional

development funds. A regional state enterprise (Minas Gerais) took the initiative in creating a small helicopter industry. A major impetus for the start of production of armored vehicles uses the formation of a joint group of the armed forces and industrialist from the Sao Paulo Region in 1965 (Grupo Permanente de Mobilizacao Industrial).[Ref. 55]

Another important sector of the arms industries are the multi-national companies. They supply licenses and components for the arms industries but they also invest in the Brazilian's industry. For example, in 1982 Ferranti (UK) took 49 % ownership in Sistemas Ferranti do Brazil, in which IMBEL has the majority. This company will produce naval electronics.

c. **The Products.**

The Brazilian arms industry is able to produce a wide variety of aircraft, missiles, rockets, armored vehicles and to produce naval vessels and small arms and products. Appendix shows that major arms systems produced by Brazil include 18 types of aircraft, 10 armored vehicles, three types of missiles and seven types of ships. Table 4-3, shows the production of small arms and ammunition in Brazil and its sources of technology.

d. **Exports and Policies.**

Although there is no doubt that Brazil has become one of the more important Third World exporters of arms, exact figures are not available. [Ref. 56] According

TABLE 4-3

ORDNANCE PRODUCTION IN BRAZIL

	PRODUCER	TECHNOLOGY	COMMENT
PISTOLS			
PASAM	Itajube	FR Germany	Mauser
Colt 1911A1	Itajube	USA	
Model 92	Beretta	Italy	Late 1960s
Tauros .38	"	"	
Rossi .38	Rossi		
RIFLES			
Mosque FAL	Itajube	FR Germany	
FAL 7.62mm	"	FN (Belgium)	
FAP	"	"	
Para FAL	"	"	
Falbina	"	"	
M1 Garand	"	USA	
LAPA	LAPA		
OVM 5.56	MEKANITA		
KMK 5.56	"		
SUB-MACHINE-GUNS			
INA MB50	Industria Nacional	Denmark	
M 12	IMBEL		
md-1/2	Beretta	Italy	
URU	LAPA Mod.	02	
M9 MI-CEV	IMBEL		
Alfa GP1	IBRAP		
MACHINE-GUNS			
MAG	Itajube		
Uiapuru	Mekanita		
AMMUNITION			
5.56 7.62 .38 .45 7.63 9 mm 12.7 20 mm	IMBEL and others.		
30 mm	IMBEL		
90 mm	IMBEL		

SOURCE: SIPRI

to unofficial Brazilian sources, arms exports exceeded $1 billion for the first time in 1980 and had more than doubled by 1984. For the arms industry, it is convenient to claim extraordinary export achievements, but as far as

specific transactions are concerned, the principles of business are evoked to justify non-disclosure.[Ref. 57] Economically, the Brazilian strategy has been to orient is arms industry toward export, as means to obtain externally originated "cheap financing" for the development of a sophisticated and expensive industrial sector. Hence, the country is developing a capability to produce weapons, and receiving socioeconomic benefits (technology, trained manpower, know-how, industrial parks, and so on), without excessively straining the local economy. While the primary motivations for the arms industry have not been economic, there still are major economic benefits resulting from its development. The trend, therefore, is toward the growth of the arms industry with strong economic motivations--a trend unlikely to change.

Finally, the Brazilian arms industry's importance as an instrument of foreign policy must be stressed. Over the last fifteen years, Brazil has maintained what some have called an ambiguous foreign policy. This ambiguity was expressed by means of keeping good relations with both the developed countries and the Third World, without making a full commitment to either. Whether this is a tenable long-term strategy is unknown. But for the arms industry, Brazilian closeness to the Third World is crucial and reciprocal since it allows Brazil to court less developed countries who may become commercial clients, political

supporters, or allies. This is being done partly with arms supply, a process that helps to increase political leverage. Last, but not least, the implementation of this policy has not been made exclusively or primarily by the military, but by professional diplomats.[Ref. 58]

3. Chile

a. **Background.**

Before 1973, the Chilean armed forces were not visibly involved in economic or politics. They supported the economic policy of slow, mainly inward-oriented industrialization,offering few products to the world market, mainly copper.

In 1973, the situation changed with the coup d'etat that caused the overthrow of the government of President Salvador Allende. With the new government, the military expenditures were increased, and an ultra-liberal path of development was tried that reduced the state involvement in the economy and reduced trade barriers. The 1973 coup d'etat also brought a military embargo from Great Britain and other countries. F.R. Germany stopped signing new contracts but did not invoke a formal embargo. In 1977, the U.S. government of President Carter ordered an arms embargo based on violations of human rights which strongly affected the Chilean resupply, since Chile was then heavily dependent on U.S. weapon deliveries.

b. **The Industry**

Limited small-arms production seems to have existed in Chile since 1811. Navy shipyards have done repair work since the creation of the Navy in the last century. Some experimental aircraft were designed and flown by the Air Force in the late 1940s and early 1950s. All these very limited activities were under the direction of the respective branches of the armed forces. Since its inception in 1960, the most important activity has been the Astilleros y Maestranza de la Armada (ASMAR) with its shipyards in Talcahuano, Valparaiso and Punta Arenas, on the southern tip of the continent. Projects for small-arms production have been united in the Army's Fabricas y Maestranzas del Ejercito (FAMAE), situated in Santiago. The Air Force's activities stopped in the 1960s, but were revived again in the late 1970s.

Since the late 1970s, state-owned production capacities have been expanded, and new projects have been started. A large swimming dock was built at ASMAR as a joint venture of ASMAR and the Spanish naval shipyard Bazan. New facilities for the Punta Arenas Yard, valued at $13 million, are financed by the South African Industrial Corporation as a joint venture of ASMAR and Sandock Austral (South Africa).

The Army's ordnance factory, FAMAE, opened new production facilities in 1983 with modern

computer-controlled machine tools for metal cutting and drilling. The Air Force decided in April 1980 to produce foreign aircraft under license. The Industria Aeronautica (Indaer) at El Bosque was set up to assemble, later produce, and then design aircraft. In 1984, its name was changed to ENAER (Empresa Nacional de Aeronautica).

In the late 1970s, a substantial private arms industry also developed. The most important company is Cardoen, which was set up in 1977 by Carlos R. Cardoen, who had studied engineering in the United States. Cardoen produces a wide spectrum of munitions, security equipment and especially armored vehicles, and has plans to enter aircraft production (including helicopters). It produces parts for ENAER and equipment for the mining industry. Other producers of mining equipment and machines have tried to enter the arms market, encouraged by the government's attitude not to buy only from its own arsenals. One such company is Makina which, among other small contracts, won the competition for a patrol vehicle for the Air Force.[Ref. 59]

c. **The Weapons.**

The Chilean arms industry has provided the country with various types of weapons system. In the aeronautical area, it has been able to establish an assembly line for PA-28 Dakota (1980) in collaboration with the American Piper Industries. It has assemble a French

fighter Mirage and, in 1982, from the follow-on-development of the PA-28, the training aircraft T-35 Pillan was produced. In 1984, an agreement between Spain and Chile was signed to establish a production line of the basic trainer aircraft C-101 Aviojet of the Construcciones Aeronauticas Sociedad Anonima (C.A.S.A.) of Spain. Also, in 1980, it selected the Swiss Mowag Piranha armored vehicle to be produced in the country, and from other licensed production and some further improvement and technology incorporation and modifications it has produced three other vehicles, the VTP-1 ORCA, from the German TM-125, the BMS-1, Aucran from the U.S. M3A1 and the Mowag Piranha.

ASMAR, is capable of doing all the ship repair and maintenance work of the Chilean Navy. This include the capacity to overhaul submarines. It is also able to construct non-sophisticated ships.

The army ordnance factory is capable of producing a wide range of small arms, ammunition and other ordnance. The factories of CARDOEN are specialist in the production of bombs, grenades, and mines. Table 4-4 shows the ordnance production in Chile.

d. **Exports**

Arms exports from Chile were, until 1984, limited to small batches of ammunition and small arms. Efforts have been made to increase exports, in line with the general economic policy of exporting manufactured products.

This would also help to recover some of the expenditure that financed the weapon systems designed for export, such as the various APCs. In 1981, a FAMAE delegation toured Africa and the Middle East. In 1984, Cardoen sold cluster bombs to Iraq. The Pillan trainer aircraft was ordered by Spain.[Ref. 60]

TABLE 4-4

ORDNANCE PRODUCTION IN CHILE

	TECHNOLOGY	PRODUCER	COMMENT
SMALL ARMS			
FN FAL rifle	FN, Belgium	FAMAE	
FN FAL HB MG	FN, Belgium	FAMAE	
SIG SG542 rifle	SIG, Switzerland	FAMAE	
AMMUNITION			
7-mm, 7.62-mm, 9-mm		FAMAE	
OTHERS			
AA-gun Mounts		SOGECO	
Cluster-bombs	(USA)	Cardoen	
Mortars		FAMAE	
Grenades	Brazil	FAMAE,	
Explosive, bombs		FAMAE, Cardoen	
77-mm Rocket		Cardoen	

SOURCE: SIPRI

4. Mexico.

a. **Background.**

The armed forces have only very limited power in Mexican politics. After the revolution of 1910, a coalition between most of the political groups took exclusive control, deliberately neutralizing the Army.

An important factor in Mexico's foreign policy is its proximity to the USA. While there is a strong feeling

of domination, it has not led to efforts to arm against this neighbor. Mexico maintains small armed forces (about 120,000 soldiers in 1983), whose main function is internal, which can be seen in the emphasis on light arms.

b. The Industry.

Mexico has a diversified industrial structure, the result of deliberate economic policy aimed at substituting domestic products for imports. However, in many cases both the technology and capital come from the USA and west European countries. Mexico, a country with large-scale oil production, had a few years of financial relief in the late 1970s, but large-scale investment in the oil industry and the high level of government spending soon caught up. In 1982, the Mexican debt was so high that the country had to ask for extensive rescheduling.[Ref. 61]

In the arms production grounds, Mexico has been reported to have decided to produce Israel aircraft but the project have never taken place.

The more important structure to mention is the government diesel national (DINA) which produce armored vehicles and the shipyards of Veracruz, Tampico and Guerrero which have produced most of the new Navy ships used by Mexican Navy. (Most of the ships used by the Mexican Navy are U.S. World War II ships.)

c. **The Weapons.**

As is shown in Appendix, arms industry have been able to produce one armored vehicle, four types of ships and several types of ammunition and small arms. Appendix show the major conventional weapons systems produced by Mexico and in Table 4-5, can be seen the small arms and ammunition product.

d. **Exports.**

The author could not find any information or indication of Mexican arms exports.

TABLE 4-5

ORDNANCE PRODUCTION IN MEXICO

	TECHNOLOGY	PRODUCER	COMMENTS
Small arms			
Trejo pistols		Trejo	
Obregon pistols			Produced 1950
Mendoza SMG		Mendoza	Several 1950
G3 rifle	Heckler & Koch, FRG	Fabrica de Armas	
FN FAL rifle	FN, Belgium		
Ammunition			
45-in, 7.62-mm			

SOURCE: SIPRI

5. Peru.

a. **Background.**

Since independence in 1826, Peruvian politics has been under the ultimate control of the military. The military was in alliance with the landowners and mining companies, both Peruvian and international, until the 1960s,

when facade democracy slowly emerged towards more representation. After 1967, a radical military government increased military expenditures and procured most of its weaponry from the Soviet Union. In 1975, the military radicals were ousted by a more conservative military government. Some of the reforms initiated by the former government were reversed and procurement of modern weapons was stepped up (mostly from the Soviet Union). Elections were held in 1980, a time of severe economic crisis, resulting in a civilian government.

Peru has not been able to improve its economic situation: it is heavily indebted, and aid donors have criticized the high level of military expenditure which substantially added to this indebtedness. [Ref. 62]

b. **The Industry.**

The most prominent field of arms production in Peru is shipbuilding. The Servicios Industriales de la Marina (SIMA) was established in 1950 by the Navy at Callao. Shipyard facilities had existed there earlier, but the Navy intended to expand the facilities for maintenance, repair and production, including work for the Peruvian merchant marine. In 1973, the legal status of SIMA was changed; it became a private company, though owned by the government and operated by the Navy through a board consisting entirely of active admirals.

SIMA currently has four production sites. The largest, employing about 3,500 people, is at Callao near the main naval base. Work is about equally divided between repair and construction. The small arms factory SIMA Cefar (Centro de Fabricacion de Armas) employs about 600 people. The other two shipyards are at naval bases at Chimbote and Iquitos on the Amazon River. They basically do maintenance and repair work both for the Navy and commercial customers, but have also built small boats, tugs, landing craft and patrol craft for the Navy. The Iquitos yard employs about 300 people. In late 1982, the Chimbote yard employed about 600 people. Employment has increased since then, when activity was shifted from Callao --where space is limited-- to Chimbote. [Ref. 63]

Indumil (Industrias Militares del Peru) is run by the Army the same way SIMA is run by the Navy. The Air Force has a similar company, called Indaer (Industrial Aeronautica del Peru). Both were established in their present form in 1973, in the case of Indumil combining activities that had been going on at various smaller production units under the guidance of the War Ministry.

c. The Products.

The Peruvian arms industries have been able to produce a trainer/ground attack aircraft designed by Italian Airmacchi but the production plant was shelved for financial reasons. In 1982, a contract was signed with

Dassault-Breguet to supply modernization kits for Mirage V and technical assistance. SIMA has, since the late 1950s, built most of the small patrol craft and support ships for the Peruvian Navy. In 1978, licensed production of two modified Italian-designed Lupo Class frigates started. This represented a substantially different type of production, in terms of size, materials used, complexity of construction, integration of weapon systems and skills required. Almost all of the materials for these ships were imported, while the civilian ships built by SIMA at Callao on the average contain a local content of 50 per cent. Production was simplified by building the ship not in sections, as is done in Italy, but in one piece from the keel up. Production was supervised by Italian engineers. The integration of the weapon systems was also the task of foreign engineers.

It took SIMA a long time to build the ships. The first was laid down in 1978 and launched in 1982. The fitting of weapon systems, electronics, and so on took more than an additional year. The second was laid down in 1979, and took equally long to complete. The reasons for the drawn-out production are not very clear. One is that funding was very insecure between 1976, when the order was placed, and 1980. Another is that design changes had to be made, not least because of the different production mode.

In addition, the Peruvian yard seems to have run into severe technical problems.

Another, less ambitious naval project is the construction of Pas of the Spanish-designed PCP-50 Type at the Chimbote yard. They are offered for export both as PCs and as missile-armed FACs, though no missile fit has been done at Chimbote so far. [Ref. 64]

Appendix shows the major arms system produced by Peru and Table 4-6 shows the production of small arms and ammunition in Peru and its production entity.

TABLE 4-6

ORDNANCE PRODUCTION IN PERU

	TECHNOLOGY	PRODUCER	COMMENTS
Small arms			
9-mm SMG		SIMA-CEFAR	
Ammunition			
7.62-mm, 9		INDUMIL	

SOURCE: SIPRI

d. **Export.**

The author could not find information about any registered Peruvian arms exports.

C. **SOURCES OF TECHNOLOGY.**

One of the more difficult factors involved in developing an arms production capability is achieving the technology level required in today's arms systems. It is the purpose of this section to review the concept of

technology transfer, and to analyze the advantages and disadvantage of the concepts of coproduction, licensing, and "Life of Type" in the scope of alternative acquisition policies for a country seeking to increase its production capabilities.

1. Technology Transfer.

Technology transfer is the process of transfering from the industry in one country to the industry of another technical design information, engineering, manufacturing and production techniques for hardware systems.

2. Coproduction.

a. **Definition.**

Coproduction is defined as the result of a government-to-government agreement,in which a contract is signed by firms of two or more nations, which allows foreign countries to share the other government orders, domestic production, and third party sales. (It may include industrial collaborating, work sharing, and off-set agreement). For example, a country which purchased a foreign system participated in the production of some of the parts or jointly produce the equipment by a joint venture.

b. **Advantages of Coproduction.**

1) Facilitate the technology transfer;

2) Contribute to the unit-cost saving by increasing the number of required systems to a level at which it can take

advantage of the economies of scale. In general, coproduction unit cost is expected to be lower than independent production;

3) Reduce research and development costs and prevent the duplication of the R&D exports;

4) Provide for standardization of equipment in the producing countries;

5) Contribute to maintaining and increasing industrial base;

6) Generates offset benefits in a range of industrial and commercial compensationspractices required as condition of military sales, i.e., supplier agrees to purchase certain dollar value of the buyer's manufactured product, raw material or services as a condition of the sale.[Ref. 65]

7) Simplify maintenance and operational support of military equipment and assure wartime supplies; and

8) Strengthens the relationship between governments and facilitate interoperativity.

c. **Disadvantage of Coproduction.**

1) It has been argued that military technology is non-productive and that some is not adaptable to civilian uses;

2) High initial investment for coproduction facilities and machinery may require considerable amount of foreign currency. This could add to external debts;

3) Because of the technology-absortion problem that the country may experience, it may become dependent upon "white collar mercenaries" to maintain and operate weapons systems.

4) The coproduction agreement involve transfers of technology which have license or royalty fees to cover technical data, engineering assistance and production rights;

5) It is believed that coproduction results in higher cost than if the weapons had been purchased directly "off the shelf" from the original manufacturer, resulting mainly from shorter production runs, loss of learning economies and duplicating tooling and cost of transferring technology.

6) Coproduction agreements will produce equipment designed for meeting the needs of the original countries, and it will take a long time to modify the equipment for specific requirements of the other country or countries.

7) Slow time of delivery is another negative characteristic of coproduction, compared with buying "off the shelf."

3. Licensing.

a. Definition.

Licensed production is production made possible by agreement under which developers of military hardware provide data, patent rights, technical assistance, and whatever else is necessary to enable production of the

desired hardware by a source in another country. The developer is usually compensated by licensing fees and/or royalties on sales and various other means. [Ref. 66]

b. **Advantage.**

1) Licensing provides several advantages in technology transfer, standardization, industrial-base job opportunities, and maintenance--and operational--support benefits;

2) Licensed production has a better delivery schedule than coproduction because only one nation is involved.

3) Licensed production is less politically involved than coproduction and does not necessarily develop the same strong relation between the parts developer and the producer.

c. **Disadvantage.**

Licensed production have several disadvantages between such as:

1) The high unit cost caused by reduced possibilities of reaching economies of scales;

2) The required payment of royalties or fees for unit produced;

3) The possible contractual limitations which could limit the arms production for third parties;

4) Slow or limited technology transfer caused by the right of the developer to hold the technical data; and

5) Because of different sources, there is variation in quality between competitive products.

4. "Life of Type Buy."

In the United States, when a weapon system or end item of equipment reaches the end of its usefulness, it is declared obsolete and, over a period of time, removed from the inventories. As that system or equipment disappears, its unique spare parts and various kinds of support material disappear also. However, foreign governments which have previously purchased the item may not be prepared to either replace it or have the item lose its usefulness due to a lack of spare parts. The resolution of this conflict lies in the idea of System Support Buy Out.

SSBO consists, essentially, of notifying customers who have previously bought a system or equipment that the item and its unique support are going to be dropped from the U.S. inventory systems and that, if the customer wants to participate, he has an opportunity to have final procurement of spare parts in sufficient range and depth to support the customer's system or equipment for its projected remaining useful life and, the opportunity to "Buy Out" the remaining on hand stocks of repair and spare parts which are unique to the system or equipment.[Ref. 67].

D. COMMON FACTORS OF PRODUCING COUNTRIES.

There is no one single pattern in the development of arms-production capabilities. Each country has its own characteristics, circumstances and interests. Each one has factors which differ from the others. However, it is the intention of this section to highlight the facilitating factors and steps which are common to most of the implementing processes of arms-production capabilities in LDCs.

1. Facilitating Factors.

The most significant factors facilitating the implementation of arms production capabilities are:

a. The amount of capital available for investment. Arms industry development requires enormous amounts of capital, especially if the program is developed completely independent of foreign assistance. This puts a strain on LDC financial resources, and explains why so many weapons programs have been terminated even after production has begun. It explains also why the richer countries among the Third World are the ones who are more often the weapons producers. Even the inexpensive labor cost of LDCs do not ipso facto make production cheaper, since other factors counterbalance the wage scale benefits, such as infrastructure, specialized materials, and the know-how needed. In fact, these other factors usually make arms production more expensive than outright purchase.

b. The amount of landmass and population. Although there are exceptions, such as Israel and Singapore, most of LDC arms producers are large countries with large military establishments to absorb weapons and equipment. Also having a large population facilitates greater specialization among the workforce and the marshalling of a critical mass of personnel. Large countries have large militaries and these in turn permit economies of scale to take place in production runs. Large armies are correlated with large landmasses. All large, heavily populated countries have large armies, and nearly all these countries have significant arms production programs.

c. The possession of technically trained manpower, a research base, and educated technicians in required areas.

d. The possession of an industrial base is a crucial facilitating factor in the development of an arms production capability.

e. The possession of a supportive government administration will also facilitate the development of an arms-production capability.

2. Implementing Process of Arms Production Programs.

Once a LDC decides to undertake an arms production program and begins devoting resources to it, there is a fairly predictable series of steps that the country goes through in its pursuit of arms-production capability.

a. Decision. The first and most important step is the decision to undertake an arms-production program. This decision may be a fully detailed plan or develop as opportunities emerge.

b. Setting of Maintenance Facilities. Facilities for services and overhaul of weapons are set up, and relations between the armed forces and the local industries are developed.

c. Licenses are obtained for assembling kits produced in other countries. Technical information is transferred and personnel is trained.

d. Small parts and components are manufactured by the local industry under supervision, and assembled kits are available to be sold to foreign countries.

e. Assembly of major weapons systems is started under licensing or coproduction agreements. Production lines and factories are installed, or other lines are adopted to produce military equipment.

f. Modifications to coproduced or licensed equipment are incorporated and a larger proportion of domestically manufactured parts and components are included.

g. The design and the production of equipment are incorporated into major arms systems.

h. Domestically designed and manufactured of major weapon system utilize foreign crucial parts, i.e. domestically produced aircraft use foreign engines.

i. Totally domestically designed and manufactured weapon systems are produced.

V. VENEZUELA.

A. GENERAL.

It is the purpose of this chapter to analyze the characteristic of Venezuela in the scope of developing an arms reduction capability. We shall review the country's historical background, the economic sectors more relate to arms production, the government structure and the Venezuelan arms industry.

B. HISTORICAL BACKGROUND.

Until 1935, Venezuelan history was characterized by long periods of authoritarian rule including the regimes of Jose Antonio Paez (1830-46 and 1861-63), Antonio Guzman Blanco (1870-88) and Juan Vicente Gomez (1908-35), alternating with shorter periods of more democratic instability. Venezuela's evolution on modern democratic lines dates from the death of Gomez in 1935. The process was interrupted by a military regime, headed by Marcos Perez Jimenez, between 1948 and 1958, but, since his downfall, it has shown every sign of being consolidated. The dominant figure in recent Venezuelan political history was undoubtedly Romulo Betancourt, the founder of the Accion Democratica (AD) party. Betancourt's democratic convictions derived form his early experiences of opposition to Gomez, and from 1945 to 1948, he was provisional

President under a revolutionary seven-member junta, which had overthrown another dictator, Isaias Medina Angarita. Betancourt was a realist, with a sound practical understanding of Venezuela's place in the world. His policies during his second period of office (1959-64) and those of his successor, Raul Leoni, revived the nation's finances after Perez Jimenez had left the economy heavily in debt.

At the beginning of the 20th century, Venezuela's principal export was coffee; Venezuela had been the world's third largest producer of coffee in the 19th century, after Brazil and Java. By the end of the Gomez era, petroleum had overtaken coffee, and Venezuela's importance as a petroleum exporter was enhanced by Mexico's nationalization of its petroleum industry (in 1938) and by the outbreak of the Second World War (in 1939). Gomez was a skilled negotiator, although he made no clear effort to distinguish between the interests of his country and those of himself and his entourage. After 1935, Venezuela's capacity in negotiation clearly increased, and it can claim to have been responsible for much of the preliminary planning that culminated in the creation of the Organization of the Petroleum Exporting Countries (OPEC), of which Venezuela was one of the five founder-members. OPEC was formally constituted at a conference in Venezuela in January 1961. Venezuela's petroleum industry was finally nationalized in

1976, but the process was gradual and carefully co-ordinated with the oil companies which operated in the country. Venezuela's wealth has also been intelligently used in restructuring civil-military relations, in bringing to a swift and humane end the small guerrilla conspiracies of the 1960s, and in promoting many advances in welfare and education. Venezuelan consumerism is the most spectacular in Latin America, and the benefits of the country's prosperity are quite widely distributed. Public liberties are secure, and Venezuela enjoys one of the best records in the Americas for respecting human rights. Since 1945, there has been substantial immigration from Spain, Portugal and Italy, as well as from elsewhere in Latin America.

Venezuelan political parties are, by contrast with the Latin Aermican norm, highly organized. Voting is obligatory, but the high polling levels in Venezuelan elections are more accurately explained by the competence of the party organizations in mobilizing their supporters, by the positive advantages in having voted, and by a civic ethos that continues to place a high value on participation. After the return to democratic government in 1958, the AD ruled for the presidential terms of Romulo Betancourt and Dr. Raul Leoni, but in 1969, the Partido Social-Cristiano (COPEI), succeeded in having Dr. Rafael Caldera Rodriguez elected. Since then, the two parties have alternated in power. Expectations that the political

left would increase its single-figure percentage level of support have been repeatedly disappointed. The debt crisis was reflected in Venezuela by the more than usually decisive victory, in 1983, of the AD over COPEI at the end of the presidency of Dr. Luis Herrera Campins, when Dr. Jaime Lusinchi was elected.

In international affairs, Venezuela has, in recent years, sought to increase its influence in the Carribean region and Central America. The COPEI Government of President Herrera Campins gave significant support to Jose Napoleon Duarte and the Christian Democrats in El Salvador. The AD is a member of the Socialist International, and Venezuela is a member (with Columbia, Mexico and Panama) of the Contadora Group, which is working for the negotiated settlement of disputes in Central America. Carlos Andres Perez Rodriguez of the AD, who was President of Venezuela from 1974 to 1979 and aspires to the presidency again in 1988, is an active internationalist. Venezuela has historical claims to much of the territory of Guyana, formerly the colony of British Guiana. [Ref. 68]

C. ECONOMY

1. General.

The Venezuelan economy is dominated by the petroleum industry, which is the major source of government revenue and of export earnings. The pattern of economic growth has thus been determined largely by the level of receipts from

petroleum exploitation and sales. The channelling of the country's petroleum revenues through central government spending resulted in high rates of economic growth and general improvements in the standard of living. However, the onset of world recession and the slump in export demand for petroleum marked a turning-point in Venezuela's economic fortunes. Exacerbated by the heavy dependence on imports, and by deflationary policies, Venezuela's real gross domestic product (GDP) contracted, with the decline in petroleum exports, by 1.7% in 1980, which contrasted with positive growth rates averaging 4%-5% annually in the 1970s. Faced with a rising external debt, further reductions in petroleum revenues and a steadily increasing import bill, the Government was forced to reduce the previously high levels of public spending.

Economic activity remained virtually stagnant, with real GDP falling by 0.3% in 1981 and growing by 0.7% in 1982. The recession worsened in 1983, and GDP contracted by 5.6%, in real terms, against a background of stringent monetary policies, a sudden flight of capital, reductions in public expenditure, de facto devaluation of the bolivar and the introduction of higher import barriers. Although successful debt rescheduling, increased petroleum earnings, further devaluation of the currency and a balance-of-payments surplus led to a renewal of confidence in the economy, GDP registered a 1.7% decline, in real

terms, during 1984. A relaxation of the Government's austerity programme and the easing of controls on credit and foreign exchange were forecast to facilitate real growth of between 1% and 2% in 1985, although much will depend on the prevailing level of petroleum revenues.

The population of Venezuela was officially estimated to be 16,399,697 at mid 1983, and was increasing at an annual rate of 2.9%. More than 80% of the population are urban dwellers, of whom onefifth reside in and around the capital, Caracas. About twothirds of the population are less than 30 years of age, and slightly more than one half are under 20. Venezuela's economically active population numbers about 5., and is expanding rapidly. More than one-third of the working population are employed in the public sector, and about 14% are engaged in agriculture. Industry as a whole, including construction, employees 23% of the work force. However, the major industry in economic terms, petroleum production and processing, employs fewer than 50,000 workers. The contraction in economic activity led to an increase in the rate of unemployment from about 7% of the labor force in 1982 to 12.4% in 1984, and to 18% by May 1985. According to unofficial estimates, the 1984 rate may have been as high as 20%. Underemployment has also increased, particularly in the agricultural sector.

2. Minerals.

Venezuela possesses vast mineral wealth, with large reserves of iron ore, bauxite, coal, gold, diamonds and silver. There are also deposits of zinc, copper, lead, phosphorus, nickel and uranium. However, the nonpetroleum mining sector contributes less than 1% to the total GDP. Venezuela's annual production of iron ore, from the mines in Ciudad Guayana, has fallen sharply from the peak of 26.4m. metric tons (gross weight), reached in 1974. In 1983, total output was only 9.3m tons, of which 7.4m. tons were exported. Higher levels of production were forecast for 1984, with Siderurgica del Orinoco (Sidor), the state-controlled steel company, taking 5m. tons, and a further 4m. tons being exported to the USA under long term contracts. However, it was announced in 1985 that the U.S. Government would seek to restrict Venezuela's exports of steel to U.S. markets in forthcoming years. Ferrominera Orinoco plans to supply the needs of the national steel industry with iron ore from its new high-grade ore mine at San Isidro, and from other mines at Cerro Bolivar, Altamira and El Pao.

Despite the presence of vast reserves, Venezuela's annual coal production had fallen from 120,000 metric tons in 1977 to 45,000 tons by 1984. About three quarters of present output is controlled by Minas Carbon de Lobatera, which operates in Tachira province. Proven reserves of

bauxite have been assessed at 500m. metric tons, and planned exploitation of deposits at Los Pijijuaos forms an essential part of government plans for an integrated aluminum industry. Bauxite production was expected to commence in mid0186, and to reach full annual production of 4.4m. tons in 1990. Production of gold, mainly from the El Callao mine, rose from 416 kg in 1980 to 971 kg in 1983, although more than 65% of total domestic output is smuggled out of the country. Diamond mining, which is also adversely affected by smuggling, has declined in recent years, with production falling to 360,000 carats in 1983, compared with 825,000 carats in 1980.

3. Petroleum and Natural Gas.

The petroleum industry is the mainstay of the economy, accounting for more than 20% of GDP and a consistent 95% of total exports earnings; it provided 65% of total government revenue in 1981, 51% in 1982 and 44% in 1983. Venezuela ranked as the third largest petroleum producer within OPEC, and the eighth largest producer in the world, in 1984. Production of crude petroleum, which derives mostly form the Maracaibo, Apure Barinas and Eastern Venezuela basins, steadily declined from a peak annual level of 3.7m. barrels per day (b/d) in 1970 to 2.2m. b/d in 1980. Recurrent agreements with OPEC on production quotas subsequently reduced average output from 2m. b/d in 1981 to 1.7m. b/d in early 1983. In the face of

declining export demand and reduced domestic consumption, Venezuela agreed to a revised OPEC production 'ceiling' of 1.55m. b/d in November 1984. Petroleum production averaged 1.69m. b/d in 1984.

4. Manufacturing.

Venezuela's manufacturing sector contributed 23% to GDP in 1982, of which nonpetroleum manufacturing accounted for 12%. A strong commitment to a policy of industrial diversification during the 1960s, to reduce dependence on petroleum, led to the establishment of a wide range of enterprises engaged in metalworking and the production of consumer goods. In the 1970s, the emphasis was shifted towards promoting export-oriented heavy industries, based on the country's wealth of natural resources. Most of the major capital-intensive industries are state-owned, and are located in the Ciudad Guayana development zone, to the east of Caracas. The private sector is dominated by small-scale industries and is mainly involved in import substitution.

After expanding at average real rates of 6.4% and 4.8% annually in the 1960s and 1970s respectively, manufacturing experienced a period of sluggish growth and falling demand. Although the introduction of a three-tier exchange rate and higher import barriers in 1983 greatly benefited some sectors, such as textiles, food processing, beverages, metals, paper and plastics, other sectors, which are not geared towards export and are heavily dependent on

imported inputs, continued to decline. In late 1984, in an attempt to stimulate production, price controls were relaxed, and manufacturers were encouraged to gear production more towards exports. Despite an encouraging 3.9% rise in manufacturing output during 1984, the sector continued to suffer from foreign exchange restrictions, high import costs, falling consumer spending and reductions in capital investment.

Aluminum has replaced iron ore as Venezuela's second most important export commodity, after petroleum. Following a period of decline (due to low world prices and high production costs), the country's output of aluminum increased to about 377,000 metric tons in 1984, representing a 20% increase over the level of 1982. Meanwhile, favorable exchange rates and a rise in world demand boosted exports by over 40% between 1983 and 1985. During the 1970s more than US $2,500m. was invested in expanding production capacity at aluminum companies, Alcasa and Venalum. Nominal annual capacity is currently about 400,000 metric tons, and was projected to rise to 580,000 tons by 1986. Annual production of hard alloys was forecast to rise to 100,000 tons by 1986, while aluminum ingot capacity at the Ciudad Guayana plant was to expand to 200,000 tons per year. The Interalumina refinery at Puerto Ordaz, the largest of its kind in Latin America, cost $1.250m. and began production in 1983. It was expected to

reach its full capacity of 1m. metric tons of alumina per year in 1985. The opening of this plant and the discovery of substantial bauxite deposits at Los Pijiguaos has brought the country closer to achieving a full-integrated aluminum industry.

Between 1976 and 1984 annual steel capacity at the Matanzas plant of the state-owned Siderurgica del Orinoco (Sidor) was steadily increased from 1.2m tons to 4.8m tons. However, as a result of stagnation in the local construction industry, domestic sales fell from a peak of 2.6m. tons in 1977 to 1.3m tons in 1983. The reduction in domestic demand was more than offset in 1983 and 1984 by rising steel exports, which boosted total output of crude steel to over 2.8m. metric tons in 1984 (compared with 1.8m. tons in 1981), making Veneuzuela the third largest steel producer in Latin America.

In 1984, Venezuela's production of locally-assembled motor vehicles reached its lowest level for 10 years, with financial losses estimated at more than 1,000m. bolivares. Virtually all of the 16 major car and truck assemblers are currently operating at about 50% of capacity, owing to the lack of parts, to the imposition of rigid price controls, to higher production costs and to falling consumer demand. A 10-year rationalization plan for the industry was launched in 1985, involving the standardization of parts, the import of cars in 'knock-down' condition (ready for

re-assembly) and increased supplies of locally-manufactured components.

The petrochemical industry, which encompasses a wide range of products (such as fertilizers, plastics, ammonia and sulphuric acid), suffered heavy losses during the late 1970s. However, increased utilization of natural gas as fuel and feedstock, the imposition of import controls and an increase in state investment have since improved production.[Ref. 69]

C. GOVERNMENT STRUCTURE

1. General.

The Constitution of Venezuela was promulgated in January 1961. The Federal Republic of Venezuela is divided into 20 States, one Federal district, two Federal Territories and 72 Federal Dependencies. The States are autonomous but must comply with the laws and Constitution of the Republic.

2. The Legislative Power.

Is exercised by Congress, divided into two Chambers: the Senate and the Chamber of Deputies.

Senators are elected by universal suffrage, two to represent each State, and two to represent the Federal District. There are in addition other Senators, their number being determined by law, who are selected on the principle of minority representation. Ex-Presidents of the Republic are life members of the Senate. Deputies are also

elected by direct universal and secret suffrage, the number representing each State being at least two and for each Federal Territory one. A deputy must be of Venezuelan nationality and be over 21. Ordinary sessions of both Chambers begin on the second day of March of each year, and continue until the sixth day of the following July; thereafter, sessions are renewed from the first day of October to the thirtieth day of November, both dates inclusive. The Chamber of Deputies is empowered to initiate legislation. Congress also elects a Controller-General to preside over the audit Office (Contraloria de la Nacion), which investigates Treasury income and expenditure, and the finances of the autonomous institutes.

3. The Executive Power.

Is vested in a President of the Republic elected by universal suffrage every five years, who may not serve two consecutive terms. The President is empowered to discharge the Constitution and the laws, to nominate or remove Ministers, to take supreme command of the Armed Forces, to direct foreign relations of the State, to declare a state of emergency and withdraw the civil guarantees laid down in the Constitution, to convene extraordinary sessions of the Congress, to administer national finance and to nominate and remove Governors of the Federal District and the

Federal Territories. The President also appoints an Attorney-General to act as a legal arbiter for the state.

4. The Judicial Power.

The judicature is headed by the Supreme Court of Justice. The judges are divided into penal and civil and mercantile judges; there are military, juvenile, labor, administrative litigation, finance and agrarian tribunals. In each State, there is a superior court and several secondary courts which act on civil and criminal cases.

The Supreme Court comprises 15 judges appointed by the Congress in joint session for nine years, five of them to be appointed every three years. It is divided into three courts, each with five judges; political administrative; civil, mercantile and labor cassation; penal cassation. When these three act together the court is in full session. It has the power to abrogate any laws, regulations or other acts of the executive or legislative branches conflicting with the Constitution. It hears accusations against members of the Government and high public officials, cases involving diplomatic representatives and certain civil actions arising between the State and individuals.

E. EDUCATION

Primary education in Venezuela is free and compulsory between the ages of seven and 13 years. Secondary education lasts for five years. In 1982/83, 383,575

children attended nursery schools; 2,998,083 were enrolled at primary and secondary schools; and 282,274 students received higher education. The adult illiteracy rate is estimated to be 15 per cent. There are plans to introduce a basic cycle of six years at primary school and three years at secondary school. Experimental courses began in 1975. There are 11 state universities, 106 higher education institutes and 13 private universities. The proposed education budget for 1985 was 15,692m. bolivares.

By 1976, the Ayacucho scholarship programme, founded in 1974, had placed 11,000 students in universities and other institutes of higher education, including 6,500 students abroad. The Instituto Nacional de Cooperacion Educativa (INCE) has trained some 400,000 students in a wide range of technical subjects, in an attempt to reduce the chronic shortage of skilled labor.

F. THE VENEZUELAN ARMED FORCES

1. General.

The Venezuelan constitution established in its article, No. 132, that the armed forces are "institutions organized by the state to ensure the defense, the stability of the democratic [illegible] the respect for the constitution and [illegible]

The total armed forces [illegible] members, which are organized [illegible] Air Force and National [illegible]

AD-A190 931 ARMS PRODUCTION IN VENEZUELA(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA A S CASTELLANOS DEC 87 2/2

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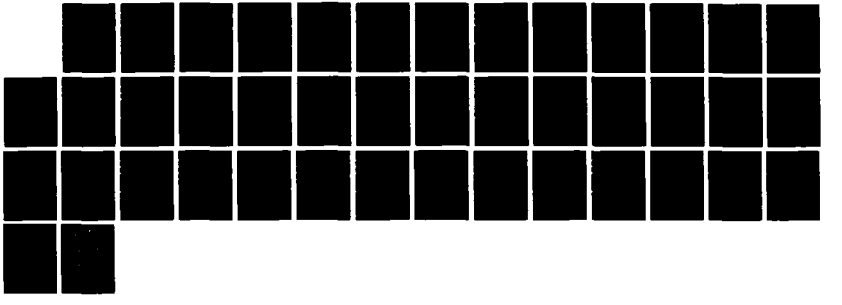

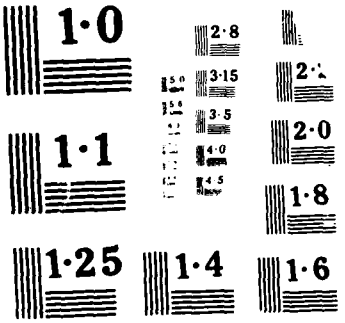
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2. The Venezuelan Army.

The Venezuelan army is composed of 34000 regular members which include selective conscripts with a two years service obligation.

a. **Operational Structure.**

1) 5 Army Division (1 Calvary)

2) 1 Armored Brigade

2 medium

1 light tank

1 self-propelled artillery

1 air defence battalion

3) 6 Infantry Brigades

2 mechanized

11 heavy

13 light infantry battalions

4) 1 Cavalry Regiment

5 squadrons

5) 7 Artillery Battalions

6) 2 Anti-Aircraft Battalions

1 self-propeled

7) 3 Independent Anti-Aircraft Group

8) 2 Independent A/A Groups (Forming)

9) 5 Engineers Battalions

10) 1 Airborne Regiment

b. **Equipment.**

1) Tanks: 81 AMX-30

35 M-18

36 AMX-13

2) Armored Fighting Vehicles:

a) Reconnaissance: 10 AML 245

30 M-8

60 M706E1

b) Armored Personal Carriers: 25 AMX-VCI

60 V-100

3) Artillery:

a) Howitzers: 105 mm 40 M-56 Pack

30 M-101 towed

155 mm 20 MK-F3

10 M109 Self-propeled

b) Multiple Rocket Launcher(s):

160 mm LAR self-propeled

c) Mortar(s): 81 mm 100

120 mm 80

4) Anti-tank:

a) Recoilless Launchers 106 mm

b) Anti-tank Guide Weapons SS-11

AS-11

5) Air Defense Guns:

40 mm 36 Breda L/70 towed

20 mm 12 AML-S530 twins

self-propeled

40 mm 20 M-42A1 twins

6) Army Aviation:

a) Transport: 1 Islander BN-2

4 Arava 202

3 Beachcraft

8 Cessna

b) Helicopters: 2 Bell 206

4 VH-1H

4 Agusta A109

4 Agusta-Sikoroky AS-61D

3. The Venezuelan Navy

The Venezuelan navy is composed of 10000 regular members (including some conscripts) organized in the Fleet, the Marines, the Naval Aviation, the Coast Guard and the River Forces.

a. **Bases**

The headquarters is located in Caracas and the main bases are: Puerto Cabello, La Guaira, Puerto de Hierro, Puerto LaCruz, Punto Fijo, El Amparo, Turiamo, La Orchila, and the scientific base of Las Aves.

b. **The Fleet**

The fleet is composed of:

1) 6 frigates type Sucre (Lupo) with 8 otomat SSM, 1 octuple albatros/aspide S.A.M., 1 agusta-bell AB-212ASW

2) 2 submarines

2 type 0-209

1 Gupply III

3) 5 LST

4) 2 LSU

5) 5 Auxilliary vessels

2 transport

3 cargo vessels

6) 6 Patrol Boats

3 with otomat

3 with oto-melara 102/72

c) **The Marines** is composed of 4500 members.

(1) Organization

4 infantry battalions

1 artillery battalion

1 amphibous battalion

1 A/A company

(2) Equipment:

11 LVTP-7

30 EE-11 VRUTU

10 Fuch S/transport Panzer 1

18 105 M.M.

6 MK-42 A/A guns

d) **Coast Guard**

(1) Organization

3 bases La Guaira, Maracaibo, La Banquilla.

(2) Equipment

2 frigates - Type Almirante Clemente

6 Vosper - 121f1, 2 msl, 460n

e) **Naval Air Force**

1) 1 squadron - 8 S2E

2) 1 squadron - 6 AB-212-A5

3) 1 squadron - 3 Casa C-212/200 MR

4) 1 Transport squadron with 1 DHC-7

1 King Air 200

1 King Air 90

2 Cessna 310

1 Cessna 402

6 C-212/200

4. The Venezuelan Air Force

The Venezuelan Air Force is composed of 5000 men located in 7 main bases: Libertador, Mariscal Sucre, Barcelona, Barquisimeto, Puerto Ayacucho, Puerto Ordaz, and Maracaibo.

a) **Organization**

1) 2 Bomber/Reconnaissance Squadrons - 20 BA Camberra

2) 1 Fighter/Ground Attack Squadron - 13 Mirage

3) 3 Interceptor/Ground Attack Squadron

17 Northirop F-5

16 Mirage V

24 General Dynamics F-16 A/B/D

4) 1 Counter-Insurgency Squadron

12 OV-10E Bronco

5) 1 Presidential Squadron

1 Boeing 737

1 McDonnell - Douglas DC-9

1 Gulftream II

1 Cessna 500

2 Helicopters Bell 214

2 Helicopters Bell 412

6) 2 Utility/Liaison/Reconnaissance Squadron

2 Cessna Citation

12 Beachcraft

8 Cessna 182

13 SA-316B Alouette III

10 Bell VH-1D/H

6 Agusta A-109A

7) 1 Training Group

10 BAe Jet Provost

20 Rockwell T2D Buckeye

23 Beach T-34 Mentor

8) Air-to-Air Missiles

R-530 Magic

9) 1 Parachute Battalion

b) **Equipment on order**

1) 15 F-5A Fighters

2) 24 IA-58 Pucara

3) 5 F-5B Fighters

4) 30 EMB-312 Tucano Training

5) 16 Bell 206

6) 4 Agusta A-109 Helicopters

5. Venezuelan National Guard.

a. **General.**

"Fuerzas Armadas de Cooperacion," or National Guard is composed of 22,000 men under the authority of the Defense Ministry. It accomplishes functions of internal order, border surveillance, custom support, and contraband control.

b. **Equipment**

(1) Armored Fighting Vehicles

Mechanized Infantry Fighting Vehicles

25 UR-416

Armored Personal Carriers

15 Shortland

(2) Artillery

120 60mm Mortars

(3) Coastal Patrol Craft

22 Type-A

12 Bertram

13 Lago

2 Other

(4) Aviation

3 IAI-201 Arava

1 BN-3 Islander

4 Beach

17 Cessnas

3 Helicopter Agusta 109-A

12 Bell 206

6 Bell 475

G. VENEZUELAN MILITARY INDUSTRY.

1. General

Venezuela's arms industry started during the 19th century with the fabrication of small arms and ammunition to support the independence war which took place from 1810 to 1823. During the 1930s, an attempt to build an armored personal carrier was made, using Ford and Chevrolet chassis. During the 1940s, the artillery group of Maracay worked in designing a rocket, and during the 1950s, they worked in designing a special kind of gun based in a mixture of oxygen and hydrogen. At the beginning of the 1960s, a light portable mortar was designed and constructed. It is to be noted that these were all isolated and circumstantial attempts. [Ref. 70]

2. Legal Basis.

a. **Laws of Weapons and Explosives.**

As early as 1939, the "Law of Weapons and Explosives" (Ley Sobre Armas y Explosivos) established in

the Article No. 5, that "Only the national government can establish war weapons and ammunition factories in the country, according to the rules that previously promoted."

b. **Decree-Law, No. 883.**

The decree-Law No. 883 of April 29, 1975 established three very important bases for the development of the Venezuelan arms production capability:

(1) It established the "National Security Council for the Development of the Military Industry" (Consejo Nacional para el Desarrollo de las Industrias Militares) with the following functions:

a) To formulate the basic strategic and actions to be taken by the military industries;

b) To propose to the national executive the political procedures,and the developing plans and programs needed for the total realization of the objectives of the industry;

c) To serve as consulting and coordinating branch for research and studies related to the defense industries;

d) To review all the matters related to the military industries that have to be submitted for government approval; and

e) To coordinate with the government's central administration organization the needs for armaments, ammunition, explosives, and other related materials required to accomplish with the national security policy.

(2) It created the "Venezuelan Company of Military Industries," (CAVIM) (Compania Anomima Venezolana de Industrias Militares) with the following characteristics:

a) Join-stock company, is totally owned by the government; and

b) It works under the policies of the "National Security Council for the Development of the Military Industries."

(3) It gave the legal authority to the national executive to grant, among other, the following incentives to the military industry:

a) Restriction on imports and custom tariff;

b) Tax exonerations;

c) Direct or indirect subsidy to the military industries;

d) Financing of Research and Development;

e) Fiscal incentives for training programs;

f) Advantageous financing condition for the military industries;

g) Facilitating administrative mechanism for the entrance and stay of foreign techniques required by the industry; and

h) Any other incentives that the national executive might consider necessary.

c. **Other Related Laws**

(1) Decree-Law No. 642. Creating the "National Council to for the Development of the Naval Industry," December 29, 1974.

(2) Decree-Law. creating the "National Council for the Development of the Aeronautic Industry."

(3) Decree Law No. 1308 Creating the "National Council for Production and Supply," December 8, 1975.

(4) Decree-Law No. 921. May 16, 1975, which orders that as of December 31, 1980, 75% of all the vehicles produced in the country should be made by the national industry and that from 1980 to 1985, the percentage should increase to 90%.

(5) Decree-Law No. 1336. November 5, 1986 exonerating 50% income taxes of the profits directly related to new investments in the production of goods for import substitution.

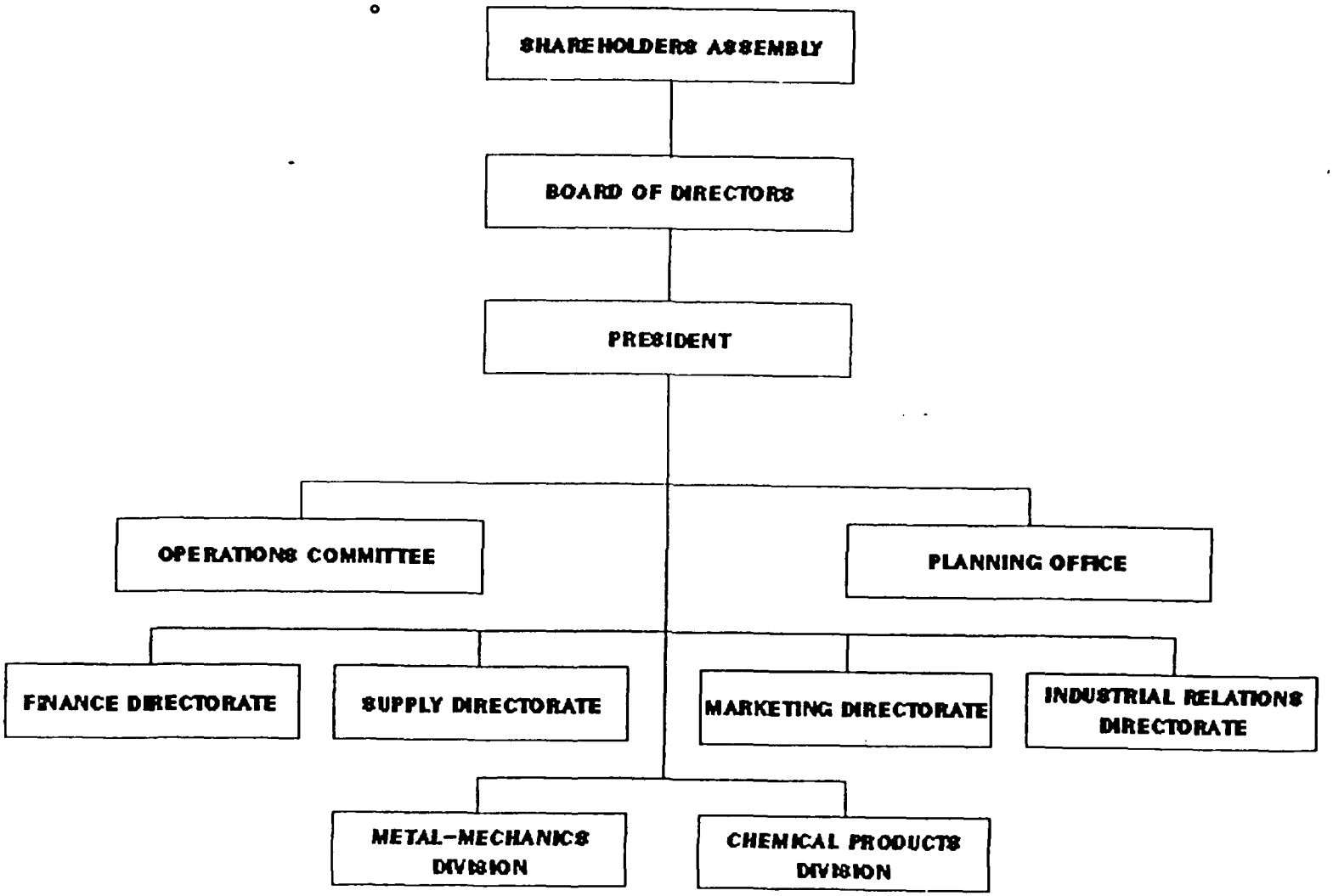
H. VENEZUELAN COMPANY OF MILITARY INDUSTRIES (CAVIM).

1. General.

CAVIM was created in 1976 as an independent company with the purpose of executing the government's policies of developing military industries and in accordance with the norms and plans of the National Security Council for the Development of Military Industries.

2. Organization.

Figure No. 1 shows CAVIM organizational chart.



CAVIM Organizational Chart

Figure No 1

3. Production.

CAVIM produces a wide variety of articles and services required to support the operation, not only of the military forces but to the oil, and general industry. The chemical and metal-mechanic divisions have been able to assimilate, create and diffuse technology and to interact with the production community in order to better employ the resources available in the country.

In the production area, the more important articles to mention are the machine-gun Orinoco and the knife "Pirana" both designed and produced by CAVIM.

Table 5-1 show the different products produced by CAVIM, the source of technology and the use and/or characteristics.

TABLE 5-1

CAVIM PRODUCTION

Type	Technology	Use
a. Arms		
FN-FAL 7,62	FN, Belgium	Rifle (5 models)
Browning P.G.P.	FN, Belgium	Pistol 9mm
Revolver M-10	Smith and Wesson	Revolver, 38 Special
Revolver M-60	Smith and Wesson	Revolver, 38 Special
Ruger 108	Ruguer	Revolver, 38 Special
Ruger 708	Ruger	Revolver,

TABLE 5-1
(continued)

Machinge-gun	CAVIM	750 BPM

b. Chemical Products

Refraction Petards	Geophysical Prospecting, use in oil industry
Venagel Dynamite	Blasting gelatives (3 types)
Trinitrotolveno TNT	TNT, civil and military use
Nitric Acid	Use in explosive production and metal treatments
CAVIM-Gel	Sensitized slurry, water resistant explosive
Hyrdoven	Water gel blasting agent, use in construction, mining, etc.
Anfo	Blasting agent
Shaded Siesmil wave generatos	Casted explosive based on pentolite, Use in oil industry
Radial Sesmic wave generatos	Casted explosive based on pentolite, use in oil industry
Shaped Siesmic generators, deep penetration	Use in oil industry
Booster	Use for initiation of blasting agent and slurry product, use in oil industry
Sismo CAVIM	Geophysical prospecting, use in oil industry
Refraction Charges	Geophysical prospecting, use in oil industry
Shaped Charges	Explosive base on RDX, HNX or PYX; use in oil industry
Nitrocelluslose	Soluble in alcohols, and soluble in esteres.

c. Ammunition

Calibre	Comments
12	7 Types
38 Special	Wadcutter, semi-wadcutter, short, original, practice
357	Magnum
357	Magnum, semi-wadcutter
7 x 57 mm	For rifles
7.62 x 51 mm	NATO standard, practice
7.62 x 39 mm	Practice for AK-47
9 mm	8 types
9 mm Parabillon	2 types
9 mm Practice	4 types
16	3 and 8
6.5 mm	Airgun pellets
4.5 mm	Airgun pellets

TABLE 5-1
(Continued)

d. Other Products

Article	Comments
Lightning conductos	Radioactives, designed and produced by CAVIM, 5 types
Metal Mechanic Product	Wide variety of metal mechanic products.
Foundings	Non-ferreous founding articles

SOURCE: Revista Informativa CAVIM, 1986.

4. SERVICES

CAVIM also provide for services and technical assistance to the armed forces and to the mining metal-mechanic and construction industries. The more important assistance services are:

a) Research and development programs for specific objectives;

b) Improvement in actual military equipments;

c) Maintenance and repair of military vehicles, small weapons, and optical equipments;

d) Technical advice in explosives use;

e) Material and chemical analysis;

f) Regain of ammunition, bombs and explosives;

g) Technical assistance in production control, quality control; and

h) Precision mechanic

5. CAVIM DEVELOPMENT PLANS

CAVIM development plans include for the near future ambitious goals in the chemical and metal-mechanic division. Table 5-2 shows the more important developing plans of CAVIM.

TABLE 5-2

CAVIM DEVELOPING PLANS

PROJECT	OBJECTIVE
Nitrate Amonium Plant	Import Substitution
Bombs and Grenade Plant	Estimation of 300,000 unit/year Reduce Cost and Imports
Fuse Plant	Import Substitution
Microfusion and Mechanized Center	Improve Production Capability in Quantity and Quality

SOURCE: Revista Information CAVIM 1986

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS.

1. The Venezuelan military expenditures tend to be stable with respect to government income, and it does not seem probable that a reduction can be expected in the near future.

2. The economic situation of the country and the cost of arms systems in the international markets make importation of the arms an increasing burden to the country's economy.

3. The resources expended in developing an arms production capability will contribute to the country's economic growth in a greater manner than those expended in arms import.

4. The process of developing an arms production capability requires--in addition to the decision to start it--the constant and decisive support of the government, and a reliable supply of financial, managerial, industrial, and natural resources.

5. Venezuela has the required resources and the legal basis required for developing an extensive arms-production program.

6. CAVIM, in its eleven years of existence, has proved to be able to create assimilated and diffuse technology and to grow in a harmonious and rational way.

B. RECOMMENDATIONS.

1. Venezuela should expand its arms industries development program in order to better utilize its production potential, reduce its imports, contribute to the economic growth, and increase its political and economic independence.

2. The Venezuelan Company of Military Industries should be the center of development and expand its activities to other related areas such as electronic, acoustic, etc.

3. Further studies should be carried out to determine the proper role of the private industry and coproduction or licencing agreements, and to determine the best direction for the military industry's growth.

APPENDIX

REGISTER OF INDIGENOUS AND LICENSED PRODUCTION OF MAJOR CONVENTIONAL WEAPONS IN LATIN AMERICA COUNTRIES, 1950-84

Columns 1-3: Countries are listed in alphabetical order. The weapon categories are in the order: aircraft, armoured vehicles, missiles and ships. Weapon designations are listed alphabetically within the weapon categories.

Column 4: gives the following information, listed vertically: (a) weapon description, (b) producing company, (c) the origin of the design (if licensed production, the country granting the licence), and (d) programme status by end-1984 (in production, completed, cancelled, planned).

SOURCE: Arms Production in the Third World, Michael Brzoska and Thomas Ohlson, Taylor and Francis, London 1980, p. 305-349.

COUNTRY	WEAPON CATEGORY	WEAPON DESIG-NATION	TYPE/PRO-DUCTION DATA	COMMENTS
ARGENTINA	Aircraft	A-182J	Lightplane FMA Licenser:USA Completed	Mainly for civilian use
		Aero Boero 85	Lightplane Aero Boero Indigenous Completed	Mainly for civilian use; later version named Aero 115
		CK-1 Colibri	Hel Cicare Indigenous Cancelled	Production after several prototypes
		Chincul Arrow	Trainer Chincul Indigenous In production	Developed Piper Cherokee; mainly for civilian use; military version for export
		El Boyero	Lightplane FMA/Petrolini Indigenous Completed	Production suspended due to problems with engine and spare parts; mainly for civilian use
		IA-24 Qalquin	Bomber FMA Indigenous Cancelled	Similar to Mosquito (UK); wooden structure; cancelled early 1950s
		IA-27 Pulqui	Fighter FMA Indigenous Cancelled	British engine; first jet fighter in Latin America; cancelled late 1940s

IA-30 Nancu	Fighter FMA Indigenous Cancelled	Designed by Pallavicino; cancelled early 1950s
IA-33 Pulqui-2	Fighter FMA Indigenous Completed	Swept-wing design by Kurt Tank; British engine; never operational
IA-35 Huanquero	Transport/ trainer FMA Indigenous Completed	Various versions with Argentine engines
IA-38 Condor	Transport FMA Indigenous Cancelled	Advanced Flying Wing design by German Horten; Argentine engine; cancelled early 1960s
IA-50 Guarami-1	Transport FMA Indigenous Cancelled	Developed from IA-35 Huanquero; production cancelled in favour of Guarani-2
IA-50 Guarani-1	Transport FMA Indigenous Completed	Developed from Guarani-1
IA-58A Pucara	COIN FMA Indigenous In production	Production delayed due design changes; output increased after Falk-land/Malvinas War

	IA-58B Pucara	COIN FMA Indigenous Planned	Developed from IA-58; improved electronics
	IA-58C Pucara	COIN FMA Indigenous	Single-seat version armed with two 30-mm cannons
	IA-63 Pampa	Adv trainer/ strike FMA Indigenous Planned	Design asssist-ance from Dornier (FRG); similar to Alpha Jet; planned production rate:3/month
	IA-DI-22	Trainer FMA Indigenous Cancelled	Wooded structure; Argentine engine; cancelled early 1950s
	Model 500D	Hel RACA Licenser:USA Completed	Mainly for civilian use
Armoured Vehicles	Model 77 155mm	TH CITEFA/Rio Tercero Indigenous Completed	Developed from French Mk-F3 howitzer
	Model 81 155mm	TH CITEFA/Rio Indigenous Completed	Improved version of 77 howitzer
	Nahuel	MBT CITEFA	Production cancelled after 6 pre-production units when cheap US tanks became available

	Roland	APC Rio Tercero Licenser; Switzerland Completed	Probably assembled from kits
	TAM	MT TAMSE Licenser;FR Germany In Production	Developed by Thyssen (FRG) for Argentine Army
	TAM Palmaria	SPH TAMSE Indigenous Planned	Palmaria 155mm turret fitted to TAM chasis; 25 turrets reportedly ordered 1984
	VAE VAPE	APC CITEFA Licenser: France Cancelled	2 prototypes delivered from France; cancelled for financial reasons
	VCC	APC TAMSE Indigenous In production	Developed from TAM
	VCIP	ICV TAMSE Indigenous In production	Developed from TAM
Missiles	Condor	SSM CITEFA Indigenous Planned	Derived from Mathogo ATM; in develop-ment stage
	Martin Pescador	ASM CITEFA Indigenous In production	Additional versions under develop-ment; radio guided
	Mathogo	ATM CITEFA Indigenous In production	Similar to Cobra (FRG) and Bantam (Sweden) ATMs

Azopardo Class	Frigate AFNE Indigenous Completed	Based on King Class designed late 1930s
Bahia Paraiso	Support ship Principe y Menghi Indigenous Completed	Carries 2 helicopters; can be used as icebreaker
Cabo S. Antonio	LS AFNE Indigenous Completed	Based on US De Soto Class design
Costa Sur Class	Support ship Principe y Menghi Indigenous Completed	
Lynch Class	PC AFNE Indigenous Completed	Serving with Prefectura Naval
Meko-140 Type	Frigate AFNE Licenser; FR Germany In production	Scaled-down version of Meko-360; arms: 4MM-40 SHSHMS; Lynx helicopter
Surubi Class	PC Ast. Naval del Estero Indigenous Completed	
Tonina Class	PC Sanym Indigenous Completed	Serving with Prefectura Naval

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BRAZIL

122A Uirapuru	Trainer/COIN Aerotee Indigenous Completed	

A-132 Tangara	Trainer Aerotee Indigenous Cancelled	Planned follow-on to Uirapuru; cancelled
AM-X	Fighter ground attack EMBRAER Aeritalia/Aermacchi Indigenous Planned	187 for Italy, 79 for Brazil first prototype crashed 1984
EMB-110	Transport EMBRAER Indigenous In production	Orginially designed for military transport & utility; also for rescue and surveillance
EMB-111	Mar patrol EMBRAER Indigenous In production	Maritime patrol version of EMB-110 Bandeirante
EMB-120	Transport EMBRAER Indigenous In production	Military versions planned for maritime patrol & AEW missions
EMB-121 Ningu	Transport EMBRAER Indigenous In production	Basically civilian, also for executive transport and AF training
EMB-312 Tucano	Trainer EMBRAER Indigenous In production	

EMB-326 Navante	Trainer/COIN EMBRAER Licenser; Italy Completed	Licensed production of MB-326GB
HB 315B Gavaio	Hel Helibras Licenser; France In production	Version of French SA-315B Lama
HB-350M Esquilo	Hel Helibras Licenser; France In production	Licensed production of AS-350B Ecurcuil; mostly for civilian use
Paulis-tinha	Trainer Neiva Indigenous Completed	Basic trainer; built in 2 batches before 1950 and 1959-62
Regente-360C	Lightplane Neiva Indigenous Completed	Utility aircraft
Regente-420L	Lightplane Neiva Indigenous Completed	Liaison & observation aircraft
S-11	Trainer Fokker Brasil Licenser; Netherlands Completed	Plans for production of more advanced Fokker S-12 and S-14 cancelled
Univer-sal-1	Trainer Neiva Indigenous Completed	Also civilian versions

	Universal-2	Trainer Neiva Indigenous Cancelled	Programme cancelled 1980 when Embraer bought Neiva
Armoured vehicles	Charrua	APC Industrias Motopecas Indigenous Planned	Tracked
	EE-11 Urutu	APC Engesa Indigenous In production	Arms; 12.7 mm Mg; also with 60/90 mm gun or ATMs
	EE-17 Sucurri	TD Engesa Indigenous Completed	Arms; 105-mm gun and MGs
	EE-3 Jararaca	SC Engesa Indigenous In production	Arms; 57-mm gun or ATMs
	EE-9 Cascavel	AC Engesa Indigenous In production	With 37-mm US gun, 90-mm French gun or 90-mm Cockerill/ Engesa gun West German or US engine
	EE-T1 Osorio	MT Engesa Indigenous Planned	Competing with MB-3 for order of 50-100 by Brazilian Army; possibly developed with Libyan aid

	MB-3 Tamoyo	MT Bernardini Indigenous Planned	Competing with EE-T1; formerly known as X-30
	X1A2	LT Bernardini Indigenous Completed	Developed from M3 Stuart (USA); Brazilian Army designation; MB-2
	XLF-40	ICV Bernardini Indigenous Planned	Rocket carrier; based on US M3A1 chassis; status unclear
	XLP-40	BL Bernardini Indigenous Planned	Based on X1A2 tank status unclear
Missiles	Cobra-2000	ATM IPA Licenser; FR Germany Completed	Status unclear; preproduction missiles delivered to armed forces
	MAA-1 Piranha	AAM D.E. Vasconcelos/CFA Indigenous In Production	Successfully tested with EMB-326; intended for AM-X fighter

	MAS-1 Carcara	ASM Avibras Indigenous Planned	TV-guided development slowed due to US freeze of co-operation in 1977; to arm AMX fighter
Ships	Argus Class	Support ship Arsenal de Marinha Indigenous Completed	Survey ship
	Niteroi Class	Frigate Arsenal de Marinha Licenser; UK In production	Arms; 4 Exocet ShShMs; last ship for training
	Pitatini Class	PC Arsenal de Marinha Indigenous Completed	
	Roraima Class	PC Maclaren Indigenous In production	1 exported to Paraguay
	Teixeira Class	PC Arsenal de Marinha Indigenous Completed	For river patrol
	Type 209-3	Submarine Arsenal de Marinha Licenser; FR Germany In production	In addition to 1 supplied directly from FRG
	V-28 Type	Frigate Arsenal de Marinha Indigenous In production	To be armed with Exocet ShShMs; up to 12 may be built

CHILE	Aircraft	Chincol	Trainer Fanaerp Indigenous Cancelled	Wooden structure; production of 50 for Chilean Air Force planned but cancelled
		HF-XX-02	Trainer Maestranza Central Indigenous Cancelled	Prototype; 2nd Chilean aircraft design; (Triciclo Experimental first flew May 1947)
		PA-28 Dakota	Trainer ENAER Licenser; USA In production	Licensed production prior and parallel to T-35 Pillan production
		T-35 Pillan	Trainer ENAER Licenser; USA In production	Developed from PA-28 Dakota; rocket-armed version offered for export; indigenization:60%
		T-36 Halcon	Trainer/ground attack ENAER Licenser; Spain In production	Some design inputs by Chilean engineers
	Armoured vehicles	BMS-1 Alacran	APC Cardoen Indigenous Planned	Half-track based on US M3A1 & Swiss Piranha APC; design begun by Army in 1974

	Carancho	AC Makina Indigenous In production	Development of Multi 163, ordered by AF
	Multi-163	AC Makina Indigenous Planned	Prototype developed by AF
	Piranha	APC Cardoen Licenser; Switzerland In production	Production of 4x4 & 6x6 types; arms; Swiss or Brazilian gun
	VTP-1 Orca	APC Cardoen Indigenous Planned	Similar in appearance to Soviet BTR-152 & Israeli Shoet Mk-2; for troop transport
	VTP-2	APC Cardoen Indigenous In production	Based on Mercedes-Benz Unimog; similar to West German TM-125; reportedly ordered by Chilean Army
Ships	Asmar-24M Type	PC Asmar Indigenous Completed	
	Batral Type	LS Asmar Licenser; France Completed	
	Elicura Type	LC Asmar Licenser; USA Completed	In addition to 1 directly from USA

		PC-1638 Type	PC Asmar Licenser; USA Completed	
COLOMBIA	Ships	Arauca Class	PC Baranquilla SY Indigenous Completed	
		Espartana Class	PC Ast. Naval Cartagena Indigenous Completed	
		LR-122 Type	PC Ast. Naval Cartagena Indigenous Completed	River patrol craft
		TF-51 Type	PC Ast. Naval Cartagena Indigenous Completed	
DOMINICAN REPUBLIC	Ships	LCT-5 Type	LC Ast. Naval Cartagena Indigenous Completed	Slightly larger than US LCT-5 type
MEXICO	Armoured vehicles	DN-3 Caballo	Recce AC DINA Indigenous In production	Reportedly based on MOWAG Roland; also recce version
	Ships	Azteca Class	PC Vera Cruz/ Solima Cruz Licenser; UK Completed	In addition to 21 delivered directly from UK; production halted after first 10

		Azucta Class	PC Ast. de Tampico Indigenous Completed	
		Polimar Class	PC Ast. de Tampico Indigenous Completed	5 for river patrol; 6 for coastal patrol
		Zacatecas Class	Transport Ulua SV Indigenous Completed	Arms; 3 AA guns
PERU	Aircraft	MB-339A	Trainer/strike INDAER Licenser; Italy Cancelled	Production plans shelved for financial reasons
	Ships	Humboldt Type	Intelligence ship Indigenous Completed	Unarmed
		Ho Class	Support ship SIMA Indigenous Completed	Commercial designed; unarmed
		Lupo Class	Frigate SIMA Licenser; Italy In production	In addition to 2 produced in Italy; arms: 8 Optomat ShShMs & 8 Aspide AShMs
		PGCP-50 Type	PC SIMA Licenser; Spain Completed	For Coast Guard
		PGM-71 Type	PC SIMA Liceners; USA Completed	Constructed under US MAP

Parinas Class	Tanker SIMA Indigenous Completed	Unarmed
Sechura Class	Tanker SIMA Indigenous Completed	Unarmed
Talara Class	Tanker SIMA Indigenous Completed	Commercial design; unarmed; ships also operated by Petroperu

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