FOOD-GRAIN MARKET EVALUATION IN NICARAGUA: THE RICE CASE

By

Luis A. Navarro U.

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CHAPTER I

INTRODUCTION

Agriculture, Development and Government

Like most of the Latin American countries, Nicaragua bases its economy largely within the agricultural sector. In 1970, agriculture accounted for about 26 percent of the gross domestic product (GDP) and furnished between 70 and 80 percent of the total value of export, 178 million dollars.

Throughout history, the agricultural sector of Nicaragua has followed a tortuous path, which explains in part the pattern of a slow development process and the final relationship between GDP growth and the export activity.

Long before Nicaragua's independence, maize, tobacco, sugar, and cacao represented the most important crops, in the production of which almost the entire rural population was engaged. The period between the independence from Spain in 1821 and 1857 was characterized by a political transition, in which Nicaragua left the Central American Federation and went into the struggle between the two existing political parties, Liberals and Conservatives, to define the new government. The economic problems here were of second order and no attention was paid to agriculture or any other economic activity. From the 1850's until 1893, Nicaragua was under a period of conservative rule, delaying the process of economic progress which was at work in neighboring countries. However, in this period the first railroad was built and "... agriculture was

revived to some extent ..."[1]

The early years of the twentieth century were also not propitious for the initiation of the take-off stage, as identified in the leading sector growth stage approach by Professor Rostow[2]. "With the emergence of the economic liberalism in 1893, new talks with the United States government on the old problem of the interoceanic communication and the following territorial occupation by the U.S. Marines, from 1910 to 1930, in addition to internal problems, prevented both the carrying out of significant reforms in the economic structure, and the formation of an export sector to support the economic growth and development. Jaime Fernandez[3] explained that, when the economic depression in the 1930's came, Nicaragua had not even recuperated from the effects of World War I. During the depression period, the country's balance of payments worsened, leading the country to four successive devaluations of the currency. The last devaluation took place in 1950 and brought the exchange rate from 5.0 to 7.05 cordobas per dollar. Table I-1 presents the main export products supporting the early economic growth of Nicaragua from 1920 to 1949. The poor distribution and low

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1 Encyclopaedia Britannica, Vol 16, 1970, Nicaragua, p. 473.

2 Y. Hayami and V.W. Ruttan, Agricultural Development, An International Perpective, (Baltimore, The Johns Hopkins Press, 1971), pp. 13-15.

3 Jaime Fernandez, Cotton Growing in Nicaragua, Situation and Prospects (unpublished M.S. Thesis, Cornell University, 1971).

TABLE I-1

MAIN EXPORT PRODUCTS, 1926-1950

	1926	1930	1935	1940	1945	1947	1949
	(thousand dollars)						
Coffee	8100	3792	3118	2094	3668	5333	4362
Gold	686	425	567	5758	7117	7641	7659
Silver	34	16	39	100	114	171	152
Sugar	876	366	88	-	-	-	400
Bananas	1226	2239	1201	446	81	342	831
Timber	1342	535	140	274	667	1725	1391
Sesame Seed	-	-	-	3	362	2185	4126
Cotton	8	48	55	203	-	198	212
Cotton Seed	-	-	-	18	12	8	31
Total Exports	13029	8343	5658	9644	13686	20708	23160
	Percentage						
Coffee	62.2	45.5	55.1	21.7	26.8	25.8	18.8
Gold	5.3	5.1	10.0	59.7	52.0	26.9	33.1
Silver	0.3	0.3	0.7	1.0	0.8	0.8	0.7
Sugar	6.7	4.4	1.6	-	-	-	1.7
Bananas	9.4	26.8	21.2	4.6	0.6	1.7	3.6
Timber	10.3	6.4	2.5	2.9	4.9	8.3	6.0
Cattle	-	-	0.2	0.9	0.3	4.9	5.2
Sesame Seed	-	-	-	-	2.6	10.6	17.8
Cotton	0.1	0.6	1.0	2.1	-	1.0	0.9
Cotton Seed	-	-	-	0.2	0.1	-	0.2
Total Exports	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Based on, United Nations, Economic Commission for Latin America, Analisis y Proyecciones del Desarrollo Economico, Vol. IX, El Desarrollo Economico de Nicaragua, and Central Bank of Nicaragua, Annual Report, various issues.

income percapita, and the small effective domestic demand, in addition to a profitable external market for some agricultural products, influenced the production structure toward international trade.

In the years following World War II, and after the last devaluation in 1950, the relatively cheaper products for the outsiders favored the production and export of coffee, cotton, sugar, and ultimately meat, consolidating in less than one decade their leader position in the Nicaraguan development. Table I-2.

The availability of good soils and a large labor supply fostered the organization of the extensive pattern observed in the agricultural production in Nicaragua. However, since the upsurge of cotton production and export beginning in the 1950's, some progress has been made in the use of capital inputs such as farm machinery, fertilizers, chemicals, and improved seed. Initially, this progress was limited to the export activity, thereby increasing the emerging differences between the export and the domestic sectors, and forming a dual economy.

High prices on international markets in the early 1950's made cotton a unique product in Nicaragua, with no close competitor for the country's resources. Government investment in social overhead capital, credit and imported input facilities for the cotton industry were effective policies for expansion. However, despite the protection given, starting in 1965, the cotton industry has been plagued by increasing

TABLE I-2

NICARAGUA: CHANGE IN THE COMPOSITION OF EXPORTS,
(Thousand dollars)

Traditional Products	1926	1945-50	%	1950	%	1965	%	1968	%
Coffee	8,100	7,673	33.7	17,331	50.7	26,354	17.7	20,563	12.9
Gold	686	7,624	33.5	8,080	23.6	5,406	3.7	4,105	2.6
Sugar	876	278	1.2	714	2.1	5,518	3.7	8,300	5.2
Banana	1,226	468	2.0	618	1.8	786	0.5	2,180	1.3
Timber	1,342	1,381	6.0	1,742	5.1	1,969	1.3	1,994	1.4
Postwar new products									
Sesame seed	-	2,047	9.0	1,515	4.4	2,144	1.4	2,545	1.6
Cotton	-	563	2.5	1,843	5.4	66,132	44.4	45,425	28.6
Cotton seed	-	64	-	204	0.6	8,688	5.8	1,038	0.7
1960's new products									
Meat	-	-		-		6,679	4.5	20,836	13.1
Shrimp & lobster	-	-		-		2,133	1.4	6,750	4.3
Copper	-	-		-		6,110	4.1	5,076	3.2
Cotton seed oil	-	-		-		327	0.3	3,838	2.4
Other products	799	2,775	12.0	2,153	6.3	16,700	11.2	36,098	22.7
Total Exports	13,029	22,938	100.0	34,200	100.0	148,946	100.0	158,748	100.0

- not significant

Source: Central Bank and CEPAL, Annual Reports.

production costs and crop damage from pests and drought. Finally, coinciding with lower prices in the international markets, cotton yields dropped from 14 cwt per manzana in 1965 to only 9.5 in 1970 thereby reducing the return to growers.

With the objective of saving the foreign exchange which the current export sector could hardly attract, the Nicaraguan government has diverted efforts toward an immediate diversification and after five years, some response has been obtained in the rapid increase in production of cattle, bananas, tobacco, and rice. Great emphasis has been placed on identifying new marketable products, in order to promote their production. Products being considered include yucca, from which yucca chips for cattle feed can be exported; peanuts for oil; okra; and pork.

General agricultural policies, in addition to credit, fiscal, and monetary policies, have been used by the government to lead and direct production, based on economic and political objectives. Maintaining large numbers of people in rural areas and achieving self-sufficiency in food production are examples of past policies. Today, maintaining the income level of the farmers and export promotion seem to be objectives for most developing countries, including Nicaragua.

One important general classification of government policies toward agriculture is comprised of price policy, structural policy, and marketing policies. Price policy

is concerned with the prices farmers receive for their products and the prices at all other levels in the market channels. Structural policies are designed to improve internal and external infrastructure of the farm and the countryside. Finally, marketing policies attempt to smooth the flow of the product in the channels from farmer to consumer, with the major objective of strengthening the producer's bargaining position.

In this research paper the intention is to analyze how these sets of policies have affected the food-grain marketing system in Nicaragua during the last decade, with emphasis placed on rice, a commodity which is now receiving special attention from the private and the public sectors.

Objectives of the Study

The overall purpose of this study is to evaluate the food-grain market system and to analyze the basic major problems existing for agricultural development in Nicaragua in the 1960's. The case of rice will be presented as an outstanding example.

The more specific objectives are:

1) To analyze the rice industry and examine the changes in its economy during the period from 1960 to 1970.

2) To establish projections of supply of and demand for rice to 1975 and 1980.

3) To analyze the impact of some public and private policies on the rice industry and the effectiveness of the prevailing institutional framework.

4) To establish means of improving and derive recommendations for developing a coordinated food-grain market.

Limitations

The present study is based only on information obtained from secondary sources. Census data, periodic statistical figures published by the National Office of Statistics and Annual Reports of the Banco Central de Nicaragua, and bulletins from the Ministry of Agriculture were the materials studied.

Of special interest were information and reports from Battelle Memorial Institute, FAO, Secretariat of the Organization of American States, and Louisiana State University, relative to the agricultural problems in Nicaragua.

Characteristics of the Country

Geographic Characteristics

The Republic of Nicaragua, the largest country of Central America, lies between the Republic of Honduras and Costa Rica, its northern and southern boundaries, respectively, and between the Atlantic Ocean on the East and the Pacific Ocean on the West. The total area, including Lake Managua and Lake Nicaragua, is 57.4 thousand square miles.

All Nicaraguan soil is composed of marine sediments, covered by recent alluvium, lavas, and ashes. Level plains in the western part of the country are fairly well drained by many short rivers flowing into the Pacific Ocean and into

Lake Managua and Lake Nicaragua.

The central region is rugged and undulating, with plateauslike areas. The flat eastern lands are crossed by large, tortuous rivers, and have numerous swamps and coastal lagoons.

Nicaragua lies between the Tropic of Cancer and the Equator, resulting in its tropical climate. However, the entire Central American Isthmus is greatly influenced by the oceans, especially the Caribbean Sea, from which the winds blow westward. The mean annual temperature in the eastern lowlands is 78° F., with little variation. The western area has a mean temperature of 90° F.

The rainfall season, which begins in May, lasts six months in the western Pacific area, in the central mountains ranges from seven to eight months, and lasts nine to ten months in the Atlantic Coast. Average rainfall in the Western, Central, and the Atlantic Coast regions is 40 inches, 65 inches, and 81 inches, respectively. The precipitation period has two peaks, one in June and the other in October, with a short dry period of about three weeks in August, called Canícula, which is very marked in the Pacific plainlands.

Social Characteristics

Since the figures of the 1970 Population and Agricultural Census are not yet available, the author will refer to the data from the 1963 Census, which showed a total population of 1.5 million people. The estimate for 1970 indi-

cates a new population figure of 1.9 million, representing an annual average growth rate of a little more than 3 percent. The Nicaraguan population, which is largely agricultural, is heavily concentrated in the western Pacific one-third of the country, especially between Chinandega and Granada. In 1963, 32 percent of the population resided in the three leader departments (states); Managua had 360,000 inhabitants, followed by Granada and Leon with 130,000 and 110,000, respectively.

Approximately 70 percent of the population is white; 20 percent of the remainder is composed of mestizos, zambos (Indian-negroes), and mulattoes, and 10 percent are negroes. During 1963 about 48 percent of the total population was 15 years old or younger, and only 3 percent was 65 or older. The average life expectancy was 57 years. The sex distribution, taken from the same Census, indicated that 51 percent of the Nicaraguans were women. The literacy rate was about 48 percent in 1965.

Economic Characteristcs

Preliminary estimates indicate that during 1970 Nicaragua's economy grew about 5.1 percent in term of gross domestic product (GDP) at constant prices of 1958. Available figures in Table I-3 show that the growth of the GDP has not been smooth; high growth rates in the periods 1950-55 and 1960-65 alternated with periods of stagnation in 1955-60 and 1965-69.

During the 1960's, Nicaragua experienced an annual ave-

TABLE I-3

NICARAGUA: GROSS DOMESTIC PRODUCT*, COMPOSITION PER ECONOMIC SECTOR, 1950-1970

Year	GDP	Agric. Sector Total [1]	Agri-culture [2]	Indus-try	Trans-porta-tion	Com-merce	Others [3]
			(Million of 1958 Cordobas)				
1950	1504.7	670.4	415	193.3	35.6	268.7	336.7
1955	2285.0	901.3	640	320.4	70.9	485.3	507.1
1960	2454.2	877.1	596	367.8	123.9	478.7	606.7
1965	3912.8	1259.0	1046.5	518.7	198.0	778.6	1158.5
1969	4699.5	1246.8	867.5	900.0	248.1	975.9	1429.3
1970	4939.8	1277.9	864.9	1008.1	257.6	1013.4	-
			Percentage				
1950	100.0	44.5	27.6	12.0	2.4	17.9	23.2
1955	100.0	39.4	28.0	14.0	3.1	21.2	22.3
1960	100.0	35.7	24.3	15.0	5.0	19.51	24.8
1965	100.0	32.2	26.7	13.0	5.1	19.9	29.8
1969	100.0	26.5	18.4	19.1	5.3	20.8	28.3
1970	100.0	25.9	17.5	20.4	5.2	20.5	28.0
			Compound Annual Growth Rates				
1950-55	8.7	6.1	9.0	10.7	14.5	12.5	-
1955-60	1.5	-1.4	-0.4	2.8	11.9	-0.3	-
1960-65	9.8	7.5	11.9	7.1	9.8	10.2	-
1965-69	4.4	-0.2	-4.2	13.7	3.9	5.2	-
1969-70	5.1	2.5	-0.3	12.0	3.8	3.8	-

1/ Agriculture, livestock, forestry, and fishing.

2/ Food and fibers.

3/ Includes government and other services.

Source: Central Bank of Nicaragua and United Nations.

* Constant prices of 1958.

rage rate of growth of the GDP --at constant prices-- of about 7.3 percent. However, early years up to 1965 were characterized by a compound growth rate of 9.8 percent, the highest in the last 20 years, in contrast to only 4.4 percent in 1965-1969. Table I-4 illustrates the declining growth rate in per capita income from 13.5 percent in 1965 to only 0.8 in 1970, even though the absolute figures rose from 250 dollars per capita in 1960 to 355 dollars in 1970.

The primary factor limiting economic growth in recent years, including 1970, has been the poor performance of the agricultural sector. A drastic decline in the level of cotton production, the sector's main commodity, has restrained growth of the total agricultural production value to a low rate. The drop in cotton production resulted from unfavorable weather conditions and declining productivity. Table I-5.

During 1970, the government took actions to reverse the trend of declining productivity, mainly by reducing cotton production from unsuitable land and inefficient farmers through the credit mechanism. The new credit policy for cotton growers consists of eliminating the financial assistance to areas in which the average yield in the last three years was lower than 10.5 cwt of lint per manzana.

In contrast to cotton, the production of domestic food supplies and cattle has increased significantly in recent years. This upward trend continued in 1970. The increase in cattle production has allowed Nicaragua to expand its export of meat to the point where it accounted for 14 per-

TABLE I-4

NICARAGUA: GROSS DOMESTIC PRODUCT, POPULATION AND PER CAPITA GDP

Year	GDP Million C$ 1958	Growth over previous year %	Population	Growth over year %	Per capita GDP		Growth over previous year %
					Cordobas	U.S.Dollars	
1960	2 473	1.4	1 410 829	2.9	1 753	250	- 1.6
1961	2 633	6.5	1 452 831	3.0	1 812	259	3.4
1962	2 911	10.5	1 496 084	2.9	1 946	278	7.4
1963	3 125	7.3	1 540 655	3.0	2 029	290	4.3
1964	3 324	6.4	1 596 860	3.8	2 082	297	2.6
1965	3 913	17.7	1 655 017	3.6	2 364	338	13.5
1966	4 033	3.1	1 715 401	3.6	2 351	336	- 0.6
1967	4 246	5.3	1 776 967	3.6	2 390	341	1.6
1968	4 445	4.7	1 841 759	3.6	2 414	345	1.2
1969	4 641	4.4	1 909 250	3.6	2 431	347	0.6
1970[a]	4 940	5.1	1 977 724	3.6	2 480	355	0.8

a. Preliminary estimates by CIAP.

Source: 1959-69 data from Central Bank, Annual Report 1969, p.69.

TABLE I-5

NICARAGUA: AREA, PRODUCTION, YIELD, AND EXPORT OF COTTON, 1950-1971

Year	Area Mnz[1]	Prod. cwt.lint	Yield cwt/Mnz	Export cwt lint	Export Dollars
	- 1000 units -			- 1000 units -	
1950	19.6	100	4.9	50	n. a.
1955	121.8	1,025	8.0	500	n. a.
1960	93.8	650	7.0	575	n. a.
1961	81.5	722	8.9	715	18,341
1962	107.3	1,209	11.3	1,225	31,297
1963	134.2	1,568	11.7	1,609	39,781
1964	164.8	2,024	12.3	2,057	51,489
1965	191.3	2,691	14.1	2,752	66,132
1966	202.8	2,398	11.8	2,451	56,814
1967	215.3	2,489	11.6	2,419	55,991
1968	209.1	2,222	10.6	2,306	56,675
1969	187.7	2,020	10.8	1,946	45,179
1970	155.0	1,488	9.6	1,462	34,131
1971	136.3	n.a.	n.a.	n.a.	n.a.

Source: Central Bank, Annual Report 1970.

1 Manzana, equals to 0.7 hectare.

cent of the value of total exports in 1970. Table I-6.

Industrial production is considered to have increased by 12 percent in 1970, as productive capacity created by investment made in early years was brought to a better use capacity. This occurred largely in response to increased demand for manufactured goods for domestic consumption and for export to the Central American countries.

During the period from 1968 to 1970, new plants for the production of insecticide, chemicals, textiles, salt, and dehydrated milk began operations. These projects represented new investments to expand industrial production capacity, but oriented principally to the Central American Common Market. Meat, included as an agro-industrial product, has represented the fastest growing export within the sector; however other products are now also begining to make contributions to foreign exchange earning, as depicted in Table I-7.

On the other hand, the increase in exports to Central American countries experienced by Nicaragua in 1970, could be explained partly as a result of the restraints imposed upon trade between El Salvador and Honduras by the July 1969 border conflict. A large part of this increase in exports went to Honduras[4]. Table I-8.

Background of the Grain Problem

In recent years, significant changes have occurred

4/ Interamerican Committee on the Alliance for Progress, CIAP/472, 1970.

TABLE I-6

NICARAGUA: PRODUCTION AND STRUCTURE IN EXPORTS OF SELECTED AGRICULTURAL ITEMS, 1960-1970

	1960	1965	1969	1970
	Production 1000 cwt			
Cotton, (lint)	650	2,691	2,020	1,488
Coffee	680	743	814	960
Sugar cane (MT)	25,037	28,424	40,958	43,944
Rice	448	710	1,401	1,474
Maize	2,588	3,723	5,010	4,840
Beans	500	1,064	1,194	1,304
Cattle (1000 slaughtered heads)	134	181	276	310
Fishery (Millions lbs.)	n.a.	n.a.	n.a.	16.7
	Percent of total export value			
Cotton (lint)	23.4	44.4	28.6	19.2
Coffee	30.6	17.7	12.9	18.0
Sugar cane	5.5	3.7	5.2	5.5
Rice	0.2	-	0.4	0.9
Maize	-	-	-	-
Beans	0.2	0.3	0.5	0.7
Cattle	4.7	4.5	13.1	14.9
Fishery	-	1.4	4.3	3.3

Source: Central Bank, Annual Report 1970.

TABLE I-7

NICARAGUA: EXPORT VALUE AND PROJECTIONS OF SELECTED INDUSTRIAL PRODUCTS, 1968-1973

	1968	1969	1970	Projections 1971	1972	1973
	Million Dollars					
Meat	15.9	20.8	25.0	27.0	30.0	34.0
Sugar	5.5	8.3	10.5	9.0	9.0	9.0
Cotton oil	3.2	3.8	4.8	5.8	5.4	5.4
Wood products	2.2	2.8	3.7	4.2	4.8	5.2
Soluble coffee	0.2	0.8	1.0	1.1	1.2	1.4
Hides and leather goods	1.1	1.5	2.0	2.5	3.0	3.5
Fertilizers	-	0.5	1.3	1.4	1.5	1.6
Chemicals	-	6.9	9.4	10.0	11.0	11.0
Textiles	-	1.8	3.9	4.4	4.9	5.5
Prepared cereals	-	1.8	2.4	2.6	2.8	3.0
Total Industry	28.1	49.0	64.0	68.0	73.6	79.6

Source: CIAP/472, 1971

TABLE I-8

NICARAGUA: INTERNATIONAL TRADE BY REGIONS

	1960		1969		1970	
	E	I 1/	E	I	E	I
	Million Dollars					
CACM	2.5	2.8	31.7	42.2	46.0	50.1
L. America	1.3	2.9	0.6	10.2	1.1	13.6
E.E.C.	16.0	10.0	29.1	24.2	33.3	28.2
USA	26.9	37.7	50.6	66.6	56.0	72.0
Japan	8.7	4.7	28.9	12.7	24.7	12.7
Others	7.6	13.6	17.9	20.9	17.5	22.2
Total	62.9	71.7	158.7	176.9	178.6	198.7

Source: Central Bank, Annual Report 1972.

1/ E = Export Fob, I = Imports Cif

within the agricultural sector of Nicaragua. The development of additional acreage and the expansion of rural credit programs, along with improved production practices, have led to substantial increases in the production of food and feed grains. Studies made by the National Institute for External and Domestic Commerce (INCEI) and the National Bank (BNN) have shown that without increasing per capita income through the sale of his product, the farmer will merely be held in a subsistence state, producing only the food and other products necessary for his own use. Only through an expansion of sales of his agricultural products and the availability of a practical storage, distribution, and marketing program, can the producer generate the income needed to purchase improved seed, fertilizer, and additional farming equipment, thus increasing total agricultural production value.

As in most developing countries, the majority of the grain producers in Nicaragua have been characterized as conservative individuals, who are farming between 0.5 and 2 or 3 manzanas of land and producing for their own consumption. Besides, they have been accused of paying no attention to changes in prices of products and factors of production and of disregarding economic incentives. It is also widely held, that these poor farmers, (growing maize and beans), save and invest too little from their income. Testing the farmer economic efficiency and responsiveness hypothesis,

Tax in Panajacejl, Guatemala, and Hopper in Senapur, India[5*], found that farmers are poor because the factors used in their productive activities are not capable of producing more under existing circumstances. Another inference states that farmers do respond to economic changes. In fact, to be illiterate and poor does not mean to be therefore insensitive to market signals expressed in terms of costs and return in allocating available factors of production.

Referring these findings to poor agricultural grain producer communities in Nicaragua, it is possible to observe similar farmer behavior, resulting in part from the rigid institutional structure and political and social restraints. Schultz[6] hypothesized that, when farmers are exposed to changing technology and allowed to reallocate traditional resources, significant growth in productivity can be brought about, as has been the case for rice producers in Nicaragua since 1964.

INCEI and BNN, in the Application for a loan to the EXIMBANK[7] in 1968, pointed out specific problems that have

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5/ T.W. Schultz, Transforming Traditional Agriculture, (4th ed., New Haven: Yale University Press, 1969), pp.36,49.

* Panajachel and Senapur present large cultural and social differences. The patterns of production and consumption also differ, but using Western standards, both are nevertheless poor.

6/ T.W. Schultz, op.cit.

7/ "Application for Capital Assistance for Installation of Local Grain Storage and Regional Terminal Facilities in Nicaragua, Central America", 1968.

plagued grain producers in Nicaragua. Lack of marketing news and an efficient information system, inadequate storage and drying facilities, poor transportation service, and deficient countryside roads have caused nearly a 30 percent loss in the total annual grain production in recent years.

In the next Chapter the case of rice production will be examined. This commodity, produced primarily for domestic consumption, is now the object of public and private attention under the diversification and technification policy, with expectation for export.

CHAPTER II

THE RICE INDUSTRY

Food Grains in the Nicaraguan Economy

The accelerated economic growth Nicaragua experienced in the first half of the 1960's resulted from increased area, production, and yield of cotton. However, growth has been delayed in the second half of the decade because of the reverting decreasing tendency of yield and prices for cotton, increasing costs of production and irregular weather conditions. Even though the other major export crops, coffee and sugar, experienced modest increments in production and value, their export is restricted by quotas. In fact, these crops were unable to maintain the Nicaraguan economic growth rate at the same rhythm as the early 60's. At constant prices of 1958, the value of production of the agricultural sector decreased from 1,282 million cordobas in 1965 to 1,266 million in 1970[1].

Traditionally, the economic activity in the production of food grains in Nicaragua has been left to the ingenuity and skill of peasant farmers scattered throughout the entire country. Under their limited managerial ability, the large provision of family labor, and good supply of farm land, the use of new land was the easiest and cheapest way to provide more food for the increasing population. This explains the expansion in production of rice, maize, beans, and sorghum, as indicated in Table II-1. It is interesting to note that,

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1 Central Bank of Nicaragua, Annual Report 1970, p.174.

TABLE II-1

NICARAGUA; FOOD GRAIN, AREA, PRODUCTION AND YIELDS, 1960, 1965, 1970

	1960	1965	1970	1960	1965	1970	1960	1965	1970
	Area 1000 Mnz.[1/]			Production 1000 cwt			Yield cwt/Mnz.[1/]		
Rice	29.7	35.0	56.0	448	710	1,474	14.8	20.5	26.2
Maize	182.7	249.0	366.6	2,137	3,437	5,010	11.7	13.8	13.7
Sorghum	69.1	68.0	80.4	515	1,013	1,267	7.5	14.9	15.8
Beans	56.3	66.0	83.3	499	185	955	8.5	11.8	11.5

1/ Mnz. stands for Manzana, equivalent to 0.7 hectare.

Source: Central Bank of Nicaragua, Annual Report 1970.

with the exception of rice, there was no significant improvement in grain yields during the second part of the decade.

When the economic emergency came to Nicaragua in 1965 and exports began failing to provide foreign earning, government planners designed an instant agricultural diversification program to strengthen the vulnerable export sector. Bananas and tobacco for cigars were expected to generate more foreign earning; in addition, rice was included primarily to save earning by import substitution and eventually to be exported. By the time rice was incorporated in the diversification and expansion program, some intent of modernization had been made by prosperous growers, and mechanization, irrigation, and the use of chemicals were not absolutely new in rice production. This incipient modernization of the rice industry in the middle 60's could be considered a side effect of the modernization of the cotton production.

Without appropriate studies of the consumption of food grains, it is very difficult to assess which one is most important in the Nicaraguan diet. Maize is consumed heavily in rural areas, in contrast to rice. On the other hand, the per capita consumption of rice in urban centers is evidently greater than in the countryside. Beans are the usual direct complement for rice; and sorghum, produced mainly as feed grain, is frequently a substitute for maize.

In this chapter, emphasis will be placed on the performance of rice, whose economic activity has been the most

dynamic of the grains in Nicaragua in the last decade.

Institutions

The government institutions engaged in agricultural activities related to food grains are the Ministry of Agriculture and Livestock, MAG; the National Development Institute, INFONAC; the National Institute for External and Domestic Commerce, INCEI; the Central Bank and National Bank of Nicaragua. The main responsibilities of these institutes are as follows: MAG controls the organization, conservation, and development of Nicaragua's agriculture. Research, education, and extension service are within its activities. INFONAC, in connection with grain production, is in charge of the diversification, promotion, and development of the irrigation systems necessary in the rice programs, as well as others. INCEI is the most outstanding agency, administering the marketing policies concerned with support price for producers and ceiling price for consumers, and import-export activities. The Central Bank of Nicaragua, as stated by Fernandez[2], is responsible for the financial leadership of the economy, and dictates credit policy for the financial institution. Its monetary policy has permitted internal and external monetary stability, as reflected by low rises in price level and cost of living, and the constant exchange rate in the last decade[3]. Finally, the National Bank of Nicaragua (BNN) is the government's main financing agency,

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2 Jaime Fernandez, op.cit.

3 Since 1950 the exchange rate has been 1$ = C$7.00 Cordobas.

supplying credit for agricultural production and commercial supply of input. BNN regularly provides up to 78 percent of the total agricultural production credit loaned to farmers.

The Economics of Rice in Nicaragua

In general, the Nicaraguan rice industry has developed acceptably in the last ten years. Prior to that time, the entire industry was one of small farms, nonirrigated, hand-tilled, and hand-harvested upland production. Since the early 1960's, initial attempts were made to introduce improved mechanized methods of production, as has been done with cotton, along with irrigation. Initially, there were no suitable locally available, disease-resistant, stiff-strow varieties of rice which were adapted to mechanization. By the middle of the 1960's, the variety Filo 1 was introduced; it had been selected and purified in Central America from parent materials originating in Surinam. At present, two-thirds of Nicaragua's rice production is grown under mechanized-irrigated conditions, using mainly the mentioned variety Filo 1.

The evolution of the rice production during the period from 1956 to 1970 is presented in Table II-2. The increase in area during the whole period presents an irregular trend, which is difficult to explain in relation to variations in rice prices or in relation to variations in production and prices of substitutes and/or complements. Production, on the other hand, shows a steady increase approaching 1.5 million quintals of milled rice in 1970. Within the 15-year

TABLE II-2

RICE: AREA, PRODUCTION AND YIELD,
NICARAGUA 1956-1970

Year	Area Mzs.[1/]	Production cwt[2/]	Yield cwt/Mnz.
	- 1000 u n i t s -		
1956	20.0	315	11.3
1957	36.8	417	11.4
1958	35.0	457	13.0
1959	33.2	461	13.9
1960	29.6	448	14.8
1961	32.9	509	15.2
1962	32.6	506	15.5
1963	29.1	600	15.5
1964	31.8	651	20.7
1965	34.8	710	20.5
1966	36.1	826	20.4
1967	35.7	908	22.9
1968	42.8	1,107	25.4
1969	53.5	1,401	25.8
1970	56.7	1,474	26.2

1/ Manzana = 0.7 hectarea.

2/ 1 cwt = 1,000 lbs. = 1 quintal.

Source: Central Bank, Annual Report 1969 and 1970.

period presented in the table, the area increased by 183 percent, while the total production increased by 367 percent.

The total value of the rice production at current prices was calculated at 125.5 million cordobas[4] for 1970, representing an increment of 200 percent in relation to 1960, as indicated in Table II-3 part (a). In the same table, the commercial balance shows the evolution in net trade, begining with a positive position at the starting point in 1960 with 0.7 million cordobas; later, at the middle of the decade, yields remained constant and total production was unable to supply the rice demanded, causing imports to surpass exports, resulting in a negative balance of 9.5 million cordobas. Finally, the decade ended encouragingly. Rice exports were 11 million cordobas greater than imports. It must be pointed out that the commercial balance does include import and export of rice grain for seeding purposes.

During the last decade, the process of agricultural development seems to have created strong changes in the structural participation of the commodities in production, value, and exports in Nicaragua. Cotton production, value, and export, after its peak in 1964-65, reduced its economic participation in the agricultural sector within the period; coffee presented similar behavior, with the variation that the better years were at the end of the 1960's, in which world prices improved enough to consolidate the structural participation in exports at the 18 percent level. Part (c) Table II-3. Rice, on the other hand, showed an increasing

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4 Cordoba equivalent to 0.14 $

TABLE II-3

RICE; VALUE OF PRODUCTION, COMMERCIAL BALANCE, 1960, 1965, 1970

	1960	1965	1970
(a) Value of Production[1/]		Million Cordobas	
Agric.Sector	726.2	1,316.6	1,459.8
Rice	41.7	64.5	125.5
(b) Commerical Balance[1/]			
(Ex-Imp)			
Food grains	2.6	-9.9	20.4
Rice	0.7	-9.5	10.9
(c) Participation in Export		Percentages	
Rice	0.2	-	0.9
Cotton	23.4	44.7	19.2
Coffee	30.6	17.7	18.0

1/ At current prices.

Source: Central Bank of Nicaragua, Annual Report 1970.

participation from 0.2 percent in 1960, dropping to a negligible figure in 1965, and finally reaching 0.9 percent of total Nicaraguan exports in 1970.

Nicaragua was allowed to reach this position through the simultaneous implementation of public programs initiated by 1966-1967, to which the private sector joined efforts, organizing one large marketing cooperative for rice in 1969. Among the most noticed public actions were the government policy of agricultural diversification, the rationalization of the use of production credit, the installation of drying and storage facilities, and the launching of the National Rice Production Program.

Before entering deeper into the analysis of the rice industry problems and programs some consideration on land use and agricultural credit, production costs and prices are now presented.

Land Use

As mentioned earlier, figures from the 1970 Agricultural Census are not yet available; thus this presentation is based on the data from the 1963 Census. Accordingly, from a total of 5.4 million manzanas, about 40 percent of the Nicaraguan land was classified as agricultural; however, not all of this land is actually under cultivation. Only approximately 7.4 percent of the total agricultural land was used for annual crops, mainly cotton and food grains; 3.9 percent was devoted to permanent crops, especially coffee and sugar cane; and 37.2 percent was under grazing. For the country as a whole, the same census showed that 50 per-

cent of the total number of farms were less than ten manzanas in size, but only 3.5 percent of the total arable land was on these small farms. Tables II-4 and II-5 illustrate the situation.

Before the initiation of the National Rice Production Program in 1966, the production of the food grain came primarily from those small farms scattered throughout the entire country. Recently, with the attention paid to the rice industry and the absorption of capital investment and technology on the part of the rice producers, there are evidences that specialization in area and technification have changed the land structure of rice production, with the aid of the banking policy directing preferential credit to technically managed farms of at least 180 manzanas.

At the end of 1967 there were about 12.900 manzanas under irrigation system producing rice. In 1969, 70 growers with mechanized farms of 300 manzanas on the average controlled approximately 60 percent of the national production.

Financing

The National Bank of Nicaragua is the government institution responsible for credit financing and technical assistance to farmers. Including the Rural Credit Program which is directed exclusively to the peasant, the National Bank participates in more than 78 percent of the total credit devoted to agricultural production. Although it participates in somewhere around 50 percent of the credit for export crops --cotton, coffee, sugar cane--, this bank covers

TABLE II-4

NICARAGUA: MAJOR USES OF ARABLE LAND, 1963

Zone	Total Arable Land	Annual Crops	Permanent Crops	Pastures
	1000 Manzanas			
Pacific	1,165.4	236.6	97.8	830.9
Central	1,348.3	142.7	126.2	1,079.4
Atlantic	99.4	20.6	13.3	65.5
Total	2,613.1	399.9	237.3	1,975.8

Source: Agricultural Census 1963, National Planning Office.

TABLE II-5

NICARAGUA: DISTRIBUTION OF FARM AND LAND, 1963

Size	Number of Farm	%	Area 1000 Mnz.	%
- 10	51,936	50.8	190.1	3.5
10 to 49	27,976	27.4	614.1	11.2
50 to 199	17,240	16.8	1,447.6	26.5
200 to 999	4,474	4.4	1,544.8	28.3
1000 to 2499	405	0.4	563.3	10.3
2500 or more	170	0.2	1,101.3	20.2
Total	102,201	100.0	5,461.2	100.0

Source: Agricultural Census 1963, National Planning Office.

95 percent of the financing for the food grains in general. Table II-6 presents figures related to production credit conceded to rice farmers by the banking system in the crop years 1960 to 1970.

Observing Table II-6, it is found that there is a persistent tendency for the amount of credit to increase faster than the area benefited. This is so because of the increased total costs of production per unit of land incurred by the increasing number of irrigated farms participating in the rice program. Of the 37 thousand manzanas assisted by the banking system in 1969 the National Bank attended 34.7 thousand, and 20.7 thousand manzanas out of 21.8 thousand in 1970.

Since the initiation of the rice program in 1966 up to the end of 1970, the National Bank claims to have invested 73.5 million cordobas in infrastructure, farm machinery and equipment, and technical assistance for the industry. To the amounts invested annually, short-term loans must be added to estimate all the financial aid received by the rice producers.

Analysis of the annual balance of the National Bank, from 1967 to 1969, shows that the rice producers have had difficulties in repaying both short and long term loans[5]. In Table II-7 figures indicate that, in increasing fashion,

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5 Short term is considered to be one year, from May to April; and long term, more than 18 months.

TABLE II-6

RICE: PRODUCTION CREDIT, NICARAGUA 1960-1970

Crop Year	Amounts 1000 C$ 1/	Area Mnz. 2/
1960/61	6,500	15,602
1961/62	5,451	10,550
1962/63	8,056	15,053
1963/64	8,275	14,119
1964/65	9,568	12,334
1965/66	11,056	14,351
1966/67	15,603	17,283
1967/68	23,241	25,599
1968/69	36,025	37,213 3/
1969/70	23,407	21,824 3/

1/ Cordoba, equivalent to 0.14 dollar.

2/ Manzana, equivalent to 0.7 hectarea.

3/ The National Bank financed 34,664 and 20,726 manzanas in 1968/69 and 1969/70.

Source: Central Bank, Quarterly Reports 1970.

TABLE II-7

RICE: BALANCE OF CREDIT[1/], NATIONAL BANK, NICARAGUA
1967-1968-1969 NATIONAL RICE PROGRAM

	Total	Not overdue	Overdue
	Thousands Cordobas		
Short Term[2/]			
1967	10,033	4,554	5,479
1968	14,345	8,034	6,311
1969	18,809	11,536	7,273
Long Term[3/]			
1967	22,029	21,981	48
1968	32,039	30,399	1,873
1969	36,072	34,056	2,016
Total			
1967	32,062	26,535	5,527
1968	46,084	38,433	8,184
1969	54,081	45,092	9,289

1/ At December 30.

2/ 1 year or less, April to March.

3/ Usually 18 months or more.

Source: National Bank.

short-term overdue payment went from 5.5 to 7.3 million cordobas in only two years (1967-1969); in the same period, long-term overdue payment grew to two million cordobas, totaling 9.3 million. Problems of inadequate marketing coordination were argued to explain the failure of the farmers to meet their credit obligations.

In specific terms, the National Bank in 1971 recognized as the cause of overdue payment from rice producers, the quality deterioration of grains and loss of value resulting from lack of storage facilities. In addition, great negative impact was the result of the local commercialization of 500.000 hundredweights of rice introduced from El Salvador in 1968, under the free trade provision of the Grain Protocol for the Central American Common Market. CIAP, Subcommittee Nicaragua, in its report 472 in 1971, explained that the absence of coordinated policies between the National Bank and INCEI has brought economic losses to farmers, overdue payments to the bank, and distrust to INCEI.

It seems to be evident that the National Bank has concentrated efforts on expanding rice production; but on the other hand, lack of physical and financial facilities has impeded INCEI from fulfilling its buying function at the pre-set high price and stabilizing the markets.

Cost of Rice Production

In Nicaragua, the heterogeneous economic, social, and physical conditions in which rice production takes place make the calculation of average cost of production a difficult task. In addition, lack of farm records and data

on costs of substitute and complementary outputs makes the analysis even more difficult, in terms of opportunity costs.

Although the major production is obtained from large, modern plantations, one still finds small, traditional farms using human and animal force, in great contrast to the large machinery used on irrigated land. At present, the classification of methods of production used by the banking system accounts only for with and without irrigation.

Available figures in Table II-8 relative to variable costs suggest that, almost ten years after the initiation of the use of irrigation and mechanization and five years after the implementation of the National Rice Production Program, on the average, the new industry has not yet achieved the degree of efficiency necessary to justify the costly process of modernization of rice production. Deficient information released by growers and government agencies shows that the average costs of production per cwt are about the same with and without the irrigation program 22.2 and 20 cordobas, respectively.

As can be expected, the important differences in costs reside in a major use of chemicals --fertilizer, insecticide and weedkiller--, as well as improved seed and water supply, by large irrigated farms. If refined computation of costs included fixed costs, interest on capital and investment, and administration, it would present a clearer picture of the economic and social benefits in production derived from the implementation of the national program.

TABLE II-8

RICE: COSTS OF PRODUCTION[1/], NICARAGUA

	Without Irrigation			With Irrigation	
	Cordobas				
Soil Preparation	A	B	C	D	E
	95	180	100	146	127
Seed, seeding and weeding	45	110	172	170	245
Cultural practices/ Chem. and Applic.	327	250	241	564	613
Water Supply	-	-	-	130	171
Harv. and Transp.	115	160	260	215	243
Total	582	700	735	1,225	1,399
Yield (paddy)	26	35	35	55	65 [2/]
Cost C$/cwt	22	20	22	22	21

A = MAG Estimation, 1964; B and D, Central Bank Survey, 1968; C and E National Bank.

1/ Costs dont include land rent, interests, depreciation and administration.

2/ There are some large farms 500 Mnz. averaging 93 cwt/Mnz.

Source: Central Bank, MAG.

A suvey conducted by the Central Bank in 1968 indicated the existance of a few farmers who were averaging 93 quintals (cwt) per manzana[6]. This yield should be a realistic goal for the near future, to make profitable the efforts and investment made in this industry. Local experimental results indicate that, under medium fertilization level, the variety in use (Nilo 1) yields up to 139 quintals per manzana, and 125 on the average[7].

Technology and production costs are closely related. The principal purposes of adopting new technology are to increase output, given inputs; or to decrease cost per unit of output by using intensively some more efficient and cheaper inputs and releasing others. The important thing to consider is whether the reduction in costs per unit of output will offset the increase in total costs.

On a purely hypothetical basis, the situation of the rice industry in Nicaragua could be graphically represented as in Fig. II-1, where the curves labeled with a star stand for the average 300-manzana farm, mechanized and using modern inputs; the other curves correspond to the traditional ten-manzana rice farms.

Section (a) in Fig. II-1 shows how the adoption of new technology has shifted the production function upward from

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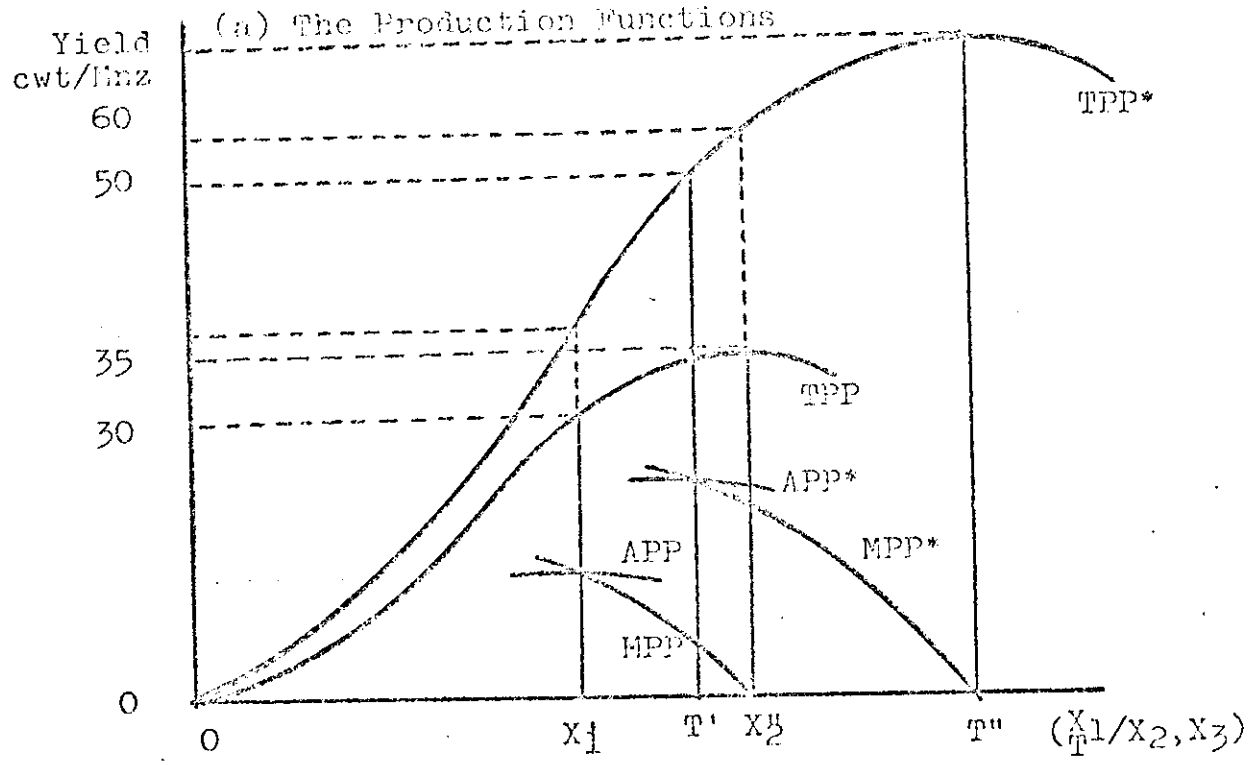
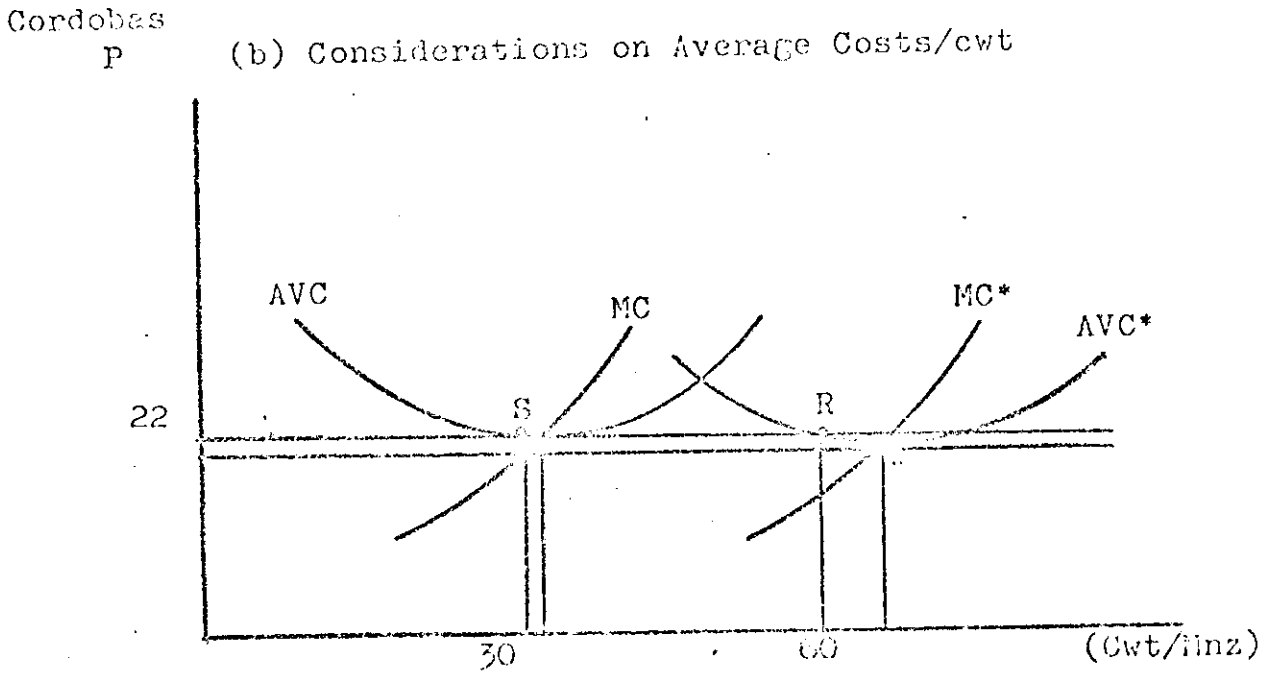
6 Luis A. Navarro U., El Arroz en Nicaragua, Special Report. (Managua, Nicaragua: Banco Central, 1968).

7 Gerald Trahan and Leonel Vaca, "Pruebas de Fertilizacion en Arroz 1968-1970", Research Report, Managua, Nicaragua, La Calera, 1970.

FIGURE II-1

THEORETICAL CONSIDERATIONS ON COSTS OF PRODUCTION OF RICE, NICARAGUA





TPP to TPP*, allowing the modern plantation to obtain a higher yield (40-55 cwt per manzana), using the same quantity of inputs used by traditional farmers between the range X_1' and X_2''. Even better, the new production function TPP* indicates that, if more inputs were used in the range between T' and T", the yield to be obtained could be greater than 50 or 60 cwt per manzana, depending on the real shape of TPP* curve.

Section (b) in the same figure is of importance in hypothesizing the average cost curves for traditional and modern farms. When considering these hypothetical curves, it is assumed that the similar variable costs per quintal presented in Table II-8 could be depicted by the points S and R, where R does not represent the point of lowest average variable cost for the modern farm. Finally, it is assumed that the lowest point (W) on AVC* could be obtained with more rational use of inputs, which would also permit an improvement in yields as indicated in section (a). A serious study is suggested to test the hypothesis and to guide properly the policy maker in dealing with the rice production problem in Nicaragua.

Milling

The quality of the rice is determined by two types of factors, the endogenous or inherent genetic characteristics and those exogenous factors, which depend on the handling of the product. Genetically, Nilo 1 (and Nilo 3) is a long-grain class variety, which is reasonably clean and meets cooking standards, but is susceptible to breakage during

milling. The exogenous variables, such as fertilization, insect and pest attack and control, maturity at harvest, milling process, drying, and storage, will be discussed in Chapter III. Since the local market does not demand high-quality rice, the present variety used and the processing practices have been found satisfactory. Becoming self-sufficient in terms of quantity has been the primary goal of the rice industry, and has made quality a secondary consideration.

In their study, Alexander and Efferson[8] reported that Nicaragua has approximately 60 rice mills, of which only 19 could be considered operational. The total annual capacity of the 19 mills, operating at maximum potential capacity, is estimated at 2.5 million cwt, enough to process the 2.0 million cwt estimated as the 1980 rice production. Analyzing samples from the mills processing for INCEI, an average yield of 67 percent was observed, which is lower than the 71 percent mill yield considered when handling other varieties, and adequately harvested, dried, and stored rice. On the average, the rice milled for INCEI contained 40 percent of broken grains.

Information supplied by the Cooperativa de Arroceros S.A. (CASA) indicates that the current mill cost is 4.12 cordobas per cwt of paddy, regardless of the yield and percentage of broken rice received by the rice owner. Table II-9 shows some milling and marketing costs as they are charged to the cooperative members.

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8 J. N. Efferson. H. Rouse and G.E. Hoffpauir, "An Appraisal of the Rice Industry of Nicaragua", Report to the Central Bank, Managua, Nicaragua, 1967.

TABLE II-9

RICE: MILLING AND MARKETING COSTS, CASA, NICARAGUA

	Variety of Seed	
	Nilo	IR-8
	Cordobas	
Costs per cwt:		
Milling	2.61	2.79
Packaging	1.12	1.18
Insurance (6 mo.)	0.04	0.29
Pests Control (6 mo.)	0.05	0.05
Sub-total	2.71	2.40
Total	6.83	6.71
Valorization:		
Cost per cwt (paddy)	36.84 1/	32.00 1/
Milling and handling	4.12	4.31
Financing	1.84	1.63
Fees Casa	0.87	0.77
Total	43.67	38.71

1/ INCEI prices.

Source: Cooperativa Arrocera S. A., Casa.

Pricing and Prices

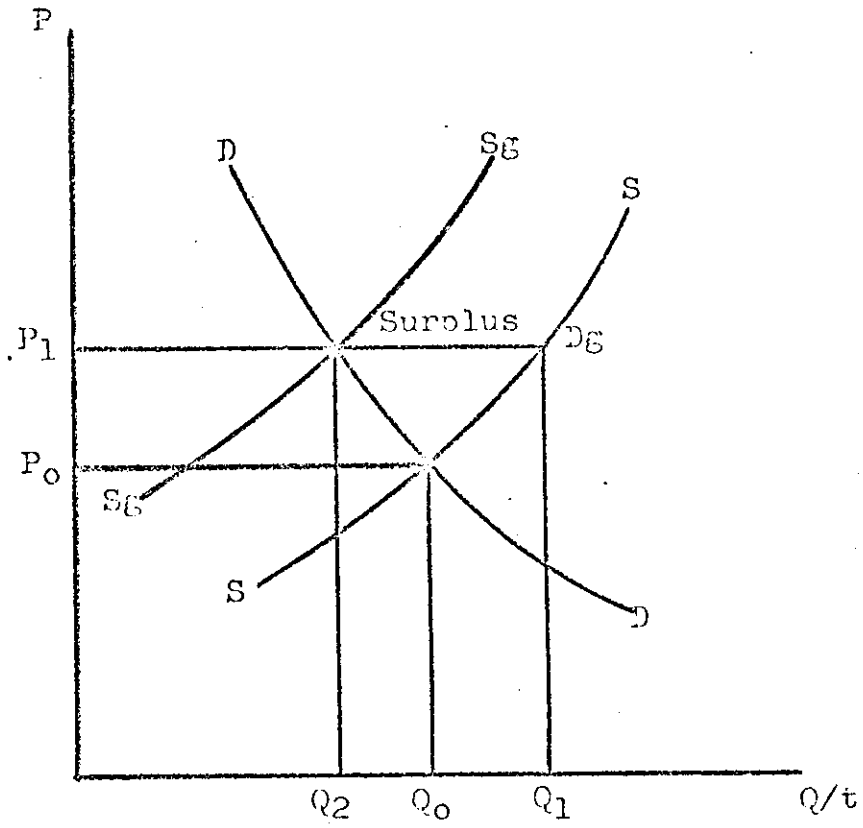
Insofar as pricing of food grain is concerned, the Nicaraguan market is a regulated competitive one. It is an imperfect competitive market, in the sense that the production sector is composed of atomistic farms producing homogeneous products with easy entry to the business and with growers and consumers acting independently without affecting market prices. But on the other hand, producers and consumers are not well-informed economic units and the perfect mobility of factors is a cuestionable matter. The food grain market is also a regulated one because of the government intervention by setting floor and ceiling prices for both producers and consumers.

Since its constitution, the National Institute for External and Domestic Commerce (INCEI) has been the government agency responsible for setting support prices, performing buying-selling functions in order to manage a sort of equilibrium situation at farm level, and stabilizing prices for consumers at the retail level. Figure II-2 explains how the adjustment process works in the regulated grain market in Nicaragua.

Given the elasticity conditions for the market supply of and demand for, let's say paddy rice at farm level, P_o could represent the equilibrium price under pure competitive market conditions. At this point, excess demand equals zero. For the Nicaraguan case, P_1 could be the regulated price for rice, which induces growers to produce up to Q_1 ghile the market would be willing to absorb only

FIGURE II-2

RICE; ADJUSTMENT IN THE REGULATED MARKET AT FARM LEVEL, NICARAGUA



Q_2, resulting in $Q_1 - Q_2$ as a surplus. At this point, a dynamic analysis indicates that competitive forces would try to depress market price to P_0, however, with the purchases made by INCEI at the support price, P_1 is maintained. The illustration also explains how, with the existence of prefixed prices, the effective demand facing the producers would be $D-D_g$ rather than the market demand D - D. The government purchases are used later to stabilize consumer prices when they begin to increase above a certain level.

According to its policy, some of the objectives aimed at by INCEI are the maintenance of farmer income level, the stimulus to production, and retail price stabilization. The trend observed in production in the last decade and presented in Table II-10 could be interpreted to be a result of the ever-increasing support prices levels offered to producers and usually anounced early every planting season. The same table also indicates the increase in prices paid by consumers from 63 cordobas per cwt in 1961 to 76 cordobas in 1970, representing an increment of 26 percent in the 1960's.

Figure II-3 depicts the important seasonal fluctuation characteristic of prices paid by consumers for milled rice during the calendar year. Obviously, the rice index price shows a marked seasonality, with a range of 7.5 percentage points from the seasonal low in March, harvest time, to the seasonal peak in August, when existing supplies are almost exhausted.

TABLE II-10

NICARAGUA: PADDY AND MILLED RICE PRICE, 1961-1970

	Floor Price 1/	Cons. Price 2/	Index F.	Index C.	Production 3/	Index
	C$/cwt		1961=100		1000 cwt	1961=100
1961	25	63	100	100	509	100
1962	25	65	100	103	506	99
1963	27	67	108	106	600	118
1964	29	67	116	106	651	128
1965	29	71	116	112	710	140
1966	36	76	144	120	826	162
1967	35	79	140	124	908	178
1968	36	77	144	122	1,107	220
1969	37	73	148	116	1,401	280
1970	37	76	148	120	1,474	290

1/ Floor Price set by INCEI for paddy rice.

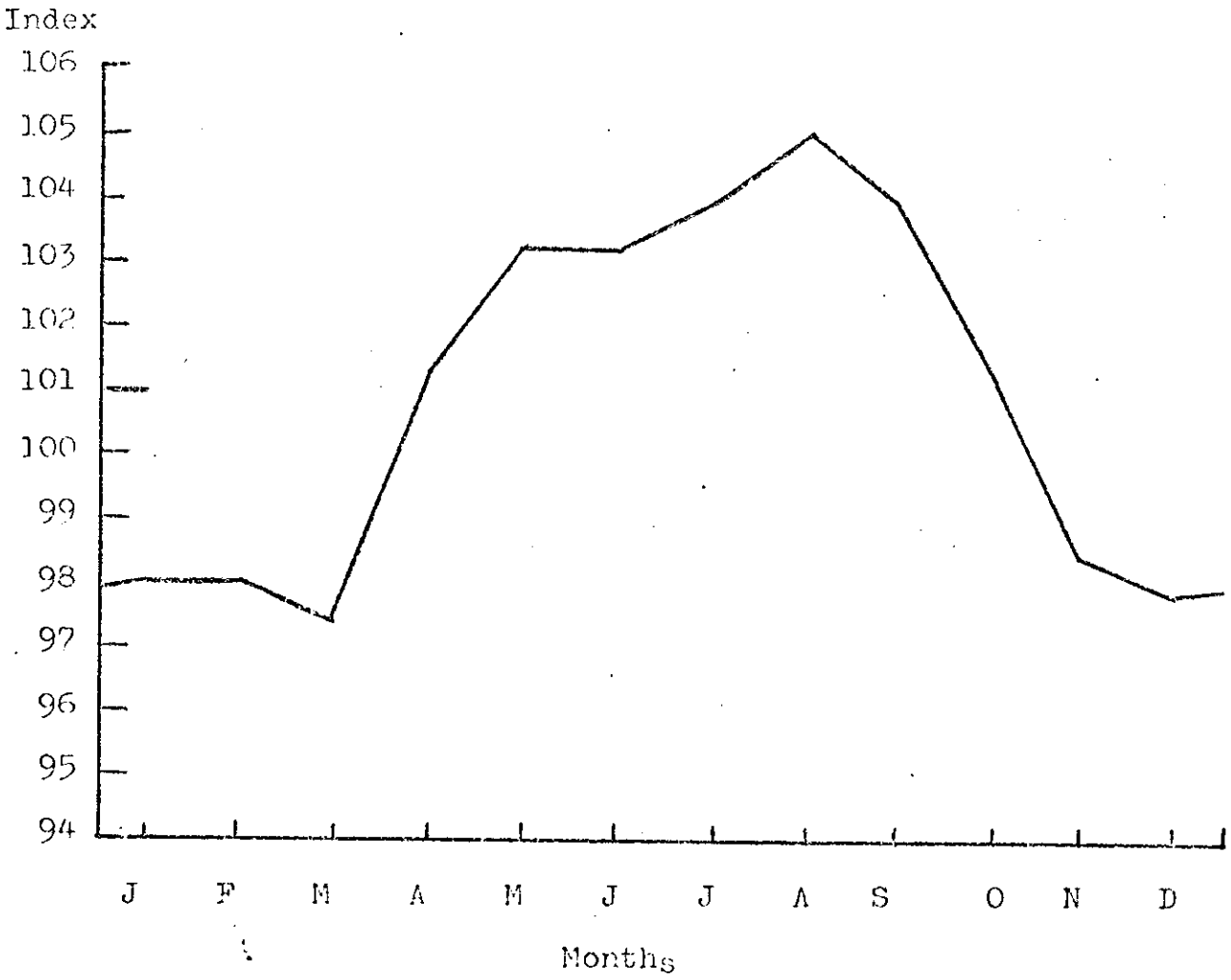
2/ Average price paid by consumers.

3/ Milled rice.

Source: INCEI, MAG, Central Bank, CASA.

FIGURE II-3

SEASONALITY IN RICE PRICE AT RETAIL LEVEL



Elaborated for this paper, based on monthly prices from 1961-1970, using the 12 month moving average method.

In the next chapter, an analysis is presented of some obstacles encountered during the production, processing, and distribution stages, which have delayed the development of the Nicaraguan rice industry.

CHAPTER III

MAJOR OBSTACLES TO FURTHER DEVELOPMENT OF THE RICE INDUSTRY

Introduction

Commercial rice production in Nicaragua has created the need to develop a distributive sector to bridge the gap between producer and ultimate consumer. However, this distributive sector should be the result of integrated economic development plans and not the spontaneous spring up in response to price incentives. Collins and Horton[1] questioned the validity of the assumption that firms providing marketing services will automatically emerge, and felt that if they do so, they probably will not provide the services most appropiate to the new production situation.

Market-oriented researches, after years of study and analysis of agricultural market coordinating problems, have defined market processes as the primary mechanisms in coordinating production, distribution, and consumption. Riley and Harrison[2] stated that the food system is a set of interrelated stages of productive activities, including manufacture and distribution of agricultural inputs; the farm production activities; and the assembly, storage processing, and distribution of food products to consumers.

1/ N. R. Collins and R. H. Holton, "Programming Changes in Marketing in Planned Economic Development," in Agriculture in Economic Development, edited by Carl Eicher and L.W. Witt (New York: McGraw-Hill, 1964).

2/ H. Riley, K. Harrison, and others, Market Coordination in the Economic Development of the Cauca Valley Region-Colombia, Research Report No.5, Latin American Studies Center, Michigan State University, 1970.

The primary objective of this chapter is to examine the major obstacles delaying further development of the rice industry in Nicaragua. This topic will be discussed under the framework provided by the comprehensive definition of agricultural marketing presented above.

First at all, it must be recognized that in Nicaragua, as in many developing countries, there exists a very limited supply of reliable statistical and this is the case in rice marketing problems. Most of the evidences of these problems come from interviews with leading rice producers, government officials, and businessmen, conducted by the different teams from Louisiana State University which appraised the rice industry in 1969-1970. Also, of relative value have been the field trips to representative areas of production and to other marketing agencies and institutions.

The Production Process

It has been concluded that one of the must serious problems of the rice industry in the short run is the dependency on one variety --Nilo 1--, which tends to yield a low quality of grain after milling. Certainly, Nilo type varieties, used in most of the irrigated farms in Nicaragua, are highly resistant to "Hoja Blanca", to blast (Pericularia oryzae), and to the major leaf spot disease of the country (Helminthosporium oryzae), but on the other hand, Nilo 1 matures in about 150 days and the local harvest time coincides with the heavy bird infestation period in February and March.

As mentioned before, of great importance is the relatively low milling yields this variety produces in terms of

whole or head rice. An analysis of the performance of 17 mills processing rice for INCEI in 1969, showed an average mill yield of 67 percent per cwt paddy rice and average of brokens of 40 percent. The same analysis indicated that with other varieties it was possible to reduce brokens to 20 percent. In the mean time, some reduction is still possible in Nilos to bring down the figure to 33 percent.

The rice experimental station has been working the last three years on introducing and adapting to local conditions other varieties and types of rice. But if in the near future there is no backstopping variety, the industry could enter a stagnation period.

With the increase in rice planted area, the pest problem and its control have also increased. Research in the use of chemicals to control Sogata orizicola, the leaf-hopper insect pest which does the most damage to the Nicaraguan rice crop, is very limited. Sogata actually causes damage in two ways, by sucking leaves, thus retarding the growth and development of the plants, and by transmitting the virus disease "hoja blanca" from plant to plant. Even though the significance of the insect problem in the rice industry is evident, ..."there are no basic facts available --not research results-- as to which insecticide to use, how frequently it should be applied, and in what volume. Thus many growers use heavy application at frequent intervals to control the insects, at a very high cost"[3].

In regard to the fertilization of rice, it was found

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3 J.N. Efferson, H. Rouse and G.E. Hoffpauir, op.cit.

that "the usual program for many large mechanized farms in Nicaragua includes the application of 100-200 lbs. of 10-30-10, ($N-P_2O_5-K$) per manzana at planting time, the application of 100-200 lbs. of Urea at 30-40 days after planting, and additional 100 to 200 lbs. of Urea 80 to 90 days after planting."[4]

Field observations apparently have shown that there is no practical justification or soil tests supporting this strong tendency to apply excessive nitrogen. In some cases, lodged rice before heading out was associated to overdoses of nitrogen, resulting in lower yields. Losses due to lodging in several cases have varied from 5 to 25 percent of the crop, depending on the severity of the lodging and weather conditions at harvest time.

Processing and Grading

It was mentioned above that the final quality of rice offered to domestic and export markets depends heavily on the variety of rice and milling process. In the case of Nicaragua, it was found that the Nilo types are not the most promising varieties, due to the tendency to break and low milling yields.

At present the average yield is about 66 pounds per cwt; approximately 27 lbs. are of head rice only, and 37 to 40 lbs. of brokens per cwt of dried paddy rice. The typical milling yield of long grain rice in the United States is 53-55 lbs. of head and 16 lbs. of broken per cwt.

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4 Ibid.

Mill equipment is an important factor influencing yields. Nineteen out of 60 mills are considered operational and according to the LSU[5] teams, the mills' records indicate that it is possible to reduce the percent of brokens of Nilos to 30 or 33 percent.

After some observation of the milling process, it was concluded that improvement could be made in the technique used, quality, and yields obtained. A 3 percent increase in yield on the commercial production of rice, 1.2 million cwt, would represent a substantial milled rice return to the entire industry.

Collins and Horton[6] pointed out that among the obstacles that may delay the development of the distributive sector, the primary one is the absence of grading systems and standard weights and measures to simplify the negotiation process among firms and the legal transfer of property rights.

In Nicaragua, buying standards for husked rice are based only on moisture and on foreign matter content of the grains. Yields and the performance of paddy rice in the milling process, qualities which are intimately related to genetic characteristics of the grains, are not considered. INCEI is now preparing a program of sampling rice to determine the qualities called for in its price support program before paying for the rice, and to offer more incentive for better quality, which is badly needed for domestic use and potential

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5 Louisiana State University.

6 N. R. Collins and R. H. Holton. op.cit.

exports. Thus, announced support prices in Nicaragua call for a minimum quality of rice, but with the exception of standars based on moisture and foreign material content, they are not being enforced. Growers, therefore, have not had motivation to emphasize production of quality grains.

Storage and Drying

Storage of grain becomes necessary to take advantage of seasonal variations in prices, to reduce losses from spoilage, to bring about the stabilization of prices, and to supply suitable amounts of rice and other grains throughout the year. In the case of Nicaragua, storage is also a partial solution to the problem of poor road conditions during the rainy season, June to December, in which it is difficult to transport the grains to the mills and to the markets. Drying problems go parallel to these of storage.

As mentioned in Chapter I, studies made by the Banco Nacional and INCEI in 1968 showed that only though the expansion of sales and the availability of proper drying and storage facilities can the farmers generate the income necessary to purchase modern inputs and chemicals and additional farming equipment, thus increasing total agricultural productivity of the country. Losses of grains due to mold, insects, diseases, and rodent attacks and quality losses in processing improperly dried grains were estimated to be as high as 30 percent.

Limited and poor drying and storage conditions have recently been alleviated by the installation, in 1971 of 100 new agricultural centers and five grains elevators re-

cently constructed by INCEI and the Banco Nacional. Each center is adequate for drying and storing basic grains and coffee. The average rice presently purchased and stored by INCEI is approximately 68 percent of total production. The remainding 32 percent is handled by small producers, who customarily dry rice in the sun, reducing milling yields calculated by about 5 percent.

The 1970-71 estimated grain production in Nicaragua was 9.5 million cwt of rice[7], maize, beans, and sorghum. It was estimated[8] that a total of 5.1 million cwt of grain was consumed in rural areas that amount included grain eaten by farmers and livestock, that used for seed, and farm losses. The remaining 4.4 million cwt were expected to be sold on a commercial basis and would require adequate drying and storage. Table III-1. The total available facilities to provide those services for the grain production in the entire country, after the completion of the 100 agricultural centers and terminal elevators in 1971, would be approximately 4.3 million cwt. This represents a capacity shortage of about 80,000 cwt. Improvement in handling and future increases in grain production will aggravate the storage and drying problem in the short run, unless additional facilities are provided.

Transportation

The role transportation plays in coordinated market

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7 Calculated on milled base.

8 J.N. Efferson, H. Rouse. op.cit.

TABLE III-1

NICARAGUA: ESTIMATED GRAIN PRODUCTION AND STORAGE CAPACITY FOR 1971

Grain	Total Production	Commercial Production	%	Storage Capacity BNN INCEI	Storage Capacity Private
	1 0 0 0 cwt				
R i c e	1,430	1,398	90	n. a.	n. a.
M a i z e	5,500	2,376	45	n. a.	n. a.
Sorghum	1,518	154	10	n. a.	n. a.
B e a n s	1,012	550	55	n. a.	n. a.
				3,392[1/]	910.0
Total	9,460	4,378		4,302	

1/ Estimate for 1971

Source: "A study of Agricultural Marketing Problems and Potentials in Nicaragua", LSU Report, 1969. INCEI Application for a Loan to EXIMBANK, 1968.

development was clearly stated by Riley and Harrison in their study of agricultural marketing problems in Cali, Colombia, in 1970: "The transportation function becomes increasingly important as new technologies lead to greater geographic specialization in agricultural production while at the same time there are rapid increases in urban population. Under these conditions "place utility" becomes a more important component of the commodities purchased by both urban and rural consumers."9

In Nicaragua, the major means of transportation to move agricultural commodities and other products are railroads and trucks. Air transportation is used only in specialized cases such as refrigerated meat for export; in contrast, mule-back and oxen-driven carts are used in the areas in which modern modes of transportation are not available.

Railroad

Until about 1952, the railroad system in Nicaragua was the most important means of transportation. It connects the principal cities along the Pacific Coast from the lake city port, Granada, to Corinto, the major port on the West Pacific Coast. In operating its 317 kilometers of tracks, for the past decade the railroad system has been constantly losing freight to the trucking industry, and is now under subsidy by the government. In the period from 1960 to 1969, the Ferrocarril del Pacifico de Nicaragua (F.C.del P.de N.) decreased by 50 percent the net metric tons moved and decreased tons/kilometers moved by 38 percent, as shown in Table III-2. In 1970 some recuperation appears to have taken place.

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9 Riley and Harrison, op.cit., p. 274.

TABLE III-2

RAILROAD FREIGHT MOVEMENT, NICARAGUA

	1960	1965	1969	1970
		Thousand Units		
Net M. T.	282	162	136	126
Tons/Kms.	22,605	13,057	13,203	16,367
Income (C$)	6,024	3,25o	2,718	2,960

Source: Central Bank of Nicaragua, Annual Report 1970.

Currently, the service the F.C. del P.de N., provides to the agricultural sector is reduced to the transportation of some export products to the harbor of Corinto. It also moves fertilizers and other chemicals from Corinto to mixer plants located in Leon and Managua.

Highways and Trucks

In Nicaragua, trucks move almost the entire commerical production of food grain from farms to milling plants, to INCEI, and to local markets. Certainly, the road system in the last 20 years has expanded rapidly from 1,880 kilometers in 1950 to 11,420 kilometers in 1970. Of great contrast was the existence of only 150 kilometers of paved road in 1950, in comparison to 1,383 kilometers in 1970. Still more important is the development of 4,021 kilometers of all-weather roads, which allow part of agricultural production to enter into the distributive process. Table III-3.

A majority of the roads in Nicaragua are located in

NICARAGUA; HIGHWAY SYSTEM AND DISTRIBUTION BY ZONES 1950-1970

Road Type	1950	1955	1960	1965	1970	1950	1955	1960	1965	1970
	Kilometers					Percentage				
Paved	150	280	674	967	1,383	8.0	7.7	10.9	11.3	12.1
All weather	330	707	1,892	2,926	4,351	17.6	18.5	30.4	34.2	38.1
Dry season 1/	1,400	2,700	3,599	4,655	5,686	74.4	73.8	58.7	54.5	49.8
Total	1,880	3,687	6,156	8,548	11,420	100.0	100.0	100.0	100.0	100.0
Zone	1965	1967	1968	1969	1970	1965	1967	1968	1969	1970
	Kilometers					Percentage				
Pacific	4,541	5,488	5,657	5,878	5,957	53.1	55.0	54.1	54.3	52.2
Central	3,236	3,620	3,855	4,002	4,492	37.8	36.3	37.0	37.0	39.3
Atlantic	771	874	937	937	971	9.1	8.7	8.9	8.7	8.5
Total	8,548	9,982	10,449	10,817	11,420	100.0	100.0	100.0	100.0	100.0

1/ Dry season lasts from December to May.

Source: Central Bank of Nicaragua, Annual Reports 1969 and 1970.

the heavily populated areas in the Pacific and South Central region, and most of them have easy access to the Pan American Highway, which connects Nicaragua with the neighboring Central American countries.

The trucking industry has grown along with the development of the highway and road system. At present, it is estimated that the country accounts for 11,150 units vans, pickups, and heavy trucks. Eighty-five percent operate in the Pacific Coast, 14 percent in the Central area, and only 1 percent in the Atlantic region.

The role played by the trucking system in moving agricultural products and farm inputs is increasing rapidly. In terms of freight transported, the figures show 202 million tons/kilometers were hanled in 1960 and 606 million in 1970.

In spite of the development mentioned, most of the problems connected with the automotor transportation service are caused by the absence of standardization in freight charges among truckers moving agricultural commodities; the lack of adequate penetration roads, particularly in the Central and Eastern areas; and improper maintenance service for the existing road system. These bottleneck are still responsible for significant losses in quality and quantity of food grains. Thus, there exists a need for the government to accelerate the implementation of projects and to establish legislation to create more competence among truckers to provide a better transportation service.

Wholesaling and Retailing

Unfortunately, a detailed study of the economics of sholesaling and retailing of food in Nicaragua has never been conducted. There is no information on institutions or human agents providing those kinds of services; nor is there information on credit, costs, and opportunities for change and improvement, etc.

In general, the food grain distribution system in Nicaragua, as in most developing countries, consists of a large number of low volume outlets. The evidence indicates that the situation described by Riley and Harrison[10] for the food distribution system of Cali, Colombia, could be used to describe the situation in Nicaragua. Figure III-1 is an attempt to present the market channels for grain in general. There are no statistical figures available to indicate volumes that flow on them.

It is without question, however, that there exists an increasing lack of adequate handling, packing, storage, and sanitary facilities when the grains approach the consumer level. An in depth analysis should be made to derive suggestions and policies to overcome this situation, which could even endanger the public health.

Price Support Program

As mentioned in Chapter II, price stabilization of basic grains in Nicaragua is the responsibility of INCEI[11].

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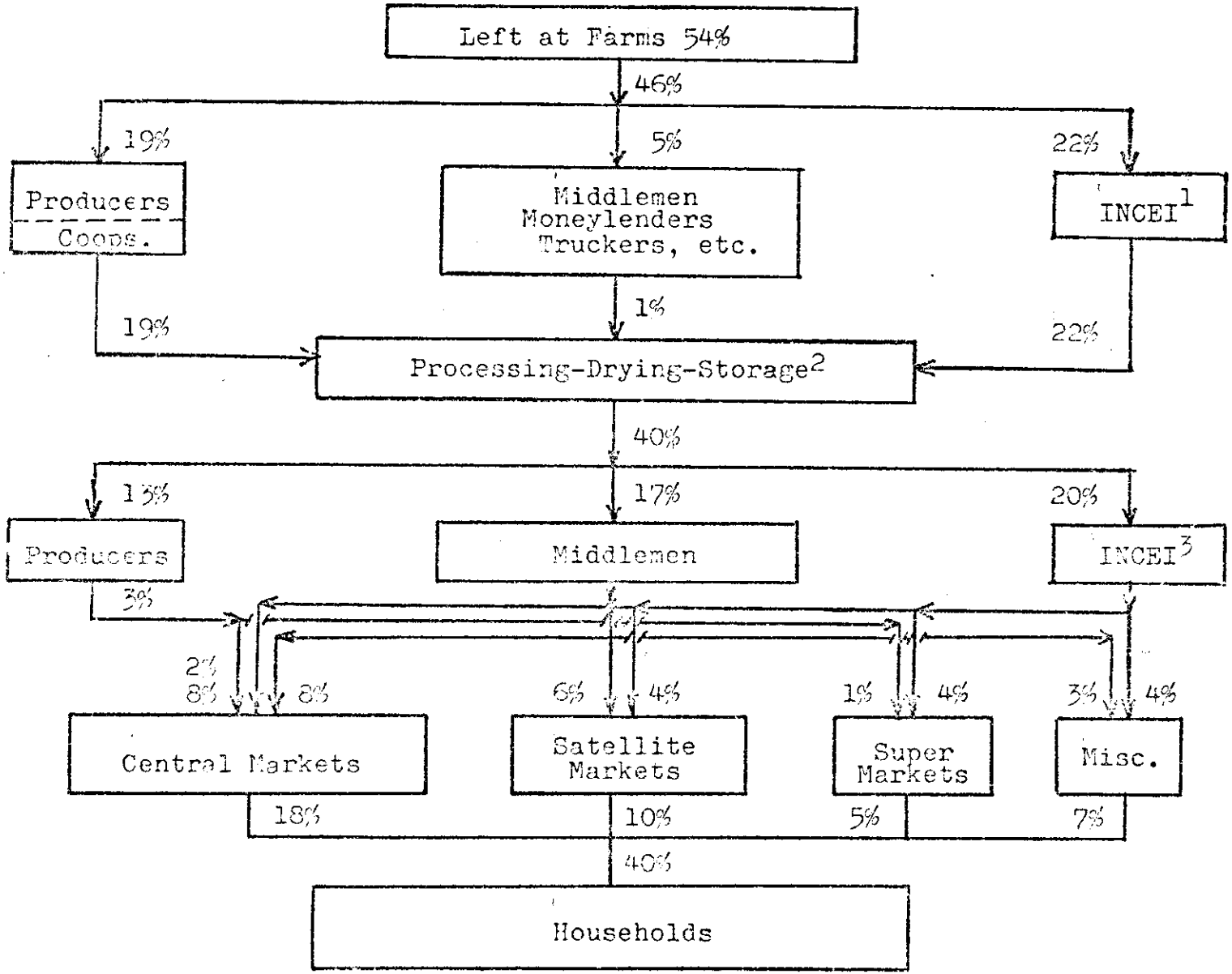
10 Riley, Harrison and others, op.cit.

11 INCEI = National Institute for External and Domestic Commerce.

FIG. III-1

COMMERCIAL GRAINS PRODUCTION CHANNELS

NICARAGUA



Like any other price regulating agency in the CACM[12] countries, it is a non-profit, autonomous government agency operating as a special wholesaler. INCEI must buy grains which are locally produced and offered to the agency for sale, and must also carry over larger stocks of grains when supply is abundant. When supply is scarce, on the other hand, INCEI is committed to sell at fixed maximum prices, where commercial wholesalers and operators can hold them in the expectation of more "favorable" prices. In recent years INCEI has handled from 60 to 70 percent of the rice production, 7 percent of maize, and 2 percent of beans.

The performance of INCEI, in stabilizing both prices received by producers and those paid by consumers, has been far from expected in the last five years.

As discused in Chapter II, increasing floor prices offered by INCEI and the simultaneous open credit policy on the part of the National Bank, initiated in 1967, did stimulate the whole grain production in such a way that the physical and financial resources of INCEI were, in two successive years, insufficient for its buying function within the price stabilization program (See Table II-10). In those years, the average prices at farm level for rice and the other grains were lower than those announced by INCEI; however, prices paid by consumers were not lower than expected.

In summary, prices have not been stable, producers in-

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12 CACM = Central American Common Market.

curred losses, and in 1969 the total grain production diminished --principally in maize--, creating distrust for the government agency. In the specific case of rice, disappointed large and prosperous farmers constitued in 1969 their own Cooperativa Arrocera, S.A., (CASA), aimed at the organized commercialization of the rice industry. After three years of operation, CASA now handles about 80 percent of the total rice production[13].

To overcome its own problems and to recover the confidence of the farmers, beginning in 1970 INCEI developed new policies, changed philosophy, and improved its managerial and administrative personnel. It is also negotiating with local and foreign agencies and banks for more funds for the stabilization program.

On the other hand, drying and storage facilities have been installated strategically in the production and consumption areas, and better skilled personnel have been hired. The new policy being enforced is framed within the provision of the CACM agreements, and careful consideration is given to the policies practiced by the other Central American price stabilizing agencies.

INCEI in Nicaragua is the only agency empowered to make imports from countries other than those of the CACM, after consultation with the other similar agencies in the

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13 CASA sells rice for its members on a contract basis. The cooperative is now representing its members when obtaining banking credit and when buying inputs and services or selling the product.

Isthmus.

The Central American Common Market and the Food Grains

At the moment of the initiation of the process of economic integration of the five Central American countries at the end of the 1950's, nobody doubted the importance of solving agricultural problems collectively and enlarging the markets for local production of both agricultural and industrial commodities. However, more than ten years later, the total balance indicates that the CACM has has a smaller direct on agriculture than on any other sector.

Most of the problems inventoried early in 1961, when the Multilateral Treaty of Central American Free Trade was established, are the same blamed today for impeding regional agricultural development. Low productivity, a disorganized storage and market system, unstable prices, inadequate land tenure, and absence of farm education are still on the list.

Common efforts for improving and developing the food-grain production and marketing within the CACM are:

a. Free Trade. With the exclusion of wheat, but including rice, most of the agricultural products now fall under Free Trade provisions.

b. Marketing and Price Stabilization Coordination Committee. This committee was established by the local regulating institutes with the following aims: to establish grain guaranteed prices for CACM exporting countries; to work toward coordinated guaranteed prices for grain purchases, to construct a regional storage system, and to examine internal and external financial possibilities for the operation of the price stabilization program.

c. Basic Grains Protocol. Ratified in 1967, it represents an attempt to stabilize prices of grains and to prevent grains from outside the CACM region from competing with those of the region.

Since 1958, the Common Market planners have placed greater emphasis on industrial development --in contradiction to Professor Rostow's approach--, and indeed, investments have proven to be more fruitful in the industrial sector, where such investment has been concentrated.

Along this line, an important warning note on the Primary-Secondary sectors relationship in the CACM made by the Battelle Memorial Institute recently stated that: "Of greater potential danger is the harm that can be done to agriculture by grating protection to locally manufactured products needed by agriculture. The establishment of the insecticide industry in Nicaragua, with consequent benefits in regional production and increased external duties, poses a significant threat to cotton producers of the region, coffee, rice and vegetable producers, and producers of other crops which are beginning to use increasing amounts of insecticides. The price charged for the Nicaraguan product is higher than of imported insecticides, and when used in large quantities could represent a considerable total cost increase. A rise in the cost of food products, along with a general rise in the cost of living, affects people personally, and their discontent is usually expressed in political terms."14

After considering some of the major problems delaying the development of the rice industry in Nicaragua, estimation are presented in Chapter IV to forecast supply and demand for this commodity to 1975 and 1980. In the last part of the chapter contains a brief analysis of the prospects for export.

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14 BMI, op.cit.

CHAPTER IV

SUPPLY AND DEMAND CONSIDERATIONS

Introduction

Forecasting is an important aspect of the strategy of planning, which permits an analysis of the use and allocation of available resources to meet specific objectives over time. However, in Nicaragua, the Planning Office, which is responsible for projecting domestic demand for food and other agricultural commodities, and for preparing programs designed to meet the production goals, has not produced plans in recent years. This office, isolated from the governmental decision process, was transferred last year from the Ministry of Economics to the Office of the President, in an effort to improve the planning performance and increase its influence in the decision-making process.

Relative to rice production in Nicaragua, two of the more recently published studies on the present situation and projections of supply and demand for rice to 1975 and 1980 are: Projections of Supply and Demand for Selected Agriculture Products in Central America Through 1980, by Battelle Memorial Institute (BMI), prepared for the USDA in 1969; and Agricultural Commodities Projections, 1970-1980, published by the Food and Agriculture Organization of the United Nations (FAO) in 1971.

Thus, the objective of this chapter is to analyze the prospects of supply and demand for rice in Nicaragua and their projections to 1975 and 1980. Another set of projections estimated for this research paper is also presented.

The last part of the chapter contains some considerations of the potentials for export.

Demand and Projections

The relationship between the consumption of a food product and the factors that affect consumption is designated the demand function. According to the economic and demand theory, the most important factors of demand are: price of the product, population growth, age distribution, per capita income, and prices of substitutes and complements. Other factors influencing the dynamic demand functions are size of the household, frequency distribution of income, advertising, product innovation, knowledge about nutrition and health, occupation, education, beliefs and values, taste, and others.

According to Nasol,[1] knowledge of the structure of demand for a particular food is important, especially in the development of workable production and marketing strategies. A knowledge of the relative magnitude of the elasticity of demand, with respect to both price and income, is useful in determining to a large extent the changes in the industry revenue as the quantity marketed varies. While prices and income are significant, the rapid increase in population and urbanization are more determinant of the future demand for rice -and food in general- in most developing countries, as well as in Nicaragua.

1/ R. L. Nasol, "Demand Analysis for Rice in Philippines", Journal of Agricultural Development, Philippines, Vol.I,No.1 (January 1971), p.1.

In regard to population and gross domestic product per capita in Nicaragua, Table IV-1 part (a) contains this information for the period from 1960 to 1970. Figures supplied by the Central Bank indicate that during the decade, the population grew at an annual average rate of 3.3 percent, from 1.4 million people in 1960 to almost 2.0 million in 1970. At the same time, gross domestic product per capita presented an annual average growth rate of 3.8 percent, from 247 dollars to 357 dollars. Part (b) presents similar figures, elaborated by Battelle Memorial Institute (BMI)[2] relative to population and GDP per capita in Nicaragua.

1970-1980

In its analysis of the demand side of the rice industry for each of the Central American countries, the Battelle Memorial Institute based its methodology on data dealing principally with population and income. In the case of Nicaragua, as well as for the other countries, one important assumption was that population growth will lead to a proportional growth in the demand for rice and other food products.

Projecting demand figures, BMI established the increasing annual average rate of urban and rural population at 5.0 and 2.6 percent, respectively, during the period from 1963 to 1980. Thus, projected population figures resulted in 2.41 million people by 1975 and 2.86 million by 1980. So far, 31 lbs. per capita demand for rice in 1962, taken as the base period, was the central information used to project the total

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2/ BMI, op.cit.

TABLE IV-1

NICARAGUA: GROSS DOMESTIC PRODUCT PER CAPITA
1960-1970, AND PROJECTIONS TO 1975 AND 1980

Year	(a) Population 1000 Inh.	GDP/c Dollars
Central Bank		
1960	1,411	247
1961	1,453	250
1962	1,496	279
1963	1,541	296
1964	1,597	327
1965	1,655	343
1966	1,715	341
1967	1,777	352
1968	1,842	345
1969	1,909	352
1970	1,975	357
Annual Average Compound Rate	3.3 %	3.8 %
B. M. I.		
1960	(b) 1,425	256
1965	1,663	295
1970	2,011	307
1975	2,407	348
1980	2,856	421

Source: Central Bank, Annual Report 1970, and BMI, Projections of Supply and Demand for Selected Agricultural Products in Central America Through 1980, USDA, 1969.

demand figures presented in Table IV-2. The total projected demand for rice, obtained by multiplying projected figures of population and per capita consumption, was estimated at 792,000 cwt for 1975 and 990,000 cwt for 1980. When the income elasticity of demand for rice in Nicaragua, calculated at 0.5, was taken into account, the projected figures were 880,000 and 1,100,000 cwt for 1975 and 1980, respectively.

In its 1971 issue of projections of supply and demand for most agricultural commodities and countries, FAO presented a different, set of figures for rice in 1975 and 1980, as shown in Table IV-3.

As a general approach, the demand for rice --and for all other foods,-- was projected at constant 1970 retail prices, on the basis of the growth in per capita income and population. In the final computations, a multiple regression equation of the form $q = a + bp + cy + zt$ was used; where q is the quantity demanded, p is price, y is income, and t is time.[3]

For Nicaragua, total demand for rice in 1975 and 1980 is estimated at 1.2 and 1.5 million cwt, respectively; these projections also represent an increment in the per capita consumption of 3 lbs. for the projected population of 2.4 million people in 1975, and 7 lbs. for the 2.8 million people in 1980.

Projections of the demand for rice in Nicaragua were

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3 The introduction of the parameter t or trend factor was an attempt to take globally into account the impact on demand of changes in consumer preferences, urbanization, income distribution, etc.

TABLE IV-2

RICE: DEMAND PROJECTIONS TO 1975-1980 BY BMI
NICARAGUA

Per Capita Demand	Total Demand					
	1970		1975		1980	
1962	A	B	A	B	A	B
31 lbs.	1000 cwt					
	638	682	792	880	990	1,100

	Population Projections			
	1000 inhabitants			
Urban	607	901	1,145	1,438
Rural	892	1,110	1,262	1,418
Total	1,499	2,011	2,407	2,856

A = Total population times 31 lbs. per capita

B = It takes into account 0.5 as income elasticity of demand for rice in Nicaragua.

Source: BMI, Projections of Supply and Demand for Selected Agricultural Products in Central America Through 1980, USDA, 1969.

TABLE IV-3

NICARAGUA: POPULATION, GDP/C, AND TOTAL DEMAND FOR RICE PROJECTIONS, 1975-1980 BY FAO

	Population 1000 Inh.	%	GDP 1/ Per Capita Dollars	%	Consumption/c. Lbs./c.	Total Demand 1000 cwt
1955	1,292	-	293	-		-
1960	1,501	3.0	282	-0.7	43.3	-
1965	1,745	3.1	376	6.0		548.0
1970	2,021	3.0	402	1.4	45.3	924.0
1975	2,373	3.3	442	1.9	48.8	1,166.0
1980	2,818	3.5	479	1.7	52.8	1,474.0

1/ At 1970 constant market prices.

Source: FAO, Agricultural Commodities Projections 1970, 1980, Vol. II, Rome 1971.

also elaborated specifically for this research paper, from data supplied by the Central Bank and the National Bank of Nicaragua. Total demand was calculated by multiplying the projected population figures for 1975 and 1980 by the expected per capita consumption of rice for those years. Per capita consumption was assumed to remain close to the 1970 level of 59 lbs., consistent with the nutritional average requirement of 55 lbs., for an adult in Central America.[4] Total demand for rice in 1975 was estimated at 1.41 million cwt, and 1.65 million cwt for 1980 (Table IV-8).

Supply and Projections

Supply theory states that the quantity of a commodity offered for sale is partially a function of its own former and expected prices. Other, no less important, factor are expected input prices, prices of substitutes and complements in production, and changes in technology.

At any given point in time, commodity supply is composed of current production, carry-in stock, plus net foreign trade of the commodity. In the case of Nicaragua, the upward trend of both floor prices for paddy paid to farmers by INCEI and prices for milled rice paid by consumers has provided the incentive for expansion of land resources use in rice, resulting in constantly increasing production (Table II-10).

Figures pertaining to government and private stock of rice are not available. However, it is not ignored that the

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4 Marco A. Ramirez, Los Alimentos en Centroamerica (San Salvador, El Salvador: Secretaria General de la Organizacion de los Estados Centroamericanos, 1968).

government stock is a function of the level of the floor prices set by the regulating institution in each Central American country and the conditions of free trade existent in the Isthmus under the provision of the Special Protocol of Basic Grains,[5] approved in 1965 and ratified in 1966. The annual average stock INCEI held in the period 1968-1970 was 280,000 cwt of equivalent milled rice[6].

As a result of the process of diversification of the agricultural production and resources use, the design of a specific program for rice, and the price support plan, in addition to the responsiveness of the private sector, Nicaragua has fulfilled the important goal of self-sufficiency in the production of rice. The total amount of rice available for --apparent-- consumption, derived from the addition of the net commercial balance --export/import-- to the annual production, indicates that the per capita intake rose from 31 lbs. in 1960 to 59 lbs. in 1970, representing an increment of 92 percent Table IV-4.

In the study of the current situation for rice, one critical question is to be raised: Can and should Nicaragua go forward in producing rice after meeting the domestic demand and nutritional requirement?. The answer is not a simple one. Many factors must be analyzed before an answer can be given.

Production Prospects

In a study conducted by a team from Louisiana State

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5 Protocolo Especial sobre Granos, Costa Rica, 1965, SIECA/COMEP/IV/D.T. 3. Guatemala.

6 Direct information supplied by INCEI.

TABLE IV-4

RICE: PRODUCTION, AND APPARENT CONSUMPTION; NICARAGUA

Year	Production	%	Imp.	Exp.	Apparent Consumption	%	Population 1000 Inh.	Lbs./ Capita
	Thousand Quintals							
1958	385	-	53	12	426	-	n. a.	n. a.
1959	402	5.1	10	52	360	-15.5	n. a.	n. a.
1960	448	11.4	-	15	433	20.2	1,411	30.6
1961	509	13.7	121	10	620	43.1	1,453	42.8
1962	506	- 0.6	71	78	499	-19.6	1,496	33.2
1963	600	18.6	81	22	659	32.0	1,541	42.4
1964	651	8.5	192	21	822	24.9	1,597	51.0
1965	710	9.1	200	5	905	10.1	1,655	54.9
1966	826	16.4	286	46	1,112	22.8	1,775	62.7
1967	908	10.0	248	2	1,154	3.8	1,777	65.0
1968	1,107	20.2	120	39	1,188	2.9	1,842	65.0
1969	1,401	26.4	93	123	1,371	15.4	1,909	71.8
1970	1,474	5.2	100	417	1,157	-15.6	1,975	58.6

Source: Central Bank of Nicaragua.

University in 1969,[7] it was found that Nicaragua still possesses more area of easily irrigated, fertile alluvial land adaptable to efficient mechanized rice production than any of the other countries in Central America. In fact, the team observed that present production could be expanded by 50,000 manzanas in the areas located between the lakes, east of Lake Nicaragua, and east of Leon. In addition, the rural people around those areas have had experience in mechanized agriculture because of the development and mechanization of cotton and sugar industries in border areas during the past two decades.

The team concluded that with the mentioned natural and human resources, there exists a good prospect that Nicaragua could become the major producer of rice for the Central American Common Market area and, in addition, produce extra rice for export to the high quality, long-grain markets in Europe.

1970-1980

Battelle Memorial Institute (BMI), in the same study prepared for the USDA in 1969,[8] which analyzes the economic situation and development and prospect of Nicaragua, also presents projected supply figures for 1975 and 1980 for most of the agricultural products.

The methodology used by BMI in projecting area harvested was based on the assumption that the area grown in each country, expressed as a percentage for the Central American region, would follow some kind of trend. The percentages

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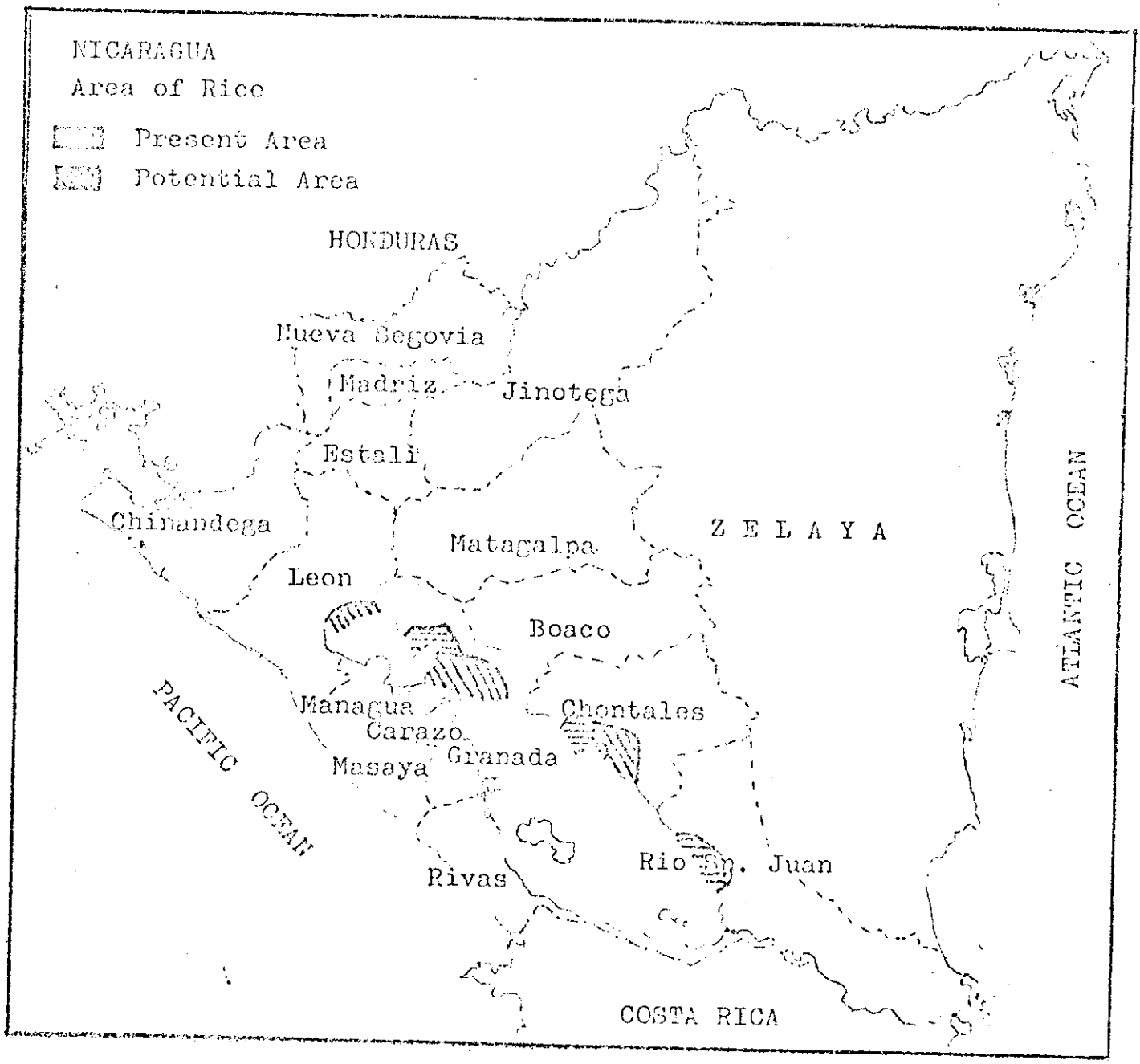
7 Efferson, Rouse, and Hoffpauir, op.cit.

8 BMI, op.cit.


NICARAGUA
Area of Rice
Present Area
Potential Area
HONDURAS
Nueva Segovia
Madriz
Jinotega
Estali
Chinandega
Matagalpa
Z E L A Y A
Leon
Boaco
Managua
Chontales
Carazo
Masaya
Granada
Rivas
Rio San. Juan
PACIFIC OCEAN
ATLANTIC OCEAN
COSTA RICA

were calculated as averages for the periods 1955-1957 and 1962-64. Then, the projected percentage estimated for Nicaragua was multiplied by the total area harvested projected for the entire region. Average yields were also calculated for the same periods and the differences between them were the primary criterion used in projecting future yields. Finally, production projections are merely the product of projected area harvested times projected yield, representing 577,700 cwt of rice in 1975 and only 623,500 cwt in 1980.

TABLE IV-5

RICE: AREA, YIELD AND PRODUCTION, NICARAGUA AVERAGE 1955-57 AND 1962-64, PROJECTIONS FOR 1975 AND 1980

	1955-57	1962-64	1970	1975	1980
Area (Mnz.)	29,160	28,940	29,400	28,980	30,520
Yield (cwt/Mnz.)	13.2	17.3	19.2	20.0	20.5
Production cwt	381,800	499,100	563,400	577,700	623,500

Source: BMI, Projections of Supply and Demand for Selected Agricultural Products in Central America Through 1980, USDA, 1969.

In connection with the low production figures projected by BMI, a questionable point arises, concerning the methodology used in forecasting aggregate harvested area of rice and then determining an estimated percentage for each country. Another point of consideration has to be that these estimations were based on information before 1965-1966, when Nicaragua entered the new rice production situation with the national program.

Considering conservative and out-of-date projections

of rice production and yield prepared by BMI, and in the absence of data from FAO, specific production projections were also made for the purpose of this research paper, from revised information supplied by the Central Bank.

In the official figures contained in Table IV-6, it can be noticed that the production projection of 623,500 cwt of rice made by BMI for 1980 (Table IV-5) was surpassed early in 1964. Observing the whole time series data for the period 1956-1970, it is precisely in 1963/64 where production, area, and yield begin increasing faster as a result of the initiation of the modernization process in the rice industry and the implementation of the national program for rice supported by both government and growers.

Taking the modernization of the rice industry and the initiation of the rice program as a land mark, two definite periods can be distinguished, before and after 1964. In calculating the projected production figure for rice for Nicaragua, the ordinary least square regression model was applied to the time-series of production and yield for 1956-1970. For area and yield trend, depicted in Fig.IV-1 three equations were calculated: for the period 1956-1963, for 1963-1970, and for the whole period 1956-1970. Estimations of production, yield, and area for 1975 and 1980 are summarized in Table IV-7. The total area was calculated by dividing projected production by projected yield.

It can be observed that the forecasted figures of production, 940,000 cwt and 1,093,000 cwt, and area 38,600 and 39,500 manzanas for 1975 and 1980, when applying the trend (a),

TABLE IV-6

RICE: AREA, PRODUCTION AND YIELD 1956-1970, AND "A" PROJECTIONS TO 1975-1980, NICARAGUA

Year	Production 1000 cwt	Area 1000 Mnz.	Yield cwt/Mnz.
1956	315	20.0	11.3
1957	417	36.8	11.4
1958	457	35.0	13.0
1959	461	33.2	13.9
1960	448	29.6	14.8
1961	509	32.9	15.2
1962	506	32.6	15.5
1963	600	29.1	15.5
1964	651	31.8	20.4
1965	710	34.8	20.5
1966	826	36.1	20.4
1967	908	35.7	22.9
1968	1,107	42.8	25.4
1969	1,401	53.4	25.8
1970	1,474	56.7	26.2
1975	1,607	50.3	32.0
1980	1,977	52.6	38.0

Source: Central Bank of Nicaragua, Annual Report 1969, 1970.

FIGURE IV-1

RICE; PRODUCTION AND YIELD TRENDS, FOR 1956-1970, NICARAGUA

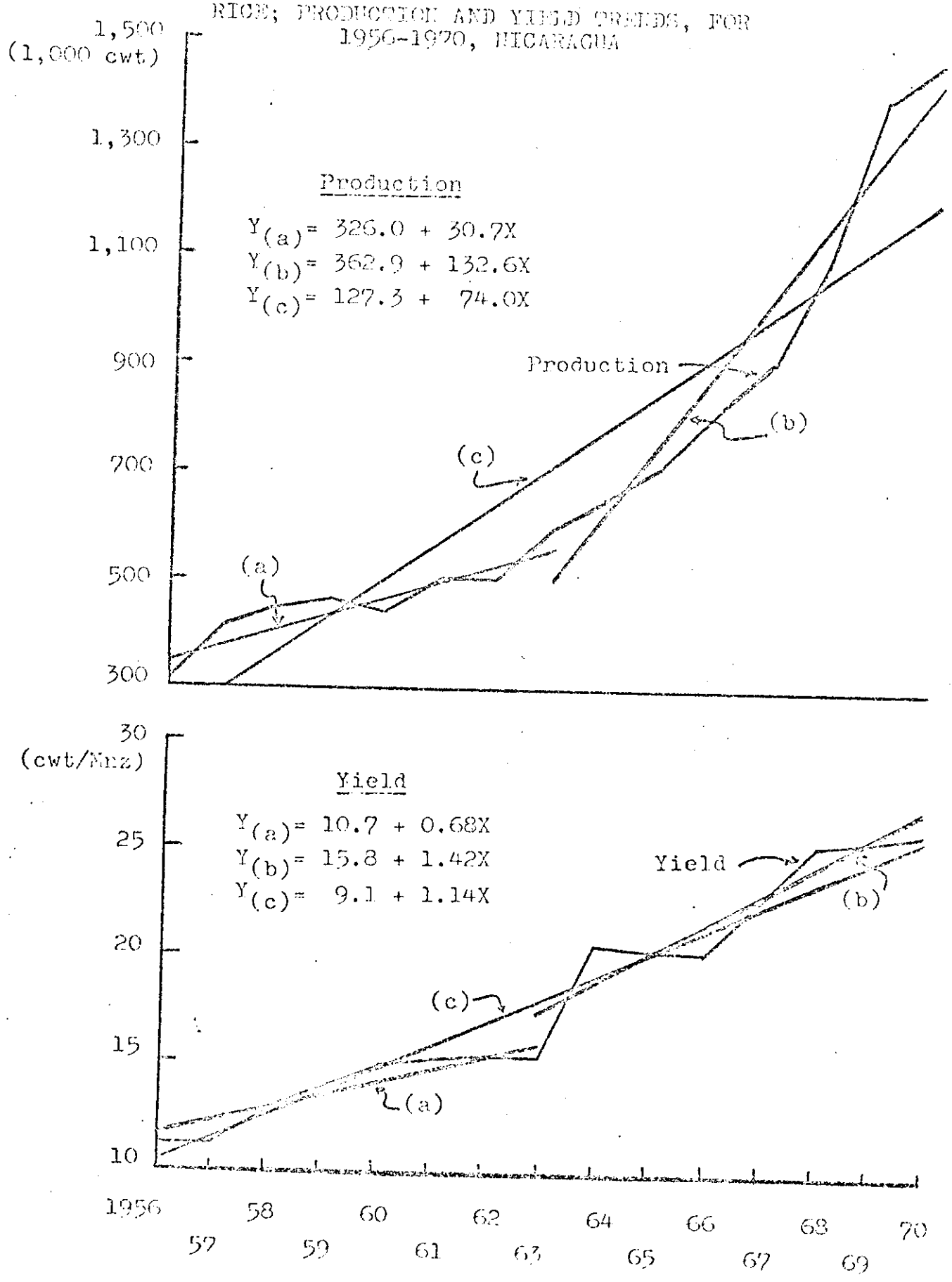


TABLE IV-7

RICE: AREA, YIELD AND PRODUCTION PROJECTIONS FOR 1975 AND 1980, NICARAGUA

Concept	1970	Projection	
		1975	1980
Production (1000 cwt)	1,474		
(a) 1956-1963		940	1,093
(b) 1963-1970		2,087	2,749
(c) 1956-1970		1,607	1,977
Total Demand		1,410	1,652
Yield (Lbs./cwt)	26.2		
(a) 1956-1963		24.3	27.7
(b) 1963-1970		34.0	41.0
(c) 1956-1970		32.0	38.0
Area (1000 Mnz.)			
(a) 1956-1963	56.0	38.6	39.5
(b) 1963-1970		61.4	67.0
(c) 1956-1970		50.3	52.6

Source: Direct calculation based on data from the Central Bank of Nicaragua.

1956-1963, are extremely low, and even lower than those obtained in 1970. On the other hand, when projections are made for the same years, but applying trend (b) 1963-1970, the productions to be obtained are very large, 2,087,000 and 2,749,000 cwt for 1975 and 1980, respectively. To be able to reach this production, assuming the increasing tendency of yield up to 34 and 41 cwt per manzana, it will be necessary to harvest 61,400 and 67,000 manzanas in 1975 and 1980, respectively.

According to the availability of land and human resources, there is no doubt that 67,000 manzanas could be used in rice production; further more, 41 cwt per manzana can be obtained from Nilos varieties presently used in Nicaragua. However, it is important to take into account the goal set by the government within the national program of rice to finance no more than 22,000 manzanas and provide them with full technology and equipment (Table II-6).

The third set of projections based on trend (c), encompassing the whole time period from 1956 to 1970, presents an intermediate position between the other two sets and keeps harmony with the public sector policy and with the real world. The estimated productions of 1,607,300 cwt and 1,977,300 cwt of rice for 1975 and 1980 can be produced from 50,300 and 52,600 manzanas, which are already in production. An average yield of 31.9 and 37.60 cwt per manzana could be only a modest target if the research programs prevail.

Definitely, supply projections based on trend (c) reflexs more likely the real rice production situation in Ni-

caragua. The highest area expected to be harvested in 1980, 52.600 manzanas, is even lower than that harvested in 1970, 56.700 manzanas. Thus, the projected figures for area can be considered within the national policy of consolidating rather than expanding the area devoted to rice production. In fact, according to this policy, the National Bank has already reached its goal of financing a maximum of 23.000 manzanas. If we take the change in total production area for rice as a direct function of the technical and financial assistance supplied by the National Bank, the tendency is to mantain the present area.

Of great importance in supporting the projected production figures is the national expectation for the improvement within the period, of the average yields presently obtained by the farmers. Implicit is the assumption that the research on rice performed with the technical assistance supplied by Louisiana State University, will continue producing positive results and recommendations allowing for higher yields. As it was mentioned early, there already exist modern mechanized farms averaging between 80 and 90 cwt per manzana, which means that a national average of 37 cwt per manzana is a feasible goal.

Finally, considering that the ever increasing support price has fullfiled its goal of estimulating the expansion in production of rice to the extend to permit Nicaragua to be selsufficient, it is expected a promt revision of the support price level and polixy. From now on,more attention is expected to be placed on fostering quality rather quantity of the grain in order to export profitably any surplus obtained.

Confrontation of Supply and Demand Projections

First of all, it is recognized that the approach of confronting demand and production projections to derive indicators of the likely future trade patterns, change in trade, and direction of the price movement has serious limitations in view of the error inherent in the elements considered. One factor not considered here refers to the physical losses of the product which occur between harvesting and consumption. In 1967, INCEI[9] estimated losses up to 30 percent for all the basic grains, primarily as a result of lack of storage facilities in the countryside.

In spite of these limitations, the projected production of rice for 1975 and 1980, in Nicaragua, were compared to the estimated total domestic demand for the same years. Table IV-8 presents the sets of projections elaborated for this research paper and those made by BMI and FAO.

Unfortunately, its publication on projections FAO did not include figures for Nicaraguan rice production; thus the available data supplied on population, total demand, and consumption per capita included in the table should be used only as a reference to similar concepts estimated by the author and BMI.

Comparing the balances calculated for this paper and by BMI, not only is great disparity observed in the data, but an opposite tendency in the pattern of production and trade is suggested. However, two important facts help to explain the situation. First, although BMI published its projections in 1969, the study includes annual information

9 INCEI, op.cit.

TABLE IV-8

RICE: CONFRONTATION OF PRODUCTION AND DEMAND PROJECTIONS TO 1975 AND 1980, NICARAGUA

Institution	1970	Projection	
Direct Estimation		1975	1980
Population (1000 inh.)	1,975	2,390	2,800
Production (1000 cwt)	1,474	1,607	1,977
Demand (1000 cwt)	1,157	1,410	1,652
(Lbs./Capita)	(59)	(59)	(59)
Balance (1000 cwt)	317	197	325
B. M. I.			
Population (1000 inh.)	2,011	2,407	2,856
Production (1000 cwt)	563	578	623
Demand (1000 cwt)	638	729	990
(Lbs./Capita)	(31)	(31)	(31)
Balance	75	- 214	-367
F A O			
Population (1000 inh.)	2,021	2,373	2,818
Production (1000 cwt)	n. a.	n. a.	n. a.
Demand (1000 cwt)	920	1,166	1,474
(Lbs./Capita)	(46)	(48)	(53)
Balance (1000 cwt)	-	-	-

Source: Direct calculation of data from the Central Bank, FAO and BMI.

up to 1964 only; coincidentally, it was in that year that Nicaragua started to improve its trend on area, yield, and production of rice, resulting from the modernization and technification of the industry. On the other hand, the methodology used in projecting aggregate data for the Central American countries as a region and then separating them in proportion to former individual participation in the group, resulted in conservative figures for Nicaragua.

Before the incomplete information available from FAO and the out-of-date projections of BMI, the projections of demand and supply or rice for 1975 and 1980, calculated for this study, will be used to consider the prospect for further development of the rice industry in Nicaragua. It is necessary to mention that the effective future consolidation of the production and the improvement of the present situation described in this paper are based on the assumption that the trend in yield, population, and per capita income will persist. It is also assumed that the support price program for rice will be maintained for at least the next five years.

If the assumptions are met, Nicaragua could produce a significant surplus of rice of more than 300,000 cwt by 1980, as has been indicated in Table IV-8.

Outlook and Prospect for Export

The attention the Nicaraguan rice industry is currently receiving from the private sector resembles that given to cotton back in the 1950's, when attractive world prices induced many farmers to produce the fiber crop. In the case of rice, increasing domestic prices and the expectation for

export to the Central American Common Market area have promoted the recent expansion in production in the second half of the 1960's. In addition, the deterioration of the international prices of Nicaraguan cotton and the increasing costs of production faced by the fiber growers have justified the government support to the rice industry within the export diversification plan.

First the rice import substitution and then the expansion for export were among the objectives when planners designed the National Rice Production Program in 1966. The program, representing financial and technical assistance provided by the National Bank, is promoting the production of 22,000 manzanas, equivalent to 15,800 hectares planted with high yield rice varieties, and using irrigation systems, modern inputs, and farm machinery. At present, approximately 6,500 manzanas are under the double-crop production system within the program.

The surplus obtained in 1970 (Table IV-8) could be taken as an index of the progress made in production and the adoption of new technology in the Nicaraguan rice industry in the last five years. The prospect for 1975 and 1980 is still more encouraging; however, before going further in the development of the program, it would be of great value to revise the whole rice activity and to study present obstacles and potential problems affecting prices and quality for future export.

In this study, two sets of interrelated problems rela-

tive to the rice industry have been identified: those primarily circumscribed to the domestic area, discussed in Chapter III, and those of major impact on the potential for export, price and quality, examined in this chapter.

In regard to the price problem, Dr. Efferson[10] pointed out that: "Under the existing price structure for rice in Nicaragua, paddy or rough rice is being purchased from farmers at prices about 20 percent above the world market, and milled rice sold at retail level is priced also above the world and United Stated prices." In addition, connected with the quality problem, Efferson continued:

"... Once Nicaragua becomes self-sufficient in rice, and produces any bolume above this level, the industry will be in serious difficulties. Any surplus produced would have to be exported and the present qualities being produced could be sold only at prices considerably lower than that now being received in domestic markets."

The possibilities to export to Central American countries should be revised in more detail. As a consequence of similar socioeconomic characteristics of the countries, and with the same motivation created by the free trade under the common market agreements, all five countries have been forcing the comparative advantage principle, applied to land and other resources and to the sociopolitical environment of the country. In fact, with and without programs, almost all the countries have expanded their rice production in the last five years, limiting themselves the opportunity to export to each other.

On the other hand, the world demand prospects for rice to 1980, forecasted by the USDA[11], are considered poor. It

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10 Efferson and Rouse, op.cit.

11 USDA, "World Demand Prospects for Agricultural Exports of Less Developed Countries in 1980: (Washington, D.C.: Government Printing Office,)1970.

is assumed that the continuation of the Green Revolution would result in lower world import demand, a demand traditionally centered in developing countries. Import demand in the developed areas is expected to rise moderately, but the increase will be small relative to potential export suppliers from both developed and developing exporters. Consequently, continued downward pressures on prices are expected.

Figures in Tables IV-9 and IV-10, preapred by the USDA in 1970, illustrate the projected situation for rice to 1980, in which demand and supply are expected to be at a similar level.

With this somewhat discouraging future international outlook for present and potential rice exports, in addition to domestic production and marketing problems, it becomes necessary to take definite action to permit the Nicaraguan rice industry to overcome major obstacles for development, within the international framework of demand, price, and quality of the product. Only then the question of full expansion of rice production could be answered.

Some recommendations for improving the marketing system of the Nicaraguan rice industry, and for other food grain industries as well, are presented in Chapter V.

TABLE IV-9

-Rice: Production, consumption, and trade, 1964-66 average, and projections to 1980 under projection sets I and II 1/

Exporting region	1964-66			1980--proj. set I			1980--proj. set II		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
	Million metric tons								
Developed:									
Japan	11.4	11.9	-0.8	11.1	11.3	-0.2	11.0	11.4	-0.4
EC	0.5	0.7	-0.2	0.5	0.8	-0.3	0.4	0.8	-0.3
Other importers	0.4	0.7	-0.3	0.5	0.9	-0.4	0.5	0.9	-0.4
Major exporters 2/	2.7	1.0	1.6	3.5	1.4	2.2	3.4	1.4	0.3
Total, developed	15.0	14.3	0.4	15.6	14.3	1.4	15.4	14.4	-0.8
Central plan	64.4	64.0	0.4	89.9	89.7	0.1	89.7	89.8	-0.1
Less developed:									
Importers	68.5	72.8	-4.3	107.6	112.4	-4.7	124.9	127.9	-3.0
Exporters 3/	24.5	21.5	3.2	35.3	32.0	3.2	38.4	34.5	3.9
Total, less developed	93.0	94.3	-1.1	142.9	144.4	-1.5	163.4	162.4	0.9
World total	172.4	172.6		248.4	248.5		268.5	266.7	

1/ Set I assumes a continuation of present food and fiber policies, allowing for moderate gains in productivity in the less developed countries. Set II assumes that agricultural productivity and economic growth in the less developed countries would be higher than projected in Set I.

2/ United States and Australia.

3/ East South America, Argentina, North Africa, and Southeast Asia.

TABLE IV-10

Rice: Production, consumption, and trade, projections to 1980 under projection sets II-A, II-B, and III 1/

Exporting region	1980--proj. set II-A			1980--proj. set II-B			1980--proj. set III		
	Production	Consumption	Net trade	Production	Consumption	Net trade	Production	Consumption	Net trade
	Million metric tons								
Developed:									
Japan	10.9	11.3	-0.4	10.7	11.2	-0.5	11.2	11.3	-0.1
EC	0.4	0.8	-0.3	0.4	0.8	-0.4	0.5	0.8	-0.3
Other importers	0.5	0.9	-0.4	0.5	0.9	-0.5	0.5	0.9	-0.3
Major exporters 2/	3.4	1.3	2.1	3.4	1.4	2.2	3.5	1.4	3.2
Total, developed	15.3	14.4	0.9	15.0	14.3	0.8	15.7	14.3	2.4
Central plan	89.7	89.8	-0.1	89.7	89.8	-0.1	89.9	89.7	0.2
Less developed:									
Importers	124.4	128.4	-4.0	124.4	128.5	-4.1	96.0	102.2	-6.2
Exporters 3/	37.9	34.7	3.2	38.0	34.7	3.4	32.6	29.1	3.5
Total, less developed	162.3	163.1	-0.8	162.5	163.2	-0.7	128.6	131.3	-2.7
World total	267.2	267.3		267.2	267.3		234.2	235.3	

1/ Set II-A assumes that major developed exporters would maintain their traditional share of the world market. Set II-B assumes that the major developed importers would become more sensitive to world grain prices and adjust their high internal prices to changes in world prices. Set III assumes that agricultural productivity and economic growth in the less developed countries would be lower than projected in Set I.

2/ United States and Australia.

3/ East South America, Argentina, North Africa, and Southeast Asia.

CHAPTER V

SUGGESTIONS FOR IMPROVING FOOD GRAIN MARKETING EFFICIENCY AND COORDINATION

Nicaragua, like many of the less developed countries, has already felt the need for a more even economic growth to maintain a balance between local and external market conditions and within the domestic productive sectors. Traditionally, Nicaragua has based its economy and development process in the agricultural sector, devoting most of the technical and financial resources to the export crops, cotton and coffee. However, decreasing international prices for Nicaraguan cotton in the late 1960's and the quota condition for coffee export, in addition to their uncertain prospects, have finally called the attention of government officials and planners to the production of new export agricultural products and food items, of which rice has had first priority during the last decade.

In many developing countries which are pursuing an accelerated economic development, it is characteristic of the food marketing problems that they arise simultaneously all along the line from the planning of production through processing, transport, and wholesaling phases to retail distribution. As is the case in Nicaragua, the phases are so closely interrelated and their great interdependence is so difficult to break up, that sucess in establishing improvement in any of the various marketing phases frequently depends on corresponding improvements taking place in the other phases. In this context, efforts to cope with the

food-grain marketing problems should be harmonized and institutionally coordinated to allow for a smooth flow of commodities through the different marketing channels.

The principal objectives of this research paper, which were emphasized in Chapters II through IV, were the identification and analysis of some market conditions which are considered barriers to output expansion, increased productivity, and production of an improved quality of food grains in Nicaragua. This chapter contains a series of recommendations which could reduce or remove many of the barriers here identified. These recommendations are organized in two categories, short and long-term, according to the time needed to make an impact on the present marketing system. Both, short and long-term strategies and studies should be implemented simultaneously, to bring about the interaction expected.

Short-Term Considerations

It is out of question now the rice production in Nicaragua has been improved in terms of the expanded production and the modernization of the production system through the use of irrigation and better inputs and technology. Of great impact has been also the establishment of price support to farmers to estimulate the quantity produced. However, in present days when the production has surpassed domestic consumption and excess supply has been obtained recently, many questions relative to the expectation for further expansion and export arise.

During the analysis of the economic problem of rice in

Nicaragua it was found that, the support price offered to producers has been higher than those offered in other Central American countries, creating occasionally flows of grain into Nicaragua, disturbing the domestic market. In addition, local retail prices has been higher than world prices and those paid in the United States. Under these circumstances, importan questions concerning the surplus of rice are, it is possible to export profitable the excess supply?; is the quality of the grain good enough for the world market?; how the Green Revolution and the diffusion of the use of the Miracle Rice affect the Nicaragua potential markets?.

With these considerations in mind and assuming that the expansion in production of rice has been based mainly in the high support price sets by INCEI (P_1 in Figure II-2), it is recommented to allow the forces of supply and demand to play more freely in the market by trial reductions in the government support price toward a natural equilibrium between quantity demanded and supplied of rice. The estimation of quantity to be supplied must consider losses due to deficient storage facilities and transportation, as well as the provision of certain amount for stock in prevision of bad weather and changes in the market conditions. On the other hand, quantity demanded should be expected to reflex the aggregated domestic --and external demand,-- given prices and qualities of rice.

Within short-term considerations for improving the product quality and the general organization of the marketing of food grain in Nicaragua, the problems here identified

have permitted the classification of the recommendations into three more specific areas: (a) Marketing Economics and Development, (b) Marketing Facilities and Food Technology, and (c) Research, Extension, and Education. For each area, recommendations for more detailed studies and other connected actions are:

(a) Marketing Economics and Development

Analysis of costs of production and marketing, identifiying separately the different processes or phases.

Analysis of the impact of the floor price policy on the food grain production over time.

Analysis of present and potential domestic and external demand for grain. Identification of markets, prices, and qualities.

Analysis of the impact of the CACM on the domestic situation for grains.

(b) Marketing Facilities and Food Technology

Analysis of processing methods and costs, storage conditions and needs, transportation, and handling.

Technological analysis of processed food grain, development of new uses, sanitary controls, grading, and packing.

Analysis of the flow of grains through the marketing channels with emphasis on the wholesale and retail levels.

(c) Research, Extension, and Education

Reallocation of technical and economic resources used in agricultural experimentation for food grains.

Analysis and improvement of the different methods used to inform the farmers about agriculture experimental results, and the development of a market news system to inform the farmers about commodity prices, crop forecast, etc.

Constant revision of the training programs and courses offered in vocational and superior agricultural education, and the suggestion for necessary changes.

It is without question how necessary is the elaboration of such studies and how changes and adjustment introduced in the marketing system can benefit and improve the grain situation. However, the fact that such studies have not been conducted in the past raises some questions relative to the existence of enough economic motivation and administration responsibility within the public sector. Questions also arise in regard to the local availability of personnel capable to conduct studies and research, not only in production but in the other marketing processes as well. Finally, but no less important, is the question of budget and other resources devoted to the search for solutions to the grain problems.

As was mentioned in Chapter II, several government agencies are involved in the food grain marketing problem, but those which play the most relevant role are the Ministry of Agriculture (MAG) and the National Institute for External and Internal Commerce. MAG and INCEI should be the institutions responsible for conducting the studies here suggested, but it is recognized that more specific duties should be established, according to their availability of management skill, technical personnel, and budget.

It is highly recommended that the relations MAG has initiated recently with foreign universities be strengthened, and that the Ministry obtain technical assistance to deal with the agricultural marketing problem. Simultaneously, a program for training abroad more Nicaraguan technicians in the areas of

agricultural production economics, agriculrual marketing, farm management, agricultural engineering, and food science should be organized in cooperation with local and foreign universities and the private and public sector. International agencies institutes, and foundations could also be of great importance in the advisory role and in providing financial assistance.

Long-Term Considerations

In general, the long-term considerations for improving the food marketing problems in Nicaragua include major structural changes in relation to agricultural research and education, and the provision of more storage and drying facilities.

The Ministry of Agriculture is the institution which is in charge of the agricultural research work, and at the same time is the top administrative government office supervising the performance of agricultural education from the vocational to the university level. Thus,MAG has enough decision-making power to influence the direction of the changes needed in agricultural research and education. On the other hand, INCEI, administrating the government storage and drying facilities and the price support program, should study and analyze the problems relative to the provision of adequate quality and quantity of these services, that could be determined from expected increases in grain production.

Reorientation of Agricultural Research

Agricultural research in the general areas of fertilization, pest control, and introduction of genetic materials started in Nicaragua back in 1942, with the technical and

financial support of the USDA. Great emphasis was initially placed on rubber --a war product--, and later on, on coffee, grains, and cotton.

After 20 years of research work, evidence has shown that the site selected for the first experimental station, LA CA-LERA, close to the capital city Managua, was inadequate and far from representative of the soil, climate, and economic conditions under which the crops are actually produced. The specialization in production of some areas and the increasing economic importance of some crops motivated the installation of new, separate experimental stations devoted exclusively to the major agricultural crops within their respective production areas. Coffee (early in the 1950's), sugar cane, cotton, and ultimately rice (in 1968) are among them.

In the case of all food grains, the Ministry of Agriculture, doing the research work in Nicaragua, should reorient the experimentation to more practical current problems faced by producers, to provide them with the solutions needed. Regional experimental stations would be of paramount importance in solving local difficulties in the older problems of time, dosage, and mixture of fertilizer and insecticides. Soil preparation, plant density, irrigation, and harvesting time should be investigated locally.

Research on the distributive sector for food grains should be include in the investigation program of MAG. It would also be interesting to consider the possibility of implementing research financed partially by the producers. In this way, the Ministry of Agricultural would have a great-

er obligation to respond to the needs of the public and private sectors, and the producers would be more attentive to the information and more eager to follow the recommendations derived from research.

Agricultural Education

Improved agricultural education and increased management skill at all levels in the agricultural sector have been pointed out as two critical needs for agricultural development. Leading agents and officials in the public sector, all the way through to the individual farmer, should be provided with knowledge about the functions and performance of marketing and distribution activities for agricultural products.

It is recognized that the educational problem is a long-term issue, calling for significant institutional changes and a higher share of the national budget. The lack of adequate information, in the general sense, regarding administration, management, and methods of handling farm problems and government programs necessitates initiating immediate action at the universities, vocational agricultural institutions, and all other related educational centers.

It is suggested that agricultural economics training courses be initiated and offered periodically. These courses, including field work, should also be open for regular students and for professionals and officials responsible for the national agricultural business. Emphasis should be placed on elementary farm management, production economics, agricultural credit, land economics, cooperatives, marketing principles, and price analysis.

Once extension personnel have been properly trained and experienced technicians have been hired, the Ministry of Agriculture, through the extension service, should teach the farmers to use well-developed and simple principles of management and to analyze the market information available to them.

Grain Storage and Drying

The poor conditions for drying and storing food grain in Nicaragua can still be identified as one of the bottlenecks in the existing marketing system, thereby delaying the expansion in production. With the recent construction of the 100 agricultural centers, the total installed capacity for drying and storing grains increased to 195,000 metric tons. However, compared to the commercial grain production, estimated at 199,000 metric tons for 1971 (Table III-1), it represents a shortage in storage space for about 4,300 cwt of grains for that year.

If Nicaragua is going to be an exporter of rice and other food grains, it may be necessary to consider the construction of additional facilities so that excess supply can be stored, if needed, according to the price conditions prevailing in the markets.

To protect from spoiling part of the 54 percent of the grains traditionally left at the farms for human and animal consumption, economical and efficient on-the-farm storage systems and structures could be tested and studied in Nicaragua to maintain the quantity and quality of grains. Investment in and operating costs of these facilities should

be offset by savings in grain and quality losses. However, a detailed study of whether further expansion of storage and drying facilities is justified, must consider the future value of production and expected deterioration of grain due to mold, insects, and rodent attacks and quality losses in processing. The problem of the lack of on-the-farm storage and drying facilities, is aggravated by the absence of enough penetration roads to connect most of the production areas with processing and consumer centers. (This also presents an obstacle to the supplier of inputs, to provide them on time when they are most needed in the rainy season). Information on costs of hiring on owning and operating such services and the seasonal increase in prices received by producers is critical for the final decision on recommending more government-owned regional facilities or on-the-farm installations owned by the producers.

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