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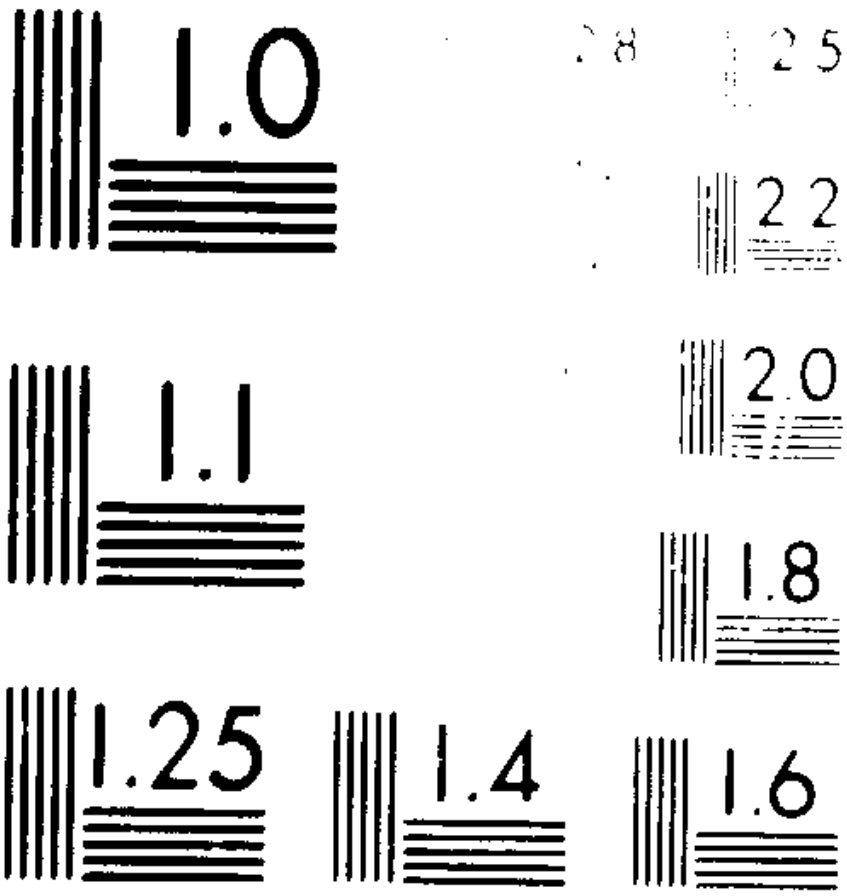
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THE AGRICULTURAL MACHINERY INDUSTRY IN CENTRAL AMERICA

Alex Roca

* Executive President, Alex F. Roca and Associates, Portland, Oregon U.S.A.

1. The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO.

SUMMARY

The Central American countries are basically agricultural economies, where more than 50% of the population is economically active in agriculture. Over 80% of the farms are under 10 Hectares (Ha) and only 5% of the farms are over 50 Ha--these are the major users of agricultural machinery.

The economic, social and political problems affecting the area have caused reductions in the production and demand for agricultural tools, machinery and implements (ATMI). The largest producer of ATMI is El Salvador, producing U.S.$4.8 million in 1978, second is Guatemala with U.S.$3.3 million. Machetes and other hand tools make up the largest portion of production. However, basic agricultural machinery as well as simple animal- and tractor-drawn implements are also produced.

ATMI are manufactured in a few large (for the region) and many small foundries and metal-working plants which traditionally fabricate to order and produce a variety of other types of products. There are also many small woodshops in the rural areas. Most production of ATMI in the region is labor intensive.

The apparent demand for ATMI has been decreasing from U.S.$128 million to around U.S.$40 million. Agricultural tools have been the least affected by the regional crises and have an apparent demand of approximately U.S.$8 million. At the same time, the demand for implements has decreased from U.S.$45 million to U.S.$15 million, and tractors and parts demand decreased from U.S.$75 to U.S.$20 million. There is also a large need for small farm machinery (there are more than a million farms under 10 Ha in the region), however, this need has not been transformed into market demand.

In general, governments in the region do not have specific and definite policies regarding agricultural mechanization for their different agricultural sectors. The development of the agricultural machinery sector is, therefore, based on import substitution and on the development of the metallurgical and metal-working industries. To implement a cohesive and rational agricultural machinery industry plan it is necessary first to determine the agricultural mechanization needs of the different sectors and establish priorities. Based on these the governments can design policies for the technologies and sectors.

The lack of liquidity as well as of foreign exchange is forcing governments to make a better use of existing equipment. This will bring an improvement of the maintenance and repair services which are generally deficient. Also, they are looking into the production of simple implements and machinery. The government of El Salvador is intervening some of their agricultural machinery industries to help them survive the

current crisis. Guatemala has projected investment for a tools and implements plant and Nicaragua is studying a foundry which will also produce agricultural machinery. Honduras has initiated production of animal-drawn implements. There are a few cooperative arrangements in agricultural mechanization with some of the developed countries. They are primarily involved with use of small farm machinery, however, even though many have positive results, there is no spreading effect on this project. It is necessary to sell government decision makers on the complementation continuation and expansion of these programs to get more than localized and sometimes temporary effects. At present, the only cooperation arrangement is between Nicaragua and Cuba. Elsewhere cooperation arrangements for the agricultural machinery industry are mostly within the metallurgical and metal-working industries.

Technical cooperation is needed to help countries in the region to define their agricultural mechanization policies, and evaluating alternative technologies. After these policies are established, aid should be given to develop a plan for an agricultural machinery industry. Then the normal help on project evaluation and implementation could be supplied. In the meantime, support should be given to existing industries and workshops to improve efficiency and product performance and reliability. The Guatemalan investment project, the Nicaraguan study and the new plant in Honduras should be given help after they have been consistent with the agricultural mechanization policies of their corresponding countries.

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INTRODUCTION

Background

Central America is the region composed of the five countries of the Central American Common Market and Panama which joins North and South America in the Western hemisphere. The region's total area amounts of 498,000 Km^2 or around 22.4 million q. miles, of which over 50% are economically active in agriculture (see Table 1). The region is undergoing a variety of political, social and economic difficulties. As a result, the amount of investment has been reduced substantially over the last three to four years (including agricultural and industrial investments) and imports have been heavily restricted. This situation is expected to continue for the next few years, as no solutions are foreseen to the underlying problems.

Agricultural Production and Equipment Needs

Agriculture contributed more than 20% to the region's GNP and to more than 65% of its exports (see Table 1). The main crops of the region are: coffee, cotton, sugar cane, cattle,

Table 1. Central America Common Market and Panama

Basic Information 1980

	Population in Millions Est. 1983	Area in 1,000 Sq. Km.	% of Population Economically Active in Agriculture	Agriculture Share of GNP	Agriculture Share of Exports
Costa Rica	2.5	50.7	35%	18%	65%
El Salvador	5.1	21.0	51%	28%	70%
Guatemala	7.7	108.9	53%	26%	65%
Honduras	4.4	112.0	57%	29%	70%
Nicaragua	2.8	139.0	44%	27%	65%
CACM	22.4	423 *			
Panama	2.0	75	20%	18%	45%
CACM/Panama	24.4	498	over 50%	over 20%	over 65%

Information obtained and estimated from the following sources 1, 3, 4, 5

* The areas were obtained for different sources and do not add.

crops of the region are: coffee, cotton, sugar cane, cattle, bananas, grains (corn, rice, beans and sorghum) and vegetables. Also important are sesame seed, cacao, hogs, poultry and tobacco.[1]*

Over 80%* of the farms are less than 10 Hectares in size, use very simple hand tools or animal-drawn implements; these farmers grow vegetables and produce, grains, some coffee and sugar. Less than 5% of the farms are over 50 Hectares. The owners of these larger farms use tractors and power-driven implements to grow most of the countries' export products. The cooperatives sector and land reform sector are still somewhat small, but they will continue to grow as the governments implement various land reform programs and make available new agricultural land to these sectors.

Coffee is the region's primary export and the region's most important source of foreign exchange. It is exported by all of the countries in the region. Coffee is planted on steep hillsides ill-suited to large-farm mechanization. In general, therefore, coffee plantations have not traditionally required much mechanization.

Equipment needs for coffee production are:

-small tractors (30 Hp or less) and corresponding implements
-depulpers
-pack sprayers
-conveyors

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* Superscript numbers refer to the List of References Annex I.

** See Annex II note 1.

-dusters
-equipment for coffee mills
-wagons
-animal-drawn implements

Cotton is another important export crop, especially for Guatemala, El Salvador, Nicaragua and Honduras. Cotton farmers are the largest and most sophisticated buyers of agricultural machinery in the region.

Equipment needs for cotton exporters are:

-tractors
-plows
-harrows
-planters
-cultivators
-subsoilers
-harvesters
-scales
-wagons
-cotton pickers

Sugar cane is also an important export crop. Cane production continues to grow in the region and planters of this crop are the second largest buyers of machinery in the region. Traditionally, harvesting and loading of sugar cane is done by hand; however, there is some demand for harvesting and loading equipment.

Equipment needs for sugar cane production are:

-small tractors (40 Hp or less)
-plows
-harrows
-cultivators
-wagons
-harvesters
-manual and mechanical choppers
-loaders

-subsoilers
-weeders
-pickers
-cutters

The major grains produced in the region are corn, beans, rice and sorghum. Not much equipment is used by grain farmers. Most of the corn is planted on small plots on hillsides without the help of machinery. These farmers need:

-improved manual implements
-grain dryers
-cleaners
-dehumidifiers
-samplers
-elevators
-baggers
-silos

In addition, the few large growers need: tractors, plows, harrows, planters, harvesters, cultivators, subsoilers, combines and corn harvesters.

Bananas are the traditional export crop of the region. Banana crops do not use great quantities of machinery. Only when starting new lands are tractors or other implements required.

Equipment needs for bananas are:

-spraying equipment
-special equipment to cut bananas
-special conveyance equipment (to processing and shipping centers)

Vegetables and Produce have a large potential for export--mostly canned or frozen. Vegetable producers are usually peasant farmers who use simple hand tools, fertilizers and insecticides.

Equipment needs for vegetables and produce include:

-animal-drawn implements

-hand implements (hoes & machetes)

-irrigation equipment
-vegetable cleaning equipment

-sorting equipment

-vegetable packing equipment

Cattle is exported by all of the countries in this region. Cattle is raised mainly by large land holders, who use less machinery than other types of farmers.

Equipment needs for cattle raising are:

-post hole digger

-wagons

-branding irons

-castration rings

-sanitary and cleaning machinery

-incubators

-feeders and waterers

-floor mats

-slaughtering house supplies

-dehorners

-refrigeration systems

-transportation and conveying systems

-general handling equipment

CHAPTER I. PRODUCTION, EXPORTS AND IMPORTS OF AGRICULTURAL TOOLS, MACHINERY & IMPLEMENTS (ATMI)*

A. National Production

Most of the local production of Agricultural Tools, Machinery and Implements (ATMI) is limited to: hand tools such as machetes, hoes, shovels, spades, rakes, pickaxes; simple hand-operated machines such as corn shellers, chaff cutters, threshers, winnowers, and hand sprayers; animal-drawn implements such as wooden and iron plows, cultivators, harrows, seed drills, and bullock carts; and certain simple tractor-drawn equipment, power threshers and grain selectors, cleaners and driers.

Most of these are manufactured in small workshops with relatively low investment, using wood, iron, and mild steel. The quality of the products is usually unreliable and the design of the products tends to be imitative without much attention to details. These products are fabricated on a made-

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* See Annex II, notes 2 and 3.

to-order basis. The small workshops produce a variety of tools and implements as well as other metal-working products and their production is not usually shown in the countries' statistics. There are also a few large (for the region) companies which manufacture in larger quantities and provide relatively better quality products.

El Salvador is the region's largest producer of ATMI. During 1978, production reached U.S.$4.8 million (see Table 2), of which production of tools was 75% at U.S.$3.6 million. The production value of machetes was the largest, at U.S.$1.9 million and 39% of total production. Aggregated value in 1978 was calculated at U.S.$3.4 million, of which U.S.$2.5 million corresponds to agricultural tools and U.S.$0.9 million to equipment and implements. At the present time, the ATMI industry is working at around 40% of capacity. However there is a plan for the government of El Salvador to intervene these industries and relieve their financial situation.

Guatemala is the second largest producer of ATMI in the region, producing at only 68% of El Salvador's level. Guatemalan production (see Table 3) reached U.S.$3.3 million in 1979. Table 3 shows the trend of production between 1970 and 1979. Total production increased from U.S.$931,660 to U.S.$3,327,610, increasing 3.57 times. The machete is the only agricultural tool with significant production, with the largest production value throughout the period and contributing 66% to total production. Other important production is in threshers, corn-shellers, huskers and machinery for coffee, sugar cane and rice.

Table 2. Agricultural Tools, Machinery & Implements

Gross Production, 1978, El Salvador

NAUCA Classification		Quantity	Value
Hand tools (C11U 3311) (CUC1 695)			(1000 US$)
699-12-01-01	Machetes	1,090,400	1,871
699-12-01-03	Hoes	150,300	352
	Axes	98,800	331
	Pickaxes	83,600	187
	Picks	91,700	266
	Shovels	174,800	509
699-12-01-09	Rakes & harrows	49	81
	Subtotal		3,597
Agricultural Machinery and Implements (C11U 3822) (CUC1 712)			
712-02-01	Forage choppers	27	74
712-02-02	Cornshellers, Huskers, Sugarcane & Rice Machinery, Fiber Shredders, Coffee Mills	2,711	1,978
712-09-03-09	Conveyors	24	57
	Subtotal		1,209
	Total	1,692,411	4,806

Direccion General de Estadisticas y Censos, Miu de Economia, El Salvador

Table 3. Production Value of ATMI - Guatemala[6]

(US$1000)

Agricultural tools	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
699-12-01 Machetes	830.60	816.40	837.70	1085.50	1308.54	1439.40	1583.54	1748.38	1966.10	2208.04
Agricultural Machines and Implements										
712-02-01 Threshers	1.28	4.21	5.08	11.58	16.74	18.33	11.65	29.72	45.29	36.96
712-02-02 Cornshellers, huskers, machinery for coffee, rice and sugar cane	6.31	8.25	10.30	23.18	30.12	33.57	31.78	42.41	53.33	51.70
712-09 Other machinery and implements for agriculture, horticulture & apiculture	93.47	122.18	150.77	343.94	519.36	550.73	596.80	20.14	1072.64	1030.91
Total	931.66	951.04	1003.85	1464.20	1874.76	2012.03	2223.77	1840.15	3137.03	3327.61

Nicaragua is the third producer of agricultural equipment and tools. Projected production for 1983 in the government-owned industries is shown in Table 4.

Table 4

1983 Production Program Agricultural Equipment and Tools Nicaragua (Unit Quantities Only)

Plows	100	Forage Choppers	215
Harrows	100	Parts & Others[a]	20
Cultivators	20	Other Implements	15
Cotton Cultivators	20	Wheelbarrows	3000
Sugar Cultivators	30	Machetes	500,000

[a]Made-to-order

Costa Rica is a small producer of ATMI products; much of the production is in agricultural tools; also manufactured are simple machinery for rice and coffee including threshers.

B. Agricultural Machinery in Operation

There is no estimate of the accumulated total numbers of agricultural machinery or implements available for the region as a whole. However, one study done in 1980 by Consuplan of Honduras with the cooperation of a Swiss mission[7], provides

Table 5. Percentage of Use of Agricultural Machinery by Farm Size, 1974, Honduras [7]

	0-10 Ha	10-50 Ha	50-200 Ha	Over 200 Ha	
Tractors	7.5	11.7	20.7	49.8	100
Iron plows	21.2	21.8	25.2	31.8	100
Wooden plows	57.4	29.9	8.7	4.0	100
Harrows	17.4	16.9	23.6	42.1	100
Planters	5.3	11.3	31.9	51.5	100
Cultivators	6.4	18.7	29.2	45.7	100
Hammer Mills	38.9	32.1	13.2	15.8	100
Forage Choppers	4.6	19.1	36.4	39.9	100

some useful information on the agricultural machinery in these countries.

According to this study, in 1978 there were around 3,080 tractors, 1,903 plows, 1,991 harrows, and 559 planters in Honduras. Also there were 208 Ha per tractor: 124.6 Ha in annual crops and 83.9 Ha in permanent crops. Table 5 shows the relationship of farm size and use of tractors and implements. From this data we can observe that the small farms are heavy users of wooden plows and hammer mills while they use very few tractors, planters, cultivators and forage choppers. The few large farms--over 200 Ha in size--use almost 50% of all the tractors, 42.1% of the cultivators and almost 40% of the forage choppers. Guatemala is known for having the largest population of tractors and implements. About half of these are of U.S. origin. Other important sources are: Great Britain, Japan, Germany, Brazil, Italy and Spain.*

The number of tractors in El Salvador was estimated for 1965 at about 1,590 units[14]. However, due to large imports of tractors and parts since that year, this number is not particularly relevant.

C. Exports

During 1979 the Central American countries exported goods worth a total of U.S.$5.7 million. Agricultural tools (mostly machetes) accounted for 85% of exports with U.S.$4.8 million

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*It is important to note that there are more than 20 different brands of tractors in Central America.

Table 6. Total Region Exports, 1979

ATMI[8] (US$000)

Agricultural Tools (699-12-01)				
Exports to other CACM members		3333	68%	
Exports to third countries		1504	31%	
	Subtotal	4837		84
Agricultural Machinery and Implements				
Exports to other CACM members		769	83%	
Exports to third countries		158	17%	
	Subtotal	927		16
Total Exports to CACM		4102	71%	
Total Exports to other countries		1662	29%	
	Grand Total	5764	100%	100%

and the machinery and implements with 15% or U.S.$927,000. Trade among the CACM members totaled U.S.$4.26 million or 75% of exports, while 25% of exports went to other countries.

Table 7 shows the trends in exports between the Central American countries. Exports increased eight times from 1960 to 1979. They more than tripled in the nine-year period 1970-79, and increased 86% during 1975-79. These increases show the benefits of the common market structure. Exports also show the patterns of production of hand tools and simple machinery and implements among the five nations.

The largest exporter was El Salvador with 76% of exports of tools and 77% of machinery and implements. Second in exports is Guatemala with 14% and 12% for exports of tools and machinery, respectively. Third is Nicaragua with 9% of total exports of tools.

El Salvador exported U.S.$2.5 million in agricultural machinery and implements in 1978. In addition, El Salvador exported U.S.$1.9 million in agricultural tools to other Central American countries that year. In 1982, exports of agricultural machinery decreased to U.S.$2.4 million (see Table 8). Guatemala is the major importer of these goods, usually importing more than a third of the total. Another third is shared equally between Nicaragua and Costa Rica and less than a third goes to other countries. The major export from El Salvador is machetes which account for more than 40%. They are followed by threshers.

Table 7. Agricultural Tools, Machinery & Implements

Intra Trade[8] (US$000)

Agricultural tools		($000)			
Exporter	1960	1970	1975	1979	
El Salvador	20	640	1329	2518	
Guatemala	--	220	220	479	
Nicaragua	--	260	462	313	
Costa Rica	--	--	--	22	
Honduras	--	--	--	1	
Total CACM	21	1120	2011	3333	81%
Agricultural Machinery & Implements					
El Salvador	20	34	45	592	
Guatemala	--	3	20	93	
Nicaragua	--	NA	101	--	
Costa Rica	--	NA	29	84	
Honduras	--	--	--	--	
Total CACM	30	122	195	769	19%
Total Exports to CACM	51	1242	2206	4102	

Table 8. Agricultural Machinery & Implements

Exports (US$000) El Salvador

Agricultural Machinery & Implements		1978[a]	1982[b]
712-01-01	Plows	750	--
712-01-03	Harrows	4,000	--
712-01-05	Other mach. for the preparation & cultivation	25,100	2,000
712-02-01	Harvesters	15,886	--
712-02-02	Threshers	55,297	183,498
712-03-01	Milking Mach.	400	--
712-03-03	Other dairy mach.	14,916	--
713-01-00	Tractors & Parts	40,644	--
	Implements	2,887,433	2,223,600
	Total	$2.5	$2,411.498

a) Departamento de Investigacion Economica, Banco Central de Reserva

b) Departamento de Investigacion Economica, and Direccion de Comercio Extesion.

Table 9. Agriculture Machinery, Tools and Implements

Exports from Guatemala ($ 000)[6]

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
699-12-01-01 Machetes	620	636	655	597	845	469	770	914	1,202	1,070
712-01-01 Plows	--	--	--	--	1	2	2	1	1	17
-02 Cultivators	--	--	--	--	--	--	1	--	1	1
-03 Harrows	--	--	--	--	--	2	--	--	1	1
712 01-05 Other Mach.	--	--	--	--	--	--	--	--	--	--
For cultivation, etc.	--	--	--	--	--	--	19	14	19	122
712-02-01 Harvesters	--	--	1	--	--	1	--	--	--	5
712-02-02 Threshers	3	--	5	3	5	11	12	9	32	28
712-09- Other Mach.	1	--	1	3	31	4	10	--	1	10
713-01-00 Tractors	--	--	--	--	--	1	3	--	--	--
Total	624	537	662	603	884	490	817	938	1,257	1,254

Guatemala is the second largest exporter of ATMI in the region with exports of U.S.$1.26 million in both 1978 and 1979. Machetes account for 90% of total ATMI exports (see Table 9). Exports values fluctuated between 1970 and 1975, and averaged U.S.$633,000. Since 1976 they began to increase and have quadrupled between 1975 and 1981, reaching a high of U.S.$1,967,000. However, exports were reduced drastically during 1982, to less than U.S.$800,000.*

Costa Rica exports are not very large; however, they increased 4.7 times from 1979 to 1981 when they reached U.S.$608,000. Major exports are agricultural tools at U.S.$410 thousand and 67% of exports in 1981. Also exported are threshers and simple machinery for cleaning, selecting and drying coffee.

Table 10. ATMI Exports: Costa Rica

U.S.$(000)

	1979	1970	1981
Agricultural tools	40	125	410
Implements and Machinery	89	165	198
Total	129	290	608

Nicaragua exports also consisted mostly of machetes, with total exports less than U.S.$500,000.

Honduras and Panama do not have any significant ATMI exports.

D. Imports

The region is a large importer of agricultural machinery mostly of tractors, power equipment and tractor-drawn implements. Imports reached a high of U.S.$99 million in 1979 and decreased 41% to U.S.$58 million in 1981, averaging U.S.$82 million per year in the three-year period. The largest import was of tractors with 65% of imports for the same period.

Table 11. Agricultural Machinery Estimated Imports*

CACM and Panama U.S.$(000000)

	1978	1979	1980	1981
Total	94.9	98.8	75.2	58.2

* Does not include agricultural tools.

Guatemala is one of the largest importers of ATMI in the region. Imports to Guatemala increased six-fold from 1970 to 1977, when they reached their highest value: U.S.$31.7 million. There has been a downward trend ever since, decreasing 16% in 1978 to U.S.$26.6 million and 13% in 1979 and 1980 to U.S.$20.4 million and U.S.$17.9 million respectively. The decline continued in 1981, decreasing 12% to U.S.$15.8 million. During 1982, imports experienced the largest decline--of 49%--to U.S.$8.0 million. In 1982, imports were only 25% of those of 1977. Tractor imports went down from

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* "1981 - 82 Exports" Banco Central de Guatemala, Direccion de Estadistica.

Table 12. ATMI Imports to the Region

US$1000

Guatemala	1970	1975	1977	1978	1979	1980	1981	1982
Tools	583	838	836	1,509	1,359	1,291	1,428	1,235
Implements	1,541	7,370	11,034	9,031	8,475	6,060	5,939	3,542
Tractors & Parts	3,183	10,970	19,851	16,617	10,615	10,506	8,391	3,203
Total	5,307	19,128	31,721	27,157	20,449	17,857	15,758	7,980

El Salvador						Jan-Sept	
Implements	6,152	7,013	4,312	1,206	939	806	1,014*
Tractors & Parts	8,392	7,888	5,162	2,092	1,151	1,397	
Toal	14,544	19,907	9,474	3,298	2,090	3,216	

*Not Identified

Panama	1972	1975	1977	1978	1979	1980	1981
Implements	2,582	4,184	4,078	3,369	3,698	3,563	5,706
Tractors & Parts	6,689	11,001	4,954	6,759	4,033	4,211	6,022
Total	9,271	15,185	9,032	10,128	7,731	7,774	11,728

Honduras	1979	1980	1981	1982
Implements	5,022	4,065	3,481	1,530
Tractors & Parts	21,505	14,676	10,078	4,556
Total	26,527	18,741	13,559	6,086

Costa Rica (millions of dollars)			
Implements	7	6.5	4
Tractors & Parts	24	17	7
Total	31	23.5	11

U.S.$9.9 million in 1977 to U.S.$3.2 million in 1982--a reduction of 84%--and implements from U.S.$11.0 million to U.S.$3.5 million--a 68% decline.

The largest group of ATMI imports to Guatemala is tractors, with 53% of imports over the 1977 to 1982 period. Second was the imports of implements, with 37% of imports for the same period. Imports of agricultural tools accounted for only 6% of the total.

Imports of agricultural machinery to El Salvador reached a peak during 1978 when that country imported U.S.$14.9 million worth: U.S.$7.9 million in tractors and parts and U.S.$7.0 million in implements. As with the other countries in the region there has been a downward trend since, reaching a low of U.S.$3.2 million in 1982--a 79% decline in the five-year period. Tractors accounted for 56% of total agricultural machinery imports for the period 1977 to 1982.

Imports of tractors and implements to Panama have fluctuated somewhat in the last ten years. There was an upward trend from 1972 to 1975, increasing from U.S.$9.3 million to U.S.$15.1 million--the highest value of imports for the period 1972-1981. The lowest value of imports of ATMI value was only slightly higher at U.S.$7.8 million. In 1981 imports increased to U.S.$11.7 million. For the period 1977-81, tractors contributed 56% of imports and implements 44%. During 1982 the largest imports among implements were threshers and shellers. Panama's imports have not been affected by the region's instability as Panama is somewhat isolated from these problems.

Table 13. Agricultural Tools, Machinery & Implements[9]

Imports Guatemala US $ (000)

	1977	1978	1979	1980
Agricultural Tools				
699-12-01	836	1,509	1,358	1,291
Agricultural Implements				
712-01-01 Plows	635	662	392	263
712-01-02 Cultivator	495	490	446	127
712-01-03 Harrows	1,625	1,468	583	402
712-01-04 Planters	185	290	194	112
712-01-05 Other Mechanical machinery for the preparation and cultivation of land N.E.C.	450	607	442	251
712-02-01 Mechanical mowers, harvesters, threshers, balers, etc.	2,528	1,384	1,988	971
712-02-02 Cornshellers, huskers, sugarcane & rice machinery, fiber shredders, coffee mills	2,945	2,268	2,367	1,444
712-02-03 Grain, fruits, egg pickers & classifiers	264	382	384	502
712-03-01 Milking machinery	32	39	38	35
712-03-02 Dairy Decreamers	18	29	51	57
712-03-03 Other Dairy Machinery	102	87	152	111
712-09-01 Incubators, Breeders	189	119	212	169
712-09-02 Agriculture Acces.	5	29	18	21
712-09-03-01 Manual grain mills, poultry feeders, etc.	183	173	415	325

(continued, next page)

	1977	1978	1979	1980
712-09-03-9 Other machinery and accessories	1,382	1,004	793	1,272
Total Implements	11,034	9,031	8,475	6,062
713-01-00 Tractors and Parts	19,851	16,617	10,615	10,506
Total	31,721	27,157	20,449	17,857

Table 14. ATMI Imports Honduras

(US$000)

Honduras	1979	1980	1981	1982
Plows	763	593	206	138
Cultivators	149	304	50	33
Harrows	444	443	334	6
Planters	58	94	78	28
Other Machinery for Planting & Cultivating	389	287	190	55
Harvesters	1,605	1,060	1,286	344
Threshers	1,448	1,098	1,042	751
Machinery for Selecting & Grading	168	186	295	175
Total Implements	5,024	4,065	3,481	1,530
Tractors & Parts	21,505	14,676	10,078	4,556
Total Tractors and Implements	26,529	18,741	13,559	6,086

Imports of agricultural machinery to Honduras reached U.S.$26.5 million in 1979 second largest amount to Costa Rica that year (see table). Since then it has decreased 77% to U.S.$6.1 million in 1982. Imports of tractors and parts decreased from U.S.$21.5 to U.S.$4.6 million, and implements from U.S.$5.0 million to U.S.$1.5 million in the same period. The largest imports is of tractors and parts with an average of U.S.$5 million per year and 78% of agricultural machinery imports for the four-year period. Largest imports of implements were harvesters, threshers and plows.

Costa Rica was the largest importer of agricultural machinery in 1979--around U.S.$31 million. From 1979 to 1981 these imports decreased 63% to U.S.$11 million. Imports of tractors reached a total of U.S.$48 million for the three-year period, for 63% of imports and an average of U.S.$16 million per year.

It is estimated that Nicaragua's imports have been small in the last few years concentrated mostly in parts and implements. Agricultural machinery reached a high of U.S.$22 million in 1977; however, it decreased substantially to U.S.$5 million in 1979.

Table 15. Agricultural Machinery Imports: Nicaragua (Millions of U.S. dollars)

	1976	1977	1978	1979
Total	13	22	13	5

CHAPTER II. NATIONAL POLICIES

A. National Policies for Agricultural Mechanization

The countries in the region do not have definite or clearly stated policies for agricultural mechanization. The primary reason for this lack of policies is the fact that the labor-saving characteristics of mechanization conflict with the goal of reducing unemployment in the agricultural sector. Nevertheless, the governments provide incentives for agricultural mechanization in many ways. They provide: 1) low import tariffs for agricultural machinery; 2) financial loans to agriculture; 3) aid to cooperatives and the reformed sector* and 4) servicing by the governments of pools of machinery and equipment.

There are two sectors where the governments are most interested in mechanization. The first is the agricultural exports sector where large increases in production are needed

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* "Sector Reformado" is made up of farmers and cooperatives who obtained land through agrarian reform programs or colonization

Table 16. CACM External Tariffs

Agricultural tools		Ad-valorem % CIF
694-12-01-01		20%
694-12-01-02		15%
694-12-01-03		8%
694-12-01-09		15%
Agricultural Machinery & Implements		
712-01-01	Plows	5%
712-01-02	Cultivators	5%
712-01-03	Harrows	5%
712-01-04	Planters	5%
712-01-05	Other mechanical machinery for the preparation & cultivation lf land N.E.C.	5%
712-02-01	Mechanical Mowers, Harvesters, Threshers, Balers, etc.	5%
712-02-02	Cornshellers, Huskers, Cotton Pickers, Machinery for sugar cane, coffee and rice	5%
712-02-03	Grain, Fruit, Egg Pickers and Classifiers	5%
712-03-01	Milking Machinery	--
712-03-02	Dairy Decreamers	--
712-03-03	Other Dairy Machinery	--
712-09-01	Incubators, Breeders	10%
712-09-02	Apiculture Acces.	10%
712-09-03-01	Manual Grain Mills, Poultry Feeders, etc.	15%
712-09-03-09	Other Machinery and Accessories	5%
713-01-00	Tractors	7%

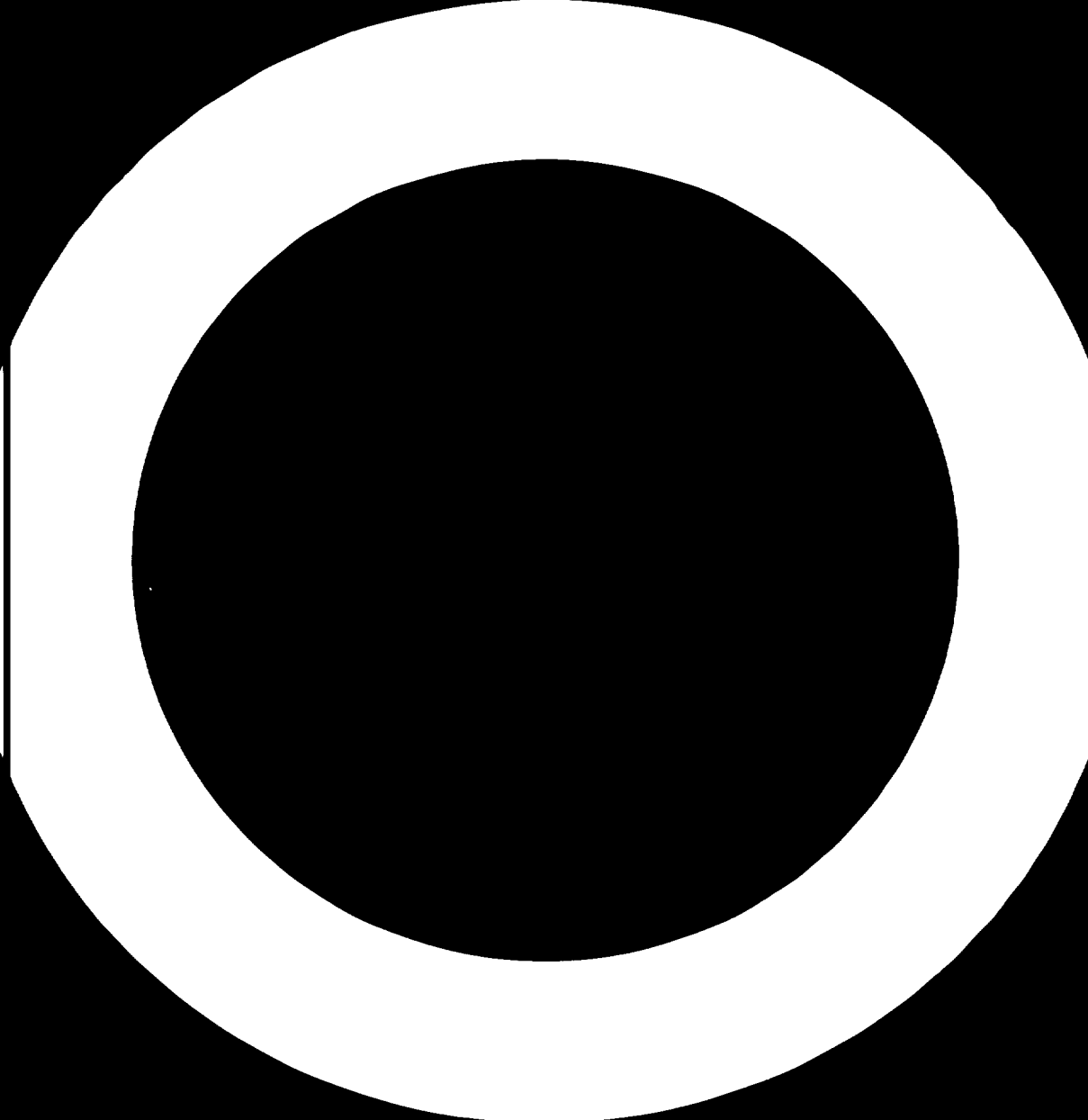
programs (development of new land).
to solve balance of payments problems. Second is the cooperatives and the reformed sector where the governments have a political as well as social interest in the success of these farms.

Incentives to mechanization are primarily through financial loans to farmers and through low or no import tariffs for agricultural machinery and implements (see Table 13). Other incentives include waiver of consular fees, and in some countries, farmers who import directly pay no tariff on their imports.

B. National Policies for Promoting Domestic Production of Agricultural Machinery.

Manufacturers of agricultural machinery and implements are classified as "A" industries as producers of capital goods. They have full tariff waivers on imported machinery and a percentage waiver on imported inputs of production. The length of waiver is 10 years for new industries and 6 for existing ones. These "A" industries are also exempt from paying corporate income tax--new industries for 8 years and existing industries for 2 years (extended to 4 if exporting). They are also exempt from taxes on equity and assets--10 years for new industries, 4 for existing ones.

In addition to the above general incentives, there are further incentives for exporting industries. In most cases these are not specific policies applied to the manufacture of ATMI, but general policies for nontraditional exports and for



import substitution industrialization. Some of these policies include trade barriers--which may include the closing of the market to competing products from non-CACM countries, and tariffs Production of some agricultural tools is protected by tariffs of 20% and 15% (as shown in Table 13).

Foreign investment is welcome in the area. There are some restrictions, such as restrictions on investments in small industries, a requirement on the percentage of nationals in the labor force, and some tributation to profit remittances. In general, however, foreign investment is treated in the same fashion as local investment (although Nicaragua is preparing a new law regarding foreign investment that is more restrictive). U.S. foreign investment is guaranteed against expropriation, convertibility and war by bilateral agreements.

Because of the economic, political and social instability of the area, the region is considered a high risk for investors, and foreign investment in the region (not including Panama) has been declining since 1978 when it reached a maximum of U.S.$201.6 million. By 1980 it had decreased to U.S.$120.3 million (see Table 14). It is interesting to note that foreign remittance that year reached U.S.$726.7 million, six times that of investment.

Table 18. Net Foreign Investment to CACM

Millions of Dollars

	CACM	Guatemala	El Salvador	Honduras	Nicaragua	C.R.
1975	180.9	77.3	13.2	10.4	11.0	69.0

1978	201.6	105.4	33.7	8.4	7.4	47.1
1980	120.3	95.5	--	5.0	--	19.8

1. Plans for Agricultural Mechanization. Even though there are no specific plans for agricultural mechanization, mechanization is implied many times in plans to increase agricultural exports and in plans for the Reformed Sector. These plans lead to financing at moderate rates of interest as well as of availability of foreign exchange for imports.

At the same time, the current low level of foreign exchange is forcing government officials to look in two new directions to reduce imports. One is to make better use of the existing machinery and to better maintain and service it. This is not only true for government pools of machinery but for privately owned equipment, as well. The second direction is toward the use of appropriate technology for hillsides and small farms, to help the small peasant farmers (also one of the political and social goals of the region).

2. Plans for the Agricultural Machinery Industry. The capital goods industry is in an incipient stage in the region. In 1970 this subsector contributed only 4.1% to the total aggregate value of the industrial sector in the region. The percentage increased to 4.6 in 1979[4]. This subsector is inefficient and highly dependent on imports for their production inputs. The manufacturing of machinery--except electrical--

contributed only 1.4% to the total aggregate value in 1970 and 1.1% in 1979.

Because of its linkages, the capital goods sector is considered an essential base for the industrialization of the region. Within this sector, the metallurgical and metal working industries are given initial priority. Plans for the ATMI industry are included in plans for this sector. Guatemala, Nicaragua and El Salvador have included the agricultural machinery and implements industry in their development plans. Both Nicaragua and El Salvador are trying to improve the efficiency of existing industries, providing to some of them substantial financial aid. Nicaragua is also studying a foundry project which will include ATMI production.

Guatemala has completed the feasibility study for an agricultural implements manufacturing plant. At an investment of U.S.$12.9 million, it will produce 2,000 units per year of plows, cultivators, harrows, planters, hoes, shovels, pickaxes, hammers, and screw drivers. After curtailing drastically its investment program the Guatemalan government still has this project in its present 1983-86 industrial development plan.

Even though Honduras did not consider any agricultural machinery industry in its 1982-86 plan, as a result of the Consuplan and the Swiss government technical cooperation agreement, a new plant has been built and is now producing plows for animal-drawn use. The initial production is for 500 to 800 implements per year, and the final size of this plant will depend on the technical and financial aid it receives.

C. Assessment of Strategies.

The only country where economy-wide planning is utilized is Nicaragua. In the other countries the agricultural development plans do not analyze in depth the mechanization problem; neither do they define any wide-range strategies. Moreover, the industrial plans in these countries are based mostly on the import substitution concept and on the priority of the metallurgical and metal-working industries. An ATMI industry is therefore considered in a plan or given priority because it is part of the metal-working industries, because there is a market of imported goods, and because it is inferred that ATMI is what the agricultural sector wants. Even so, this sector has not stated specifically or set any priorities in agricultural mechanization.

D. Main Obstacles for the Development of the ATMI Industry.

In addition to the usual problems encountered by the capital goods industry in developing countries (such as lack or shortage of skilled workers, industrial entrepreneurs, repair and service of industrial equipment, lack of adequate institutional as well as physical infrastructure) the region has two very strong constraints to the development of an ATMI industry.

The first is the lack of investment in the region. Political, economic and social instability in the region have restrained private local and foreign investment. No solution to these problems is seen in the near future. Moreover, even though the participation of governments in the industrial

sector is increasing, funds are limited because of the above-mentioned problems--unless of course large amounts of foreign aid are made available to the region.

The second problem has to do with market size and appropriate technology in the agricultural sector. The market size for the competitive production of ATMI* at the national level is limited to hand tools, hand-operated machinery, and animal-drawn implements. In the larger countries and at the regional level, production of simple tractor-drawn implements, power threshers, simple powered processing equipment and irrigation pumps is also possible.

The largest need in the region is for small farm machinery. However, at the present time the demand for small farm equipment is very limited and most of the supply is of poor quality. The obstacles to convert this need into a market demand are great. First, there are cultural limitations from both farmers (resistance to change) and middle class technicians (abhorrence of intermediate technologies). Second, there are no definite agricultural mechanization policies which clearly specify direction and technologies in this sector. Third, the financial and purchasing capacity of the small farmer is limited or non-existent.

To overcome these obstacles strong government action as well as external technical and financial aid are required.

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* Protection (by trade barriers) of local production will result in increased prices for agricultural production.

CHAPTER III. REGIONAL COOPERATION

A. Existing Technical Cooperation and Recommendations for the Future

There are a few cooperative arrangements on agricultural mechanization in the region, most of which are involved with pilot projects and include small farm mechanization. They are primarily country-to-country cooperation agreements with the developed countries. There is also some FAO involvement. Traditionally these programs are of limited success because, in addition to the several problems with this type of aid, most "experts" are new to the area; there is no cooperation among different agencies to learn from each other's experiences, and most importantly, there have been no spreading effects from the pilot programs. Experts in this area are not able to sell government decisionmakers their ideas, to be implemented elsewhere by locals, even when a project is underway with positive effects.

Cooperation in the agricultural machinery industry has been included in the technical aid given to the metallurgical

and metal-working industries. When recommending policies to be implemented, the recommendations given are customarily based on import substitution or on ATMI needs which have not been transformed into market demand.

The apparent immediate need is for a program to help governments to determine clear, specific policies in agricultural mechanization. This program may need to begin by evaluating the situation, the uses, and the prospects of ATMI in each country and should include recommendations on alternative technologies. After the agricultural mechanization policies are established, then an agricultural machinery industry program could be designed. In the meantime, technical assistance is needed: (1) to improve the efficiency and help the growth of existing industries (e.g., IMPLACSA, Nicaragua, and Implementos Agricolas Centroamericanos S.A., El Salvador); (2) to implement a specific program for the small workshops to improve their efficiency and to improve product performance and reliability. (This program should be complemented by education and training of farmers. The idea of using the new, improved tools, machinery and implements has to be sold to the farmers; they should also learn the efficient use of these tools.); (3) to help implement new projects in Guatemala and Nicaragua as well as the new plant in Honduras, as they are shown to be consistent with agricultural mechanization policies.

B. Technical Cooperation Among Developing Countries

The only technical cooperative arrangement between developing countries in the region for agricultural mechanization in

the agricultural machinery industry is between Cuba and Nicaragua. The Cubans are aiding Nicaragua mostly with large-scale farming and the development of the metallurgical and metal-working sector. They are studying a potential foundry and an agricultural machine manufacturing plant.

CHAPTER IV. IMPLICATIONS OF THE PRESENT GLOBAL SITUATION

The present world recession has been especially hard on the capital goods industry. In the special case of the ATMI industry, the situation has been worsened by the reduced loans to third world countries as well as restrictions on foreign exchange and imports in these countries. Moreover, large numbers of farmers in the developed countries are heavily in debt*, thereby further reducing sales potential for agricultural machinery.

These problems in the agricultural machinery industry have led to a number of effects in the developed countries. First, the large transnational corporations have trimmed their operations and some companies have shut down operations, thus reducing the supply of ATMI products. This decrease, coupled

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* In the U.S. many farms have been or are about to be foreclosed on by the government. This situation has been caused by, among other things, the world recession, some of the U.S. government's agricultural policies, the largess of government loans, and the lack of managerial support to these farmers.

with the restrictions on imports, may create new production possibilities in the region.

Second, there have been reductions in support for existing equipment in the developing countries (i.e., training courses have been reduced or eliminated and cost much more. Also, lead times for parts supply have increased because of the low stock levels in the parts distribution centers).

Third, new production techniques (i.e., the use of robotics and other labor-saving devices) are being introduced and can be expected to accelerate the introduction of more sophisticated agricultural equipment.

Fourth, foreign investments in third world countries are becoming more selective and tend to concentrate in the more stable industrialized developing countries with large internal markets and substantial incentives for production and exports.

CHAPTER V. PATTERNS OF DEMAND AND NEEDS FOR ATMI

The apparent consumption of agricultural tools in the region can be estimated at around U.S.$8 million. Import values balance export values at around U.S.$3.5 million each. More than 50% of consumption is of machetes. The rest is of hoes, axes, pickaxes and shovels. Consumption of agricultural tools has not been drastically affected by the area's economic problems. Internal consumption is not expected to substantially change in the next few years, and the market for new production of agricultural tools other than machetes is estimated to be around U.S.$2 million. In spite of the small market, production at the national level is possible because of the small plant size required for efficient production of most of the agricultural tools.

The apparent consumption of implements and tractors in the region could reach a high of close to U.S.$100 million and a low of about U.S.$60 million. Local production supplies from 2 to 4% and exports are limited, so most of the apparent consumption is satisfied with imports. During the high consumption years, consumption of implements reached close to U.S.$40 million; during the low years it went down to U.S.$25 million.

Considering the variety of products and the plant size needed for efficient production, the market for local production is limited to: basic plows, harrows, cultivators, planters, threshers, and simple machines for cleaning, sorting, and grading rice and coffee.

The apparent consumption of tractors and tractor parts may reach U.S.$70 million in high consumption years and as low as U.S.$35 million. Local production of tractors or tractor parts has been insignificant. The apparent consumption of tractors has been adversely affected by the economic crisis and the political instability of the region.*

In addition to the loan limitations, foreign exchange restrictions, and liquidity problems, reduced purchases of tractors is due to: (1) lower prices of the export agricultural commodities and the resultant lower purchasing power of agricultural export farms; (2) in most of the countries large land owners (the major users of tractors) are prefering to have their investments in the U.S. (where money is more secure and high rates of interest bring good secure returns); (3) there is fear of obtaining loans in foreign currency because of the effects of devaluation on loan payments. (For example, because of the devaluation in Costa

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* The exceptions are Panama where there is more stability and Nicaragua where the reduction in the purchase of tractors has been due mostly to the civil strife.

Rica, many farmers could not meet their loans in foreign currencies, forcing them to re-export their tractors to Panama).

The apparent consumption of small farm machinery and implements is very small, even though the need is very large. Much of the production of animal-drawn implements and of simple hand-operated machines is done in rural workshops not included in the statistical reports of production. There are close to one million farm units in the region with less 10 hectares--55% of those in Guatemala. If the need of these million farms for mechanized appropriate technology is transformed into market demand, the production possibilities are great, even at the national level.

CHAPTER VI. STRUCTURE OF PRODUCTION

A. General

The industry as a whole is formed of small and mechanized plants. As was mentioned before, many are small workshops in the rural areas. The main market for local production is national consumption. There is some intraregional trade and exports to other countries. The main constraints on expanding production are the same as placed on the manufacturing sector in the region--such as limited market, lack of economic and political stability, lack of liquidity, reduction of demand, etc.

B. Manufacturers of ATMI

The following manufacturers have applied for fiscal and tariff waiver incentives, and so are registered with the "Direccion de Industrias" of their respective countries. Sizes are by employment: "I" corresponds to less than 4 employees; "II", 5 to 19; "III", 20 t0 50; and "IV", over 50 employees.

Guatemala

1) Mecanica Industrial Agricola (Guatemala City) size III, manufactures dryers for grains.

2) Ashe Consultores (Guatemala City) size III, assembly of electronic equipment for agriculture.

3) Talleres Fuentes Huos (Guatemala City) size III, agricultural machinery.

4) AGROFORD S.A. (Guatemala City) size IV, assembly of agricultural machinery.

5) EMASA (Escuintla) size II, harrows, planters-fertilizers, row-plows, cultivators, harvesters and other agricultural machinery for cul- tivation.

6) ICSA (Escuintia) size III, machinery for the sugar, cotton and coffee mills.

7) IAGSA (Mazatenango) size III, plows, cultivators, harrows, planters and others.

8) Maquinaria Agroindustrial S.A. (Santa Lucia) size III, plows, cultivators, weeders, planters, fumigators, fertilizers, trailers and collectors for sugar cane.

9) Equipos Sociedad Anonima (Barbarena) size IV, water pumps, couplings, etc.

10) Induriego (Santa Catarina) size IV, irrigation equipment.

El Salvador

1) Implementos Agricolas Centroamericanos, S.A. (Santa Ana) size IV, plows, disc harrows, cultivators, planters, shovels, pickaxes, rakes, hoes, machetes, axes.

2) Talleres Pacas S.A. de C.V. (Santa Ana) machinery for depulping, cleaning, and selecting coffee.

3) Metal Mecanica Diasalinas S.A. de C.V. (Santa Ana) silos for grains, washers, dryers, and vibrators.

4) Industrias SPM (Apopa) size IV, agricultural machinery.

5) Fastabend (Santa Ana) minor implements for hog raising.

6) Talleres Mardones (Santa Ana) agricultural machinery.

7) Talleres Sarti (San Salvador) hoppers for coffee.

8) Herramientas Centroamericanes, shovels.

9) El Caballito, dryers, various machinery for coffee mills.

Costa Rica

1) Talleres de Fundicion Poscan (San Jose) dryers and washers.

2) Talleres Mecanico Industrial Rodolfo Bendix (San Jose) dryers, elevators, storage bins, coffee threshers.

3) Xeltron (San Jose) electronic units for grain selection.

4) Sotomi (Siguga) rice shellers and dryers.

5) Indoplastic (San Jose) rubber roller covers for rice shellers.

6) Famesa (Alajuela) belt conveyors, rollers, trailers, hoppers.

7) Especialidades en Inoxidables S.A. (San Jose) cassava washers, belt conveyors.

8) IMECO (Liberia) conveyors, dryer kilns.

Nicaragua

1) Impiacsa, plows, harrows, planters, fertilizers, cotton cultivators, sugar cultivators, other implements and parts,

forage choppers.

2) IMASA, machetes.

3) Emensa, wheel barrows.

Honduras

1) Fabrica de Implementos Agricolas (Consuda & CDI) plows.

CHAPTER VII. REPAIR AND MAINTENANCE OF AGRICULTURAL MACHINERY

Machinery and equipment are usually very poorly maintained--on the farms as well as in the workshops. There is little training for the user in the operation or maintenance of agricultural machinery and implements. Operating and maintenance manuals are often missing or are written in foreign languages. Moreover, most dealers and agents represent excessive numbers of products and models and do not know enough about the equipment to assist users.

In general, equipment repair is also deficient. Equipment repairs are usually provided by three groups of workshops: the dealer's workshop; the private repair workshop; and the government workshop (which repairs the equipment from the government-owned machinery pools).

Equipment dealers usually provide the best repair service and charge higher prices for services. Some of their mechanics and foremen have attended service training courses provided by the manufacturer; they also have enough facilities and tools and maintain a regular stock of parts. However, there are some problems with the service provided by the equipment dealers.

The first of these problems is location. Most dealerships are located in the capital of the country where the best mechanics are working and where the large workshops, tools, and parts warehouses are located. Many have branches in the larger cities where a small workshop with a few mechanics usually provides lower quality repair services. There are no dealer workshops in the rural areas, nor are there field service trucks to provide repairs on farms located away from the capital of the country. A second problem stems from the fact that much of the equipment used in these countries was bought abroad or through an agent with no manufacturer's dealership in the country. Out of more than 20 different brands of tractors in the region, only around 14 (depending on the country) have dealers representing them. A third problem is that the repairs usually take longer than they should and are not always well done. There are several reasons for this: (1) the low educational level of most mechanics; (2) most training is on-the-job; (3) mechanics usually guess but do not always understand service manuals in foreign languages and information onequipment changes for different serial numbers is often not available or (especially for microfiche) is not consulted; (4) because the dealerships represent many different equipment products, the mechanics repair many types (from industrial forklift trucks to stationary diesel generators, construction equipment, etc.) and do not repair enough of any one model to get to know it well; (5) inadequate parts supplies mean parts must be ordered from manufacturer's distribution centers as

they are needed with consequent delays in repair time; (6) they use an excessive .pa number of assistants (ayudantes) who have no training on the equipment or the right use of tools.

Private Repair Workshops are located in most of the cities of the countries. Their size varies as does their quality of performance. They normally repair automobiles and trucks as their major source of business, and they usually provide service inferior to that of the dealers because, in addition to some of the deficiencies mentioned in relation to the dealers, the mechanics lack training in agricultural equipment. Moreover, they often lack the right tools, parts, and service manuals.

Government Workshops service the equipment pools and are the least efficient in the repair of equipment. Some of the reasons for this inefficiency are: (1) the red tape and delays on deciding a repair schedule, approving transportation, approving parts purchases, etc.; (2) the low pay for mechanics--the good ones usually leave after they are trained and have some experience; (3) favoritism plays an important role in filling empty positions and in promotions; (4) there are no incentives for higher productivity or punishments for low productivity.

CHAPTER VIII. THE AGRICULTURAL MACHINERY INDUSTRY

The agricultural machinery industry in the region is, with few exceptions, part of the metallurgical and metal-working sector, and it usually combines the production of ATMI with that of other products of the metal-working industry. The designs of these products are usually cheaper copies of imported products and very few ATMI products in the region are produced under a license or patent. Production in series is customarily done in batch processing by the few large (for the region) manufacturers. The little vertical integration that ispresent occurs only in the foundries. These melt scrap iron in shaft furnaces, fabricating corn mills, some components, and machinery for sugar mills.

The larger plants have better managerial organization, labor is better paid and has a higher level of skills. They rely on imports for production inputs and have some degree of quality control. Even though they are more capital intensive than the smaller workshops, they use very little automation or automatic control machinery and they are still labor intensive.

The medium and small size workshops in large cities are normally machine shops (there are also some small foundries) which import their inputs and cut, weld, machine, and assemble agricultural tools, simple equipment, and implements on a made-to-order basis. Workers are not very sophisticated and there is little quality control, if any. Therefore, with a few exceptions, their products are usually unreliable.

The small workshops in small cities and towns are very small--ordinarily less than four employees. They fabricate a variety of products on a made-to-order basis, usually copying a product brought by the customer. They use different inputs--from imported materials to local iron and scrap iron--depending on the customer or what is available at the time of production. Their skills are varied but of limited depth. Some combine their production with repairs, others with simple machining, while still others are woodworking shops producing wooden plows and parts for agricultural tools. There is no quality control, and the products are normally of poor design and of lowest quality.

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ANNEX II. NOTES

1. Estimates of the percentage of farms of less than 10 hectares were obtained for different years. For Guatemala, they were for 1979[2], Honduras[7], Panama[15], and El Salvador[12], the early seventies. Information for Costa Rica [10] and Nicaragua[10] was from the early sixties; however, these two countries had only 5% of the total number of farms under 10 Ha at that time. We estimated a total of 1,223,000 farms in the region, of which one million five thousand were less than 10 Ha or 81.5%. On the other hand, we estimated fifty-five thousand frms over 50 Ha or 4.5% of the total number of farms in the region.

2. Statistical Information on industrial production is very uneliable as industrial entrepreneúrs do not provide accurate information to government officials or census personnel. Normally data on production is available only from those industries which have applied to qualify for incentives as producers of capital goods. Production figures sometimes vary depending on the source. We have found that the Central Banks provide the best information available, as they try to crosscheck the reports they receive.

3. The author visited the countries of Costa Rica, Guatemala, El Salvador, and Honduras where much of the information

presented here was obtained, verbally and/or informally. Other information was obtained through the UNDP representatives in the region. Given the time frame of the study, no attempt was made to verify the figures obtained. Therefore, the data given in the different regions shows a gross idea of quantities or dollar values at current prices and is not to be used as reference unless gross data is needed.

ANNEX III. LIST OF PERSONS CONTACTED

Costa Rica

1. Ing. Agr. Alberto Vargas B.
   Sub-Director de Investigaciones Agricolas
   Ministerio de Agricultura y Ganaderia

2. Ing. Agr. Alfonso Ramirez Bonilla
   Economista Agricola
   Oficina de Planificacion Nacional y Politica Economica

3. Ing. Agr. Urias Ugalde Varela
   Jefe Departamento Agrotecnico
   Consejo Nacional de Produccion

4. Lic. Maria Tereza Elizondo
   Jefe de Departamento de Asesoria Industrial
   Ministerio de Economia, Industria y Comercio

5. L. Alexis Orosco Raffo 6. Lic. Pablo Araya C.
   Economistas
   Direccion General de Comercio Exterior
   Ministerio da Economia, Industria y Comercio

El Salvador

1. Enrique Escalante
   Jefe del Departamento de Proyectos
   Direccion de Industrias
   Ministerio de Economia

2. Lic. Nelson Zelaya
   Centro de Informacion Comercial
   Ministerio de Comercio Exterior

3. Sigmifredo L. Caballero
   Jefe del Departamento de Control y Programacion a.i.
   Direccion Ejecutiva de Cooperacion International
   Ministerio de Planificacion

4. Jorge Alberto Amaya 5. Manuel de F. Martinez A.
   Tecnicos Sectorialistas
   Direccion Ejecutiva de Cooperacion Internacional
   Ministerio de Planificacion

6. Carmen de Maron .
   Representante P.N.U.D., El Salvador

Guatemala

1. Ing. Rodolfo Estrada H.
   Vice-Ministro
   Ministerio de Agricultura

2. Lesbia Valladores de Castellanos
   Sub-Directora, Direccion de Politica Industrial
   Ministerio de Economia

3. Lic. Leonel Suarez Cardona
   Jefe, Departamento Agropecuario
   Secretaria General del Consejo de Planificacion Economica

4. Lic. Jose Herrera Oralle
   Jefe, Departamento de Sectores Productivos
   Secretaria General del Consejo de Planificacion Economica

5. Elsa Morales de Lara
   Secretaria Estadistica,
   Direccion de Politica Industrial
   Ministerio de Economia

6. Juan Jose Rabanales
   Subdirector del Departamento de Cambios
   Banco de Guatemala

Honduras

1. Salvador Melgar Ascensio
   Director General de Industrias
   Ministerio de Econimia

2. Renzo Scavazzon
   Representatante de la FAO
   Organizacion de las Naciones Unidas para la Agricultura
   y la Alimentacion

3. Lic. F. Ricardo Freire Mejia
   Jefe del Departamento de Investigaciones industriales
   Banco Central de Honduras

4. Ing. Madgalena Savarain
   S.I.D.F.A. para America Central
   ONUDI

5. Lic. Lilian de Morales
   Director Departamento Industrial
   Consuplan

6. Ing. Noel Alcides Sandoval
   Gerente General Programa de Mecanizacion Agropecuaria
   Secretaria de Recursos Naturales

7. Ing. Carlos Tejada G.
   Director Nacional del PROMECH

8. Peter H. Deinken
   Oficina de Medio Ambiente y Technologia
   Agencia para el Desarrollo Internacional
   Embajada EUA

Also information was received from

1. Miguel Bermeo-Estrella
   Oficial Encargado
   PNUD, Panama

2. A.C. Bowers
   Representante Residente
   PNUD, El Salvador

3. P.N.U.D. offices in Honduras and Nicaragua