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RICE AGRIBUSINESS IN GUINEA-BISSAU

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SECTION III: FORECASTS AND FUNCTIONAL RELATIONS BETWEEN RELEVANT VARIABLES FOR RICE AGRIBUSINESS

INTRODUCTION

The political and economic changes that took place in Guinea-Bissau in the last thirty years have contributed for structural changes in the economic system. During that period, the country became independent from Portugal, adopted a centralized economic regime and, in the past few years, the the elected government has begun to implement a relatively open economy.

Because rice is economically and socially the most important agricultural product in Guinea-Bissau, many studies were carried out to determine its socioeconomic structure, the changes that took place in the last thirty years and to identify the most likely short and midterm scenarios.

The focus of this study is the production chain of rice agribusiness, analyzed under a perspective of balanced operation of the agricultural, processing, market and commercialization production segments and the support system.

To complete this study we researched existing works in the country, interviewed rice agribusiness agents and, most significantly, used the results from the "Workshop on Rice Study" in which the agribusiness agents and the USAID/SUNY/AFRICARE/LABAT Corsortium participated. In addition we researched the findings of a debriefing based on the preliminary results of the study.

The first section of this report includes the description of rice agribusiness in Guinea-Bissau. We listed and an analyzed the major strong and weak characteristics of each segment of the productive chains of agribusiness in Guinea-Bissau, namely, agricultural, processing, market, commercialization segments and the support system.

Section II shows, in detail, the expenses and the revenues for each existing production system in the country, for each hulling system (processing) and some transportation and storage costs.

Next, we make a few estimates and describe the functional relations between the most relevant variables for rice agribusiness. In that section, we also present likely worldwide and domestic scenarios for rice.

Finally, we present the main recommendations for rice agribusiness considering the new domestic and international scenarios.

SECTION I

DESCRIPTION OF RICE AGRIBUSINESS: STRONG AND WEAK CHARACTERISTICS

1. DESCRIPTION OF RICE AGRIBUSINESS

1.1. Production Segment

Rice (*Oryza sativa, L.*) is a herb of the grass family native to Asia. Apparently, it was introduced to Africa long ago, since wild species of this grain were found in this continent in the 15th century by the Portuguese colonizers. Before they landed in the country, red rice (*Oryza Glaberrima*) had been cultivated in the country. However, it is considered a wild species and it is not accepted in the international market.

Some subspecies of red or African rice are still being cultivated in Africa, since some tribes prefer them whereas the rest of the world considers it unacceptable for human consumption.

The Portuguese colonizers introduced the *sativa* species, native to Asia, in Guinea-Bissau early in the colonization period. Therefore, rice cultivation has been present in the country for more than four centuries.

Currently, rice cultivated in Guinea-Bissau is characterized by a wide variety of sizes and colors. International standards classify Guinean rice among regular varieties. Another characteristic of locally-produced rice is that it is very popular among the rural population. Such characteristic makes it decisively important to choose the proper seeds to cultivate.

The importance of rice for the Guineans is secular. This grain is present in practically all the popular manifestations, in the most important rites and commercial transactions, because it works as currency and is the main component of their diet. Therefore, rice, is the "symbol of the Guinean family;" it is always present on the most important decisions of the country's economy and politics.

There are three major rice cultivation systems in Guinea-Bissau: salt water paddies, fresh water paddies and upland farming. Fresh water paddies correspond to the large continuous areas (flooded paddies) cultivated along rivers. Salt water paddies are similar to what used to

be mangroves. These areas were isolated from the sea by small barriers; its proper management has made it possible to desalinize and enable them for rice cultivation.

Upland cultivation or farming in rainfall-dependent areas takes place in elevated zones or plateaus. Recently, rice has been cultivated by "ponteiros[1]." Concentrated around the Gêba River Valley, they use mechanization, water management, modern supplies and selected seeds.

No matter which system is used, rice cultivation takes place in the rainy season. The major difference is that it is planted and harvested earlier by growers who use the upland system. The harvest of fields in which farmers use modern technology takes place in the Summer with the objective to harvest the production between crop seasons because of higher prices.

Table 1 shows that, in 1993, the largest yields came from fresh water paddies (44%) followed by upland farming (28%). The remainder is cultivated in salt water paddies (19%) and irrigated cultivation (9%).

Still based on Table 1, it is demonstrated that fresh water paddies original production in 1989 was 14% greater than in 1995. There was an increase of 25 to 28% in upland farming production. Farming areas using modern cultivation methods currently respond to 9% of the production.

Based on an estimate prepared by our research team, the rate of participation in rice production for each production system is significantly different from the official data, as shown in the last column of Table 1.

Before the War of Independence, the largest yields were produced in salt water paddies. However, the residual effects of the war and a long drought forced the abandonment of many paddies, causing a decrease in total yields. According to information collected through interviews carried out in October 1995, the process of recovery of these paddies has been done with government support in the Southern region of the country. So far, 12,000 ha have been recovered.

Concerning geographic distribution, there is a concentration of rice farming in the Tombali region, in the South, Bafatá and Oio, in the East (Map 1). Between the various ethnic groups existing in the country, the *Balantas* are the largest rice growers.

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[1] - Rural rice growers who use relatively modern technology (Translator's Note).

Table 1

GUINEA-BISSAU: Distribution Rate of Explored Rice-growing Area According to Production System - 1989 to 1993

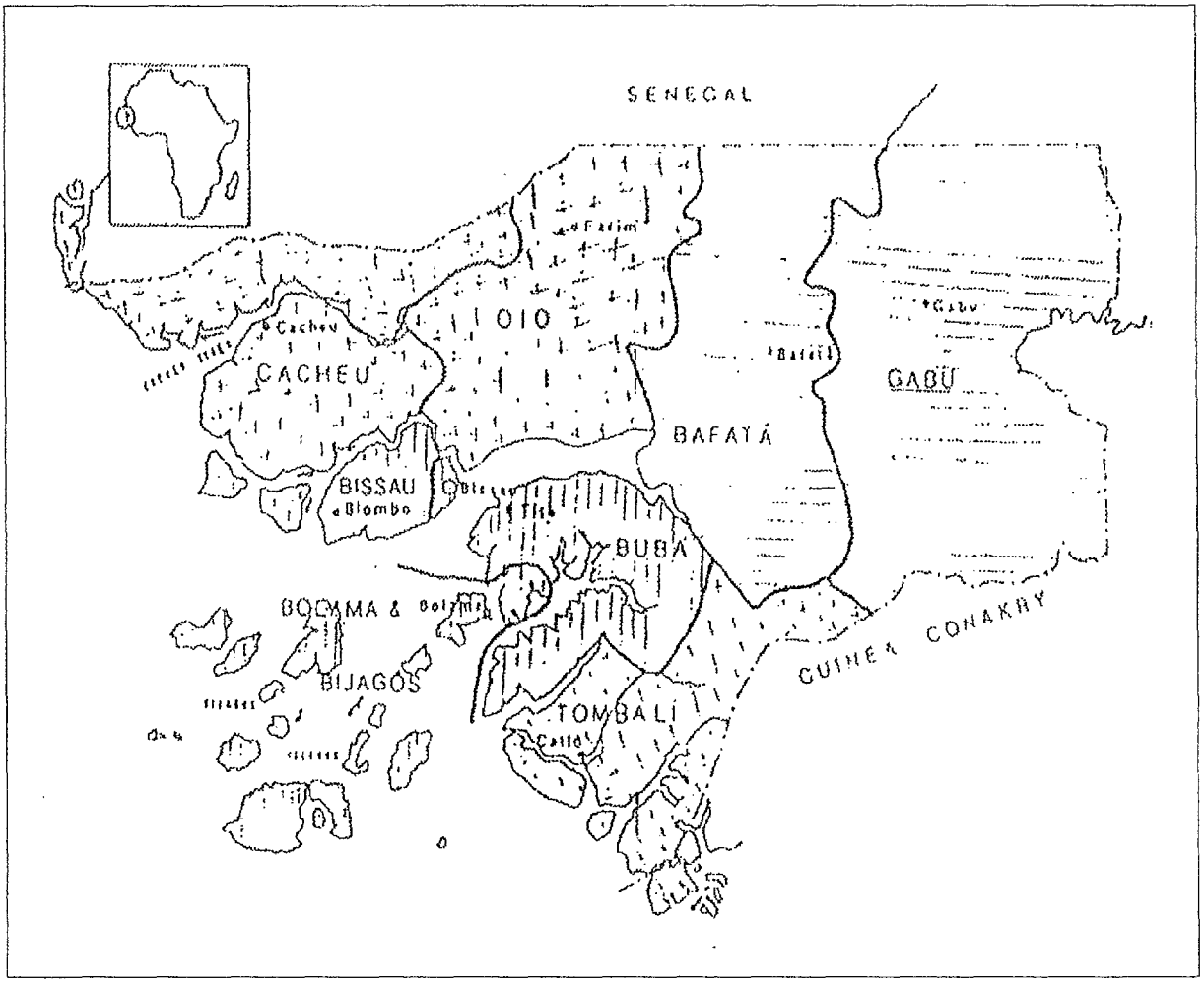
Production system	Official Data 1976	Official Data 1989	Unofficial Data([2]) 1993	Unofficial Data([2]) 1995
Salt water paddies	54.2	20.5	19,0	40,0
Fresh water paddies	35.8	54.2	44,0	32,0
Upland farming	10,0	25.2	28,0	18,0
Irrigated Cultivation(modern)	----	---	9,0	10,0
Total	100,0	100,0	100,0	100,0

Source: Statistical Yearbook of Guinea-Bissau, SCET INTERNACIONAL(1979) and field survey.

[2] Numbers are a compilation of technicians, traders and farmers opinions collected on filed trips by the technical team working on this report.

MAP I

GUINEA-BISSAU - Distribution of Rice-Farming Areas by Region, 1993.



Percentage of Country Area
10% or less
Between 10% and 15%
15% or greater

The major indexes for rice sector performance in the country during a twenty-year period are shown on Table 2. We must stress that, there is, in recent published material on rice in Guinea-Bissau, divergence as to the accuracy of those numbers. The fact is that, some authors estimate that actual yields from explored areas are, in fact, greater than the official data. Despite this dispute, we decided to use the official data.

An analysis of Table 2 figures shows that the performance of rice production increased from 1976 to 1994, demonstrating that the geographical growth of areas being used for cashew cultivation did not endanger rice cultivation to the point of causing negative growth. What may be happening is that the growth of rice farming is moderate as a result of cashew cultivation.

An index that clearly shows this relationship is the Geometrical Annual Growth Rate (GACR) at 1.71% between 1976 and 1983 that dropped to 1.38% between 1984 and 1995, a period in which the cashew production growth reached 24.66 % per year.

The average yields for the past seven years reached nearly 2,000 kg/ha, which was achieved in part with government efforts, soon after the Independence, and the support of foreign missions. In spite of this progress, which represented an increase of 100% in revenue for that period, a lot could still be done to increase gains, because while rice farming in Guinea-Bissau has increased productivity by one ton per hectare, worldwide production has increased twice as much.

In spite of the official source of the data analyzed in the previous paragraph, there is a widespread feeling among technicians, rice growers and business operators that the average level of productivity is around only 1,500 kg/ha.

Table 2

GUINEA-BISSAU - Production (t), Harvested Area (ha), Yields (kg/ha), and Importation, 1976-94

YEAR	**Production (unhulled)** A	Harvested Area B	**Yields** C=(A/B)	Production (hulled) D=(A*.65)	**Importation (hulled)** E	Donations (hulled) F	**Total** Supply G=(D+E+F)	Apparent Supply /Inhabitant H=(G/pop)
1976	61,109	...	...	39.721	10.891	...	...	...
1977	37,000	...	...	24.050	13,309	11.600	48.959	65.3
1978	60.010	...	...	39.006	28,107	15,000	82,113	108,0
1979	46,200	...	...	30.030	13.094	16.400	59.524	77.3
1980	21.800	...	...	14,170	11.948	8.600	34.718	43.9
1981	85,000	...	...	55,250	33.046	28,000	116,296	143.6
1982	85,000	...	...	55,250	16.782	17.600	89.632	108,0
1983	70,000	...	...	45.500	22.878	24,200	92.578	108.9
1984	115.581	...	...	75,127	17.658	23,300	116.085	133.4
1985	125,000	...	...	81,250	10.513	12.700	104.463	117.4
1986	121,200	...	...	78.780	41,123	15,000	134.903	148.2
1987	146,000	...	...	94.900	38,000	12,000	144.900	155.8
1988	88,384	41,136	2,148	57.450	37.489	7,230	102,169	107.5
1989	105.859	49.449	2,141	68.808	39,000	7,240	115.048	117.4
1990	118.834	57.011	2.084	77,242	43,270	6.500	127.012	127.0
1991	123.564	61.436	2.011	80,317	59.650	11,000	150.967	147.1
1992	123.612	65.023	2.012	80,348	75.720	8,000*	164.068	155.8
1993	125.907	63.788	1.973	81.840	66,270	5,000	153,110	142.3
1994	131.017	67.817	1.932	85,161	33.870	6.678	125.708	114.3
1995*	136,000	68,129	2,000	88.400	45,000	6,000	139.400	122.1

Source: MDRA, Banco Central de Guiné-Bissau and SCET INTERNATIONAL(1979).

Table 3, on the other hand, shows the performance of the production of this grain in four key periods in the history of Guinea-Bissau. The first period, called Colonial Mercantilism, which was characterized by forced labor and by rice as a currency of exchange. In 1961, according to data that is only available for that year, the production reached 174,000 tons of unhulled rice.

During the period known as the Independence War, in spite of the unavailability of data, we can induce that there was an enormous reduction in production because of the mobilization of part of the population for war and the large number of people who migrated to neighboring countries or to the urban areas. In addition, the battles were more significant in the South, the greater rice-growing area; there was also intense bombing, which destroyed dams and dykes used to flood the paddies. The residual effects of that time are still felt. The condition of cultivated areas never returned to what they used to be before the war, in spite of the gains in productivity.

Production grew during the third era, but never reached the levels attained in 1961. With the centralized economy, the country produced 107,500 tons of rice between 1983 and in 1987, 70,000 tons of hulled rice, while annual average of importation reached 26,000 tons.

At this moment, with a market economy, the production average (1990 to 1994) is 70% greater than what was obtained in the Colonial period. Currently, peasants have greater freedom to decide what they want to plant. Therefore, they can diversify their farming and decide to cultivate, usually, cashews and other fruit, whose yields are more profitable and can be exchanged for currency.

Table 3
GUINEA-BISSAU: Average Yields of Unhulled Rice, According to Historical Period.

Historical Period	Year	Yield(tons)
Colonial Mercantilism	1961	174,500
Independence War	1963-74	----
Centralized Economy	1983-87	107,500
Market Economy	1990-94	119,500

Source: MDRA, BCGB e HESSELINK & SLOBBE(1987).

1.2. Processing Segment

Until the beginning of the 80's all rice produced for consumption in the country was hulled manually by women using rudimentary equipment (wood mortars). According to PEARSON et al apud LEA & BARBOSA (1992), the outcome of a six-hour workday of rice-hulling in a mortar equals 24 kg of unhulled rice. This means that to hull the production of a hectare of rice 80 workdays would be necessary.

In 1984, 35 small-capacity rice shuckers were installed in the Southern region of the country. The machines were financed by the Ecumenical Council of Churches and the Belgium Oxfam. They had a milling capacity of 10 thousand tons of rice per year, less than 10% of the country's production at that time. Most of these machines are no longer in operation, due to lack of replacement parts. Two other larger rice shuckers, installed before 1984, never began operating. They are in Bissau and in Cumaré and belong to the Government and the reasons for their inactivity is unknown.

Recently, the total capacity of installed rice mills has noticeably grown. A large capacity unit that can process more than 20,000 tons of rice a year was installed in Bafatá. There is also a mobile shucker of mid capacity in the region of Catió.

In 1995, twenty-five new small and mid-capacity unities will be installed. The team responsible for this study, in a field trip to Catió, had the opportunity to check some of these new processing unities currently installed and felt the rice growers and business operators' enthusiasm.

According to rice growers, the rate of rice processed mechanically will grow substantially, making their operations more efficient and competitive because of reductions in labor and transportation costs. Rice growers also said that many business operators from Bissau and other metropolitan areas currently show interest in purchasing processed rice from the region.

These twenty-five milling units were donated to the Government that, in its turn, sells them to the private businesses at subsidized prices. The conditions for payment are, according to interviews with a beneficiary of that program, a fifty-percent down payment. The balance is charged as the operator profits from the use of the equipment.

The nominal processing capacity in the country is estimated at over 40,000t. However, the current operating capacity, which depends on sale schedule and availability of operational capital for stocks of raw materials, will likely be reduced by half.

There are two important details that can be concluded from this table. First, there was an increase of 100% of rice processed mechanically, with a strong tendency for further growth and, secondly, there was a high unused capacity of mills that absorbed short and midterm processing demands.

1.3. Market and Commercialization Segment

Rice commercialization in Guinea-Bissau is conducted throughout the year through seven commercialization circuits and takes many forms, from a simple product exchange to more sophisticated transactions, as verified in the importation circuit.

As demonstrated by HESSELINK & SLOBBE(1987), the existing commercialization circuits in Guinea-Bissau are the following:

a) Trade between "tabancas" (settlements) from the same region. It is characterized by the exchange of small quantities of rice by other food products, such as fish, salt, milk and palm oil.

b) Trade between the Northern and Southern Regions. The inhabitants of the Northern region, in which there is an acute shortage of rice, travel to the South to purchase rice or exchange it for small cattle or liquor. Usually, these transactions are carried out between family members and volumes are more expressive because they usually weight more than 50 kilos.

c) Trade between urban and rural populations. This commercial circuit resembles the constant in item "c" regarding motivation: the acute product shortage in metropolitan areas. The difference here is the form of payment, which is predominantly cash, at a higher value for the products.

d) Trade between private business operators and peasants. Two forms of commercialization prevail in this marketing system. One, in which the business operators purchase small quantities of rice from peasants by exchanging them for currency or products, especially "cana"(liquor). The other system consists of the supplying by the business operators of various articles for consumption during the year, which are paid with rice after the harvest. As a matter of fact, this system works as a future market and the merchant's gain is higher than usual, because the merchants make a profit on the sale of various products to the peasants and collects rice in payment at prices below the market levels.

e) Foreign Trade. It occurs in the Northern and Southern region of the country. In periods of shortage or if the rate of exchange is favorable, the Northern populations import rice from Senegal. The trade is estimated at 800 t/year. Another source, RIBEIRO & MIRANDA(1993)

estimates the volume at 1,308 t/year. Financial resources for those transactions come from, predominantly, foreign currency sent by Guineans working abroad to their family members.

f) Trade with milling business. This method is becoming increasingly prevalent as a result of the establishment of various rice milling units in production areas. This circuit is characterized by two different trade models. In the first form, the farmer takes rice to the milling units and pays for the service with a percentage of the processed rice; the other, the miller purchases rice from the farmer, for processing and sale.

g) Official Import Businesses. It corresponds to the transactions performed by import and export companies, called "economic operators." This is the predominant form of trade between Guinea-Bissau, China, Pakistan and Indonesia. Trade volumes are very expressive (see Table 2). The major objective of this trading system is the exchange for cashew nuts; here, rice works as a currency of exchange. The sale of this rice takes place between local rice harvests.

It is estimated that only 10% of the domestic rice production trade enters the monetary circuit.

Figure 1 shows the volumes of domestic production and importation. There is a clear rising trend, in particular for the importation of rice. That increase in importation is associated with the exportation of cashews, when rice importers obtain financing abroad as rice, which is exchanged by cashew nuts in Guinea-Bissau.

Because the growth of supply levels is greater than population growth, it is fair to affirm that per capita consumption and reexportation are growing. In fact, consumption grew from an average 123Kg per inhabitant/year to 186Kg in 1990 (FONSECA, 1990). According to RIBEIRO & MIRANDA (1993), the exportation and illicit reexportation in 1990 have been estimated at 13,081 tons of unmilled rice that generated an unofficial revenue of 3.3 million dollars.

By analyzing Table 4, which shows the major indexes for trade in Guinea-Bissau, we observe that:

a) while domestic production grew, revenue for rice growers decreased. This phenomenon points out to a deterioration in prices paid to rice growers, resulting from poor efficiency in the existing commercialization system;

b) the ascending importation trend has been greater than domestic production; the value of imports has been relatively stable;

c) the availability of rice for consumption in the country, in the referred years, varied from 107.9 to 139.9 thousand tons, which leads us to affirm that there is an increase in per capita consumption. On the other hand, the volume of rice consumed in the country grew from 48.1 to 56.4 million dollars.

d) importation has represented a significant percentage rate of the local production since it grew from 34% in 1986 to 53% in 1993. In 1995 the rate fell to 33%, as consequence of the unfavorable exchange rate and the larger local production.

e) considering the relationship between prices paid to rice growers and prices paid by consumers, we observe that there is a large transfer of revenues from rice growers to other agents of the commercialization system. This can be confirmed by observing that, in 1986 farmers received 53% of consumer prices while in the 1990's the percentage rate fell to only 32, 27 and 33% for 1991, 1993 and 1995, respectively.

The inefficiency of the commercialization system, reflected in lower prices to farmers, is a result of the entry of the country in the open economy, which left financing institutions without capital and the lack of an infrastructure in the commercialization chain, primarily, in the collection, transformation and distribution phases of rice to the regions.

Finally, Figure 2 compares prices paid for rice produced by Guinean farmers, prices for imported rice and prices at the consumer level. It shows that prices paid to farmers in the 1990-1995 period, suffered a small decline with a subsequent recovery. While consumer prices grew 47% from 1992 to 1995, price to farmers grew only 12%. Even more serious is the decline of 10% in prices for imported rice in the same period. These results clearly demonstrate that Guinean farmers lack professional training and have little expertise.

Table 4

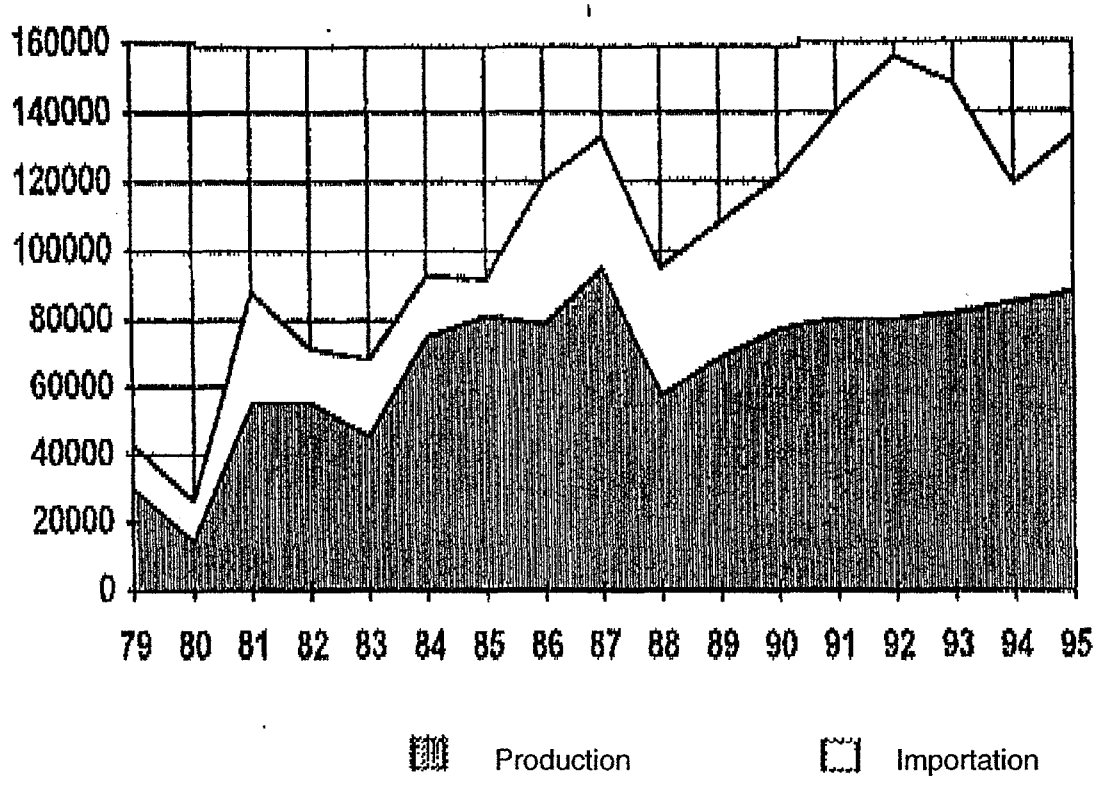
GUINEA-BISSAU - Rice Trade Index

Activity/Year	1986	1991	1993	1995
A. Domestic Produc.(unhulled/tons)	121,200	123.564	125.907	136,000
B. Price to Farmer(US$/t)	237	114	107	155
C. Farmer revenue(B*A)	28.724	14.086	13.472	21.080
D. Importation (unhulled/tons)	41,123	59.650	66,270	45,000
E. Price-FOB(US$/t)	253	293	278	280
F. Amount of importation(E*D)	10.404	17.477	18.423	12.600
G. Availability for consumption* {[(A*0.65)+D]*0.90}	107.913	139.967	133,298	120.060
H. Price to Consumer(US$/t)	446	351	393	470
I. Value of Cons. Products(H*G)	48,129	49,128	52,386	56.428
Relationship:				
Importation& domestic production	0.34	0.48	0.53	0.33
Price to farmer/ Price to consumer	0.53	0.32	0.27	0.33

Source: Table 2, Annex 12, LEA & BARBOSA(1992), Anuário Estatístico de GB.
(*) Corresponds to [(domestic production + importation) - (exportation + re-exportation)] estimated at 10%.

FIGURE 1

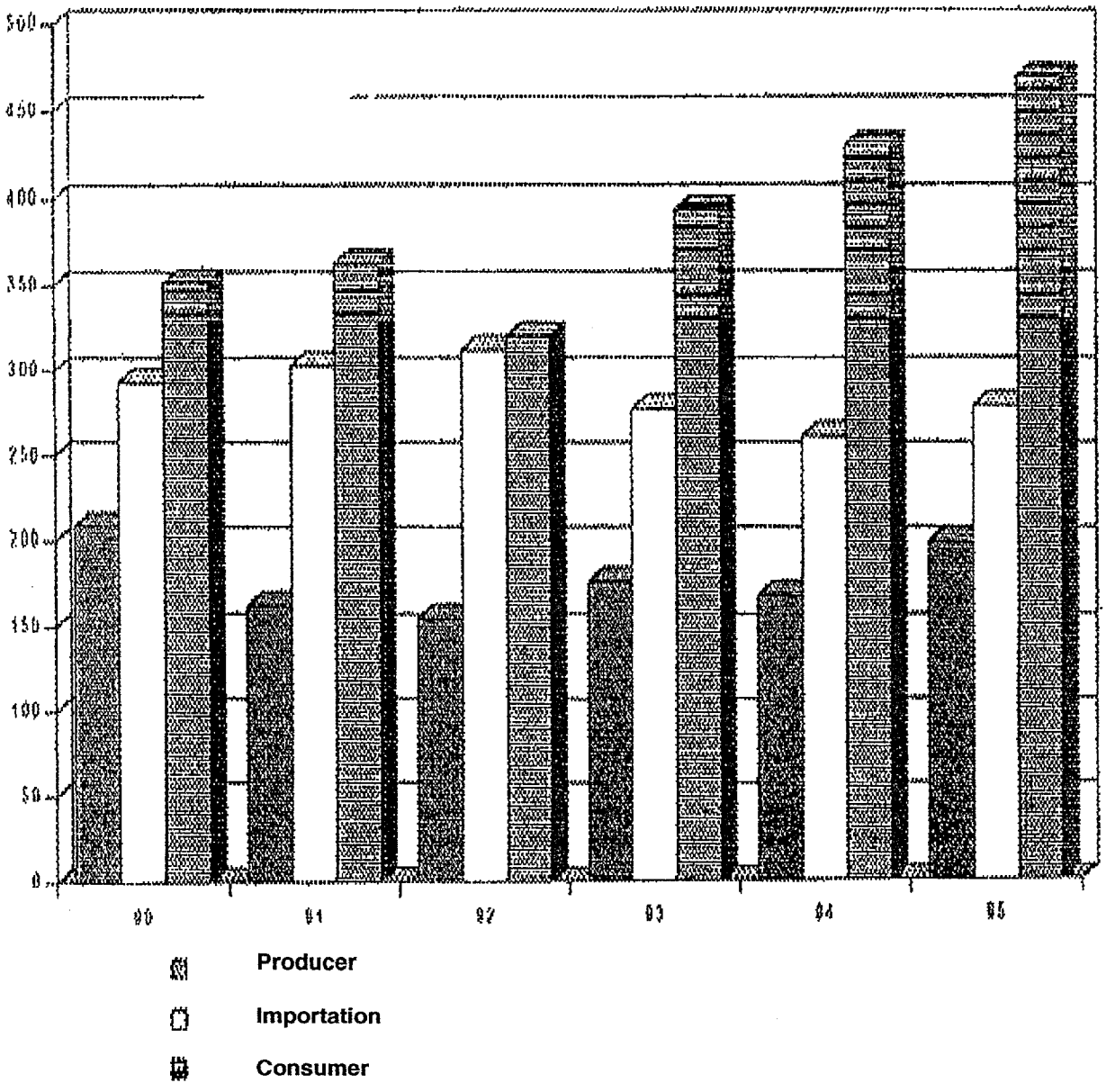
GUINEA-BISSAU - Production(t) and Importation(t) of Hulled Rice, 1979-95



Source: Table 2

FIGURE 2

GUINEA-BISSAU- Evolution of Prices (Us$/t) to Farmers, for Imported Rice and to Consumers, 1990-95



Source: Table 2 and BCBG (1995)

1.4. Support System

In any production chain, the support system must be the most efficient link. The support system assists and integrates the production, processing and commercialization segments.

The rice agribusiness support system in Guinea-Bissau suffers from a series of deficiencies and needs that hinder greater dynamism in the sector.

The production component has been harmed by the deficiency in seed supply; seed production is decreasing year after year. Technical assistance and rural extension leave a lot to be desired, since agencies responsible for that task are poorly equipped and their technical staff, though very knowledgeable is unmotivated due to very low wages.

Moreover, for those same reasons, agricultural research is nearly nonexistent, which is a disturbing fact, in view of the market globalization guided by a competitive edge on an international level. In addition, there are no policies structured for the training of rice growers nor recurrent training for technicians in rice farming.

Funding, conservation and recovery of the common use of the paddies' infrastructure (damns and dykes), which is the responsibility of to the Government, is not being done according to the pace nor the importance of rice agribusiness for Guinea-Bissau.

The complete economic infrastructure that also supports the rice sector is in poor condition. There paved roadways are deteriorating and unpaved roads are in precarious condition. Such inefficiencies weaken the transportation of products from the production areas to the consumer centers and increase transportation costs. The lack of bridges, boats, rafts or ferry boats is also a serious obstacle for the efficient transportation of rice production.

The national fleet has been tremendously reduced and the condition of mid and large capacity vessels has greatly deteriorated; these are recognized as the most appropriate means for the transport of rice because of the low cost it offers. In addition, in recent past, most of the navigable areas and the docks in rice-producing areas are practically unusable because they have not been dredged in recent past, as done regularly in the Colonial period.

The storage structure is expressive and inadequate in rural and urban areas. The silos' capacity is far below the country's needs and many are located away from the production zones. Such situation causes transportation costs to rise and contributes for higher losses. Nevertheless, many business operators are building their own silos both in production and consumption areas.

Price and market information services have expanded satisfactorily, although they leave a lot to be desired. Toward that goal, ANAG's SIMA - Sistema de Informação de Mercados Agrícolas (Agricultural Market Information System), funded by TIPS/USAID is a modern support instrument for commercialization that is currently being popularized in the country. Rice agribusiness leadership must attempt to organize and establish ways for sustainable development.

Long and short-term credit is necessary, especially for rice growers using modern technology, who currently represent a significant figure in the rice sector.

Finally, the Government must support the creation of mechanisms for the establishment of a supply and equipment market for the agricultural sector and encourage the establishment of agroindustries, including rice mills.

2. STRONG CHARACTERISTICS OF RICE AGRIBUSINESS

In this section, we intend to show and analyze a few favorable reasons for the modernization and growth of the rice sector in the country to make it compatible with the economic and cultural stage of the Guinean people. In order to do that, we highlight the strong characteristics or potentialities that must be considered and/or levered to boost such an important economic segment, and a property of all Guineans.

Below, we list the most relevant characteristics of each segment of the rice production chain, i.e., agricultural, processing and commercialization segments.

2.1. Agricultural Segment

a) the secular tradition of rice cultivation in paddies is inserted into the most expressive rituals and in collective and individual decisions of country folk. Rice growing is the most important subsistence cultivation for Guineans living in rural areas. According to FONSECA(1990), rice consumption per capita averages 138 kg/year. In Bissau, the capital of the country, it reaches the high magnitude of 186Kg/year.

b) soil conditions are appropriate for upland rice growing. A large area of the Guinean territory is located in a delta created by large rivers with flooded paddies appropriate for fresh water cultivation. Additionally, approximately 15% of the territory is constituted by mangroves partly set aside for salt water paddies.

c) rainfall is also appropriate for cultivation through prevailing methods. In spite of the long below-the-average rain period, the production systems, results allow us to believe that a

rain-abundant climate pattern will follow in Guinea-Bissau. This cyclic phenomenon of drought and rain for weather-related variables is a fact scientifically proved by GIRARDI & TEIXEIRA (1978).

During the last drought, many paddies were abandoned, soil nutrients carried by showers to paddies diminished and there was great difficulty in desalinating mangroves as a result of rainwater shortage.

d) according to SCET INTERNATIONAL the potential expansion area for rice cultivation is 175,000 ha in salt water paddies, 125 ha in fresh water and 3,000 ha in upland farming. It is important to point out that these areas have not been reserved for cashew cultivation that is the agricultural product that greatly competes with rice for cultivation area.

e) rice varieties combined with different cultivation systems give rice paddies greater resistance to diseases and to the salt residues in mangrove paddies and satisfies the nutritional needs of rural population.

f) labor availability for rice farming is still sufficient to allow substantial growth in rice production. Rather than just being an economic activity, rice is a secular rite, enrooted in the culture of ethnic groups, in particular the *Balantas* people. Two facts could be used to sustain our statement:

I) that the competition for labor between cashew and rice farmers is inexpressive, since farming requirements do not overlap during the year but are, in fact, complementary; and ii) once rice milling units are installed, manual labor by women will be available to cashew farming.

g) Guinean rice farmers have the best technology for rice cultivation in Western Africa. However, paddies that were abandoned after protection dykes ruptured must be recovered. Also, the government must carry out a program to popularize and improve seed varieties of traditionally farmed rice (early and late varieties) accepted by peasants and thus, increase production and reduce the seasonableness of supplies.

2.2. Processing Segment

a) installation of small and mid-capacity rice-processing unities in major producing areas.

b) the number of rice mills in the country tends to grow even though, currently, not even 20% of the national yield is processed and milling services experience frequent equipment down time. We anticipate that on a midterm basis, all rice produced will be processed

mechanically in view of the good geographic distribution of rice milling units and the decrease in labor, freight and storage costs.

c) Reduction in processing costs, as mills become more frequently used and the availability of raw material grows.

d) establishment of mobile rice milling units that will make it possible to process the product at the settlements, i.e., closer to rice growers, enabling the processing of a larger volume of rice at reduced costs, bringing farmers closer to the commercial and information flow.

e) in the Southern region of the country, a few milling unities are currently adding a new dynamism to the region. Rice growers take their products to be processed in the mills and other business operators want to purchase their processed products. As a result of this it is estimated that the production resulting of the services offered by the facility to rice growers will produce system-wide cost cutting, labor availability and better prices for processed rice.

2.3. Marketing and Commercialization Segment

a) production volume increases in the last 20 years reached 4.1% per year, while the population grew a rate of 2.2% per year. The increment in the production "per capita" was 86% in the triennials 1983-85 and 1992-94 while the consumption "per capita" estimates for 1993 is 138 kg/inhabitant/year for the country and 186 for the city of Bissau.

b) in addition to the great potential of domestic demand, neighboring countries (Senegal, Gambia and Guinea-Conakry) are rice importers. Guinea-Bissau has a rare opportunity to lead the regional rice market in CEDEAO - Comunidade Econômica dos Estados da Africa Ocidental (Western African Economic Community) member-countries as a consequence of their political instability compared with it neighbors. In practice, this exchange is currently taking place due to the large volumes of Guinean rice being illegally exported and the volumes of food products that enter the country to be reexported to the Community member-countries.

c) the nutritious quality of local rice is a strong element in the competition against imported rice that, Additionally not having this characteristic, also has an inferior size and color quality. Currently, in rural areas, studies have identified a rejection for imported rice as "it does not last long in the stomach."

d) the total volume of local husked rice volume that enters the commercialization circuit is small. With the establishment of new silos for the storage of this grain and the increase of

the operating capacity of rice milling units it is feasible to affirm that there will be an intensification in rice trade with substantial growth of volumes.

e) reduction of momentous variations of rice supply and prices with the development of a production calendar through the use of early and late seeds and alternative production systems. Another course to reduce such serious distortions in the market will be the permission granted to all and any business person with financial resources to do so, to import rice. This will force the competition not to speculate with imported rice and both farmers and consumers would profit.

f) There is a great probability that, due to a series of foreign and domestic factors, that will increase the competition of local rice, making peasants equally interested in cashew culture. These factors are:

1. end of the drought that seriously hurt rice farming. Many paddies were abandoned, soil fertility in many cultivated areas dropped and even loss of water because of the low water levels.

2. cost reduction for locally-produced rice along the production chain caused by the increase in the operating capacity of milling machines and increase in competition between business operators.

3. price increases for rice imported by Guinea-Bissau in consequence of the worldwide decrease in rice supply as a result of the small growth in production, reduction of international stocks in addition to the reduction in international food aid to the country.

4. use of the commercialization channels created by the cashew agribusiness, which are very efficient internally.

5. strong reduction of the trend of exchange of imported rice for cashew nuts, because cashew farmers now prefer to be paid in cash.

2.4. Support Segment

a) usually, business operators transport their products by sea and by rivers and stuaries. The navigability of the coastline into inland and vice-versa depends on tide levels. In the Northern and Eastern regions roadways respond to their needs, due to the country's small territorial area.

b) small governmental investment aimed at the recovery of paddies (dams, dykes, dredging) would have an enormous effect in production and revenues. The dredging of previously navigable docks and rivers would substantially reduce rice transportation costs, currently being nearly completely being done by trucks.

c) the recovery of the damaged roadways and pavimentation that connects Buba to Catió will generate an extraordinary return, because it will make rice cultivation viable in the South.

d) availability of a significant number of agriculture-specialized technicians and research and a good infrastructure and rural extension in all sectors of the country.

e) availability of supply and farming machinery market, with a large potential for business activity in this sub-sector.

f) large demand for short and long-term agricultural credit from domestic and foreign sources.

g) fast and effective response to incentives granted to rice-agribusiness agents when it is done in an intelligent and planned manner. An example is the governmental program that grants credit to rice business operators for the purchase of hulling machines with a 50% down payment and the balance paid within an 8-year period.

h) possible foreign aid for rice farming, according to sustainability principles.

3. WEAK CHARACTERISTICS OF RICE AGRIBUSINESS

Below we present the major hindrances to rice farming that, with minimum effort, could be solved and make rice business more dynamic. Such obstacles are, demonstrated below by segment.

3.1. Agricultural Segment

a) the use of improved seeds is inexpressive. Seeds currently used are genetically degenerated. There are practically no rice seed growers operating in the private sector.

b) the generation of rice farming technologies adapted to the ecological and cultural conditions of country and the dissemination of the existing stock are minimally carried out, in reaction to the needs and the importance of rice for the country.

c) it is estimated that the area of abandoned paddies is the same as cultivated area. The major reason for this situation is the lack of drainage caused by the reduction of governmental agencies participation for construction and maintenance of common-use infrastructures (dams and dykes).

d) for the past 25 years, rainfall and water levels for paddies have been below average, causing the abandonment and low productivity of many of them, in particular, salt water paddies.

e) inadequate water management in paddies also contributed for the decline in productivity. In fact, based on the data from Table 11, we can affirm that when there is an increment of 10% in rainfall, rice production falls 6.3%, when in fact it should increase, in view of the production systems used. Thus, with the actual perspective of rainfall increases for the next years rice production will decrease if there is no improvement in water management.

f) small competition for farming areas against cashew cultivation when rice is explored in upland farming. The competition for labor occurs, also, in a significative way when upland rice is farmed in the Southern and Northern regions. Other forms of rice-growing coincide only temporally with cashew farming, such as salt water cultivation that coincides with the cashew-planting phase in the Southern region.

g) reduction of labor availability, particularly young men, as consequence of the country-city migration what will raise labor costs.

h) lack of a long-term macroeconomic policy for rice agribusiness, which leaves sector agents subject to a series of risks and uncertainties, predominantly, extreme price variations resulting from shortages or merchants' speculation.

3.2. Processing Segment

a) estimates place the volume of rice processed manually in wooden mortars at 90%. Processing the yield from one hectare through this rudimentary technology requires the same amount of labor used to produce it.

b) processing costs are comparatively higher compared to other countries as a consequence of the use of imported fuel, not electric power, to run processing unities.

c) many processing unities are located far from production zones causing equipment to be idle, causing a consequent cost rises.

d) shortage of operational capital for milling businesses that are necessary to build stocks of raw material to be available for immediate exchange for small-volume farmers who go to rice hulling services to exchange their yields for processed rice; milling unities could also stretch operational period and reduce downtime.

e) production losses of 30% in post-harvest activities (transportation, storage and processing) and poor quality of end-product as a consequence of the variety of rice and rudimentary hulling (wooden mortars and milling unities mechanically inefficient).

3.3. Market and Commercialization Segment

a) small yield per capita volume, which blocks bargaining power during sale. Additionally, the harvest is concentrated between December and April causing a seasonable rice supply that compresses prices to farmers. In fact, a ton of rice in the harvest season (February) costs US$ 119 while in-between harvests (September) it reaches US$ 170, i.e., 43% higher.

b) precarious roadways, silted ports and rivers, rundown vessels and deficient silos have contributed for the raise of commercialization costs. In fact, transportation costs for a ton of rice from Catió to Bissau is equivalent to 41% of its production costs (see Table 5 and Annex 10). In addition to this disfunction, farmers' disorganization and disinformation allows intermediaries to make tremendous profits.

c) urban population growth is causing an increase in rice per capita consumption. During the Colonial period, urban population was approximately 10% of the country's total population. Now it is over 25% with a tendency to grow further.

d) strong influence exercised by rice importers cartel causing price hikes on the consumer level when there is no supply from domestic producers.

e) Asian countries frequently sell their product at low prices in the international market in search of markets and foreign currency, because, notwithstanding the large domestic consumption volume, rice has a reasonable weight in their trade balance. Still as a reducer of competitiveness of locally-produced rise, subsidy policies and food aid to poor countries practiced by the United States help lower rice prices in the international market.

f) import dues are transferred to consumers of locally-produced rice although it has a favorable effect on the production. The exchange of imported rice for cashew nuts allows the continuation of high profit margins for commercialization operators.

g) the liberalization of the Guinean economy has disorganized the rice commercialization system in Guinea-Bissau in virtue of the Government's abrupt departure from it. As consequence, this process has become inefficient, causing reduction in prices paid to rice growers and a rise in consumer prices.

3.4. Support System

a) deactivation of government services that periodically dredged rivers and docks.

b) unavailability of supply and means of production market to support rice farming, with special emphasis for selected seeds, agricultural supplies and replacement parts.

c) incompatible school and farming calendars.

d) poorly-preserved paved roadways, many requiring paving.

e) reduction of governmental services to support rice farming, which caused the decay of common-use paddies infrastructure.

f) unavailability of credit lines to stimulate all segments of the production chain of rice, as well as more aggressiveness in the implementation of boost incentive mechanisms in the sector, in particular, the processing component.

g) lack of class associations and farmers cooperatives on a regional and national levels to unite sector businesses, strengthen and integrate rice agribusiness in Guinea-Bissau.

h) exaggerated enthusiasm on the part of the "ponteiros" using technology *vis-à-vis* with production costs.

I) Precarious control and need of regulatory mechanisms for transactions at the borders.

j) deficient storage system regarding management of government silos, inexpressive number of privately-owned silos and inappropriate existing barns in rural and urban areas.

SECTION II

SURVEY AND ANALYSIS OF COST/REVENUE IN RICE AGRIBUSINESS

This section presents cost and revenue components in production, processing and commercialization segments. We used conventional methodology and defined all technical coefficients (official and estimated) used on the tables. Detailed information is found on Annexes 1, 2, 3 and 4. An executive summary of that information is analyzed below.

Because the above-mentioned annexes will serve as a reference for this analyses, we would like to make the following comments on the information contained in them.

a) upland rice farming, whose financial indexes are found on Annex 1, contributes with 28% of the national production. However, by interviewing agents in rice agribusiness, we concluded that this percentage rate is around 18%. It is estimated that the Southern region produces 31% of rice yields in the country. The two ethnic groups, the *Fulas* and the *Nalus*, are the largest producers. In the Eastern region, the *Mandingas* and the *Fulas* produce 26% of the country's rice yields. The 43% is produced in the Northern region by the *Balantas* and *Manjacos*.

b) farming in salt water paddies, as shown in Annex 2, is done only in the Southern (49%) and Northern regions (51%). The *Balantas* are the largest rice growers in both regions followed by the *Nalus* (Southern region) and *Folupos* (Northern region). The official data demonstrates that this system accrues for 19% of rice production in the country. On the other hand, our estimates, based on interviews, reaches approximately 40% of national yields.

c) there are two methods of freshwater farming. The "Improved" method is characterized by the use of relatively modern practices (Annex 3). This practice represents only 10% of rice production and is concentrated in the Gêba River Valley, in the Eastern region by "ponteiros."

The second freshwater farming method is called "Traditional" (Annex 4). The official data shows this system producing 44% of Guinean rice while unofficial estimates indicate 32%. The region with the largest number of rice growers is the Northern region with 44% because the *Mandingas* are the largest producers, followed by the *Folupos*. In the Eastern region the production reaches 30% by the *Fulas*, following the *Mandingas* as the largest rice growers. Finally, the remaining production comes from the Southern region, where the *Beafadas* and the *Fulas* are the largest growers of this grain.

1. AGRICULTURAL SEGMENT

Annexes 1, 2, 3 and 4 show that the predominant cost item is labor, which reflects a very low cultivation technological degree. The analysis of the tables below, demonstrate indexes resulting from the average of three levels used, the percentage rate of participation of each level in the total production and the contribution of each system in the total Guinean production.

Based on Table 5, we observe that saltwater and traditional freshwater paddies have the lowest rate of production cost per hectare, which is US$ 108, while the highest is observed in improved freshwater paddies (US$ 143). The least efficient, in terms of profitability, is upland farming since the difference between the cost and revenue reaches only US$ 8.00 against US$ 292 obtained by the modern system. As for quantitative importance, we must stress the good profitability from saltwater paddies. They reach a differential of US$ 164, in which labor costs represent 92% of total, which demonstrates high social importance.

We also evaluated the community cost indexes resulting from the execution of infrastructure service for improved saltwater and freshwater paddies, commonly built and paid by private rice growers (see Annexes 2 and 3).

As demonstrated by previous analysis, farmers' revenues (total revenue minus other costs divided by the number of workdays) for the four methods of cultivation range from US$ 1.28 in upland farming to US$ 4.37 for improved paddies. On average, farmers' income is greater than their costs, which reach US$ 1.19, showing that rice farming is profitable.

To calculate revenue at the producer level we used a productivity average of 1,275 kg/ha and a price average of US$ 1.57/tons (details in Annexes 1, 2, 3 and 4).

Table 5

GUINEA-BISSAU - Cost/Revenue from Yields of One Hectare of Rice According to Cultivation System and Worker's Daily Wages, 1995.

Cultivation System	In US$ Cost/ha	Revenue/ha	Daily Wage/Worker
Upland farming	114	122	1.28
Salt Water Paddies	108	272	2.83
Improved Fresh Water Paddies	143	435	4.37
Traditional Fresh Water Paddies	108	179	2.27
National Averages	113	231	2.53

Source: Annexes 1, 2, 3 e 4.

A comparative analysis of a worker's daily wage with the revenue resulting from the corresponding rice yield from that labor and introducing a commercialization focus to the analysis, we found that, for a constant value of the salary for the labor (US$ 1.19) in the four systems during the year, there are significative differences in revenues when the sale is done during the harvest (February) or in-between harvests (September) (Table 7).

In fact, there is a 100% difference without considering the efficiency of each production system. As for the upland method, it is entirely unprofitable to sell the production right after the harvest that, in practice, does not happens since rice yields from this system are used for farmers consumption until paddy rice is harvested.

Table 7 indicates that it is advantageous for farmers to wait to sell their yields between harvests, for which educational campaigns and appropriate storage are necessary.

Table 6 shows the income of cashew farming, which has a symbiotic relationship with rice farming. Therefore, by comparing the costs of rice farming with cashew farming, we found that cashew farming is much more profitable. While the daily income per workday for cashew farmers is US$ 4.36, rice farmers profit only US$ 2.53.

Table 6

GUINEA-BISSAU - Worker's Daily Wage in Cashew Farming per Workday, 1994.

Activity	US$
Revenue from Cashew	4.36
Revenue from Cashew Wine	7.46
Revenue from Cashew Nuts + Wine	6.03

Source: FRANÇA, 1994.

Table 7

GUINEA-BISSAU - Comparative Analyses between the Costs of a Workday* and the Corresponding Volume of Rice Harvest and In-between Harvest Periods

1995

In US$

Production System/ Financial Indexes	Period	
	Harvest (feb.95)	In-between Harvests(sept.95)
Upland farming		
- Workday Wage	1.19	1.19
- Revenue(9.3 kg)	1.11	2.22
Salt water Paddies		
- Workday Wage	1.19	1.19
- Revenue (19,1 kg)	2.19	4.39
Improved Freshwater Paddies		
- Workday Wage	1.19	1.19
- Revenue (29,0 kg)	3.49	6.96
Traditional Freshwater		
-Workday Wage	1.19	1.19
-Revenue(15.4 kg)	1.85	3.70

Source: Annexes 1, 2, 3 e 4.
(*) Social security and other costs are not included.

In spite of its small representation in the gross national yields, rice cultivated in improved paddies yields US$ 4.37 per worker, which is similar to what is obtained by those working in cashew farms. A way to make rice more competitive is to transfer its commercialization for the second semester of year when the prices double (see Table 7).

2. PROCESSING SEGMENT

The spreadsheets in Annexes 5, 6, 7, 8 and 9 display the costs and revenues for different levels of down time of the 250-900-tons/year-processing equipment, in addition to manual rice hulling. We also presented costs and revenues from mills when rendering services or when they purchase the raw material at different prices.

From examining Table 8, which presents three levels of down time and two levels of salary for rice hulling services, we observe that if equipment is down 75% of the time, in practice neither alternative offers a compatible return of the invested capital. The 250-tons/year unit only yields profits when it operates at a 65% capacity and charges a 10% fee of the processed volume. The result is a gain of US$ 2,030/year.

The best revenue from the 900-tons/year unities is when the mill charges 10% of volume of processed rice, independently of the down time ratio.

An analysis of the alternatives shown on that table shows that, regarding the 250-tons/year unit, down time cannot be greater than 50% and the fee for hulling services has to be at least 10%.

Concerning larger milling-capacity equipment the study shows that the level of down time must not be below 50% and the fee for services must be above 5%.

In short, the lowest profit margin obtained by the 250-tons/year unit is negative whereas the highest reaches US$ 2,030, which corresponds to US$ 169/month. As for the largest unit, the lowest profit margin was US$ 297/year and the largest corresponded to US$ 759/month.

Table 8

GUINEA-BISSAU - Financial Performance of Mechanized Rice-Hulling Unities (Rendering Services)

1995

	In US$ 1.00		
	Down time Rate		
Activity	75%	50%	35%
1. 250 tons/year-unity			
a. Annual Net Profit (5% fee on processed volume)	- 371	- 18	144
b. Annual Net Profit Annual Net Profit	355	1,433	2,030
2. 900 tons/year-unity			
a. Annual Net Profit (5% fee on processed volume)	297	1,609	2,323
b. Annual Net Profit Annual Net Profit	2,908	6,832	9,113

Source: Annexes 5 e 6.

The following analysis refers to rice hulling services that purchase raw material for processing and sale. Table 9, therefore, shows that for all three rice hulling services the best alternative is to purchase raw material at US$ 0.12. If the price of the raw material is at US$ 0.24, two unities will suffer losses. It is clear that the alternative that is sound for farmers and milling businesses is a price for the raw material between US$ 0.12 and 0.24/kilo of unhulled rice.

Manual rice hulling, the predominant method in the country, is done by a team of three women and presents positive gains in all alternatives. However, a profit is made only when the price of the raw material is US$ 0.12. The ideal alternative, for rice growers and milling companies alike, would be a price for raw material between the two values presented on the table and the average degree of annual use equal or greater than 50%.

Still based on Table 9, we found that the income from milling equipment is US$ 3.14/day when the price of the raw material is US$ 0.12. It falls to US$ 0.14 when there is 100% increment in raw material supply, i.e., in-between harvests.

By what has been exposed above, and based on Table 9, we can affirm that manual rice hulling seems to be the most profitable for milling companies. Each of the women integrating rice hulling team makes US$ 3.14 per workday while rice and cashew farmers earn, respectively, US$ 2.53 and US$ 4.36. The salary for a workday in Guinea-Bissau is US$ 1.19.

3. MARKET AND COMMERCIALIZATION SEGMENT

Below we present the main transportation, storage and port costs. Annexes 10 and 11 present the costs with transportation by land or water or a combination of both.

In all screened areas, products can be transported by land, whereas only between Catió and Bissau the transportation can be done by boats. Between Catió/Bissau/Bafatá the transportation can be done by a truck/boat combination.

Transportation costs are high in Guinea Bissau. The transportation of a ton of rice from Catió-Bissau is equivalent to 41% of production costs, which reduce the competitiveness of Guinean rice reflecting the inefficiency of the sale system, which transfers income from farmers to other agents.

The storage system is precarious though many new unities are being built as a result of projects. Consequently, the cost of storage/ton/month is US$ 2.86. Port dues are at US$ 6.25

and some services executed in Bissau (storage/vessels/storage) charge US$ 5.71/tons in Catió and 9.52/tons in Bissau.

Table 9

Guinea-Bissau - Financial Performance of Rice-Hulling (Mechanized or Manual) When Purchasing Raw Material

1995

Activity	In US$ 1.00 Down time Rate 75%	50%	35%
1. 250 tons/year Unity			
a. Net Profit (raw material purchased at US$ 0.12/kg)	6,643	14,007	18,425
b. Net Profit (raw material purchased at US$ 0.24/kg)	-818	-874	-897
2. 900tons/year Unity			
a. Net Profit (raw material purchased at US$ 0.12/kg)	25,541	52,100	67,961
b. Net Profit (raw material purchased at US$ 0.24/kg)	-1,244	-1.472	-1.682
3. Three-women Team			
a. Net Profit (raw material purchased at US$ 0.12/kg)	592	1,186	1,543
b. Net Profit (raw material purchased atUS$ 0.24/kg)	26	55	72
c. Revenue in US$ per Workday:			
- Raw material at US$ 0.12/kg	3.14	3.14	3.14
- Raw material at US$ 0.24/kg	0.14	0.14	0.14

Source: Annexes 7, 8 e 9.

SECTION III

FORECAST AND FUNCTIONAL RELATIONS BETWEEN RELEVANT VARIABLES OF RICE AGRIBUSINESS

1. PRICE AND VOLUME FORECASTS FOR THE NEXT 5 YEARS

Table 10 presents a forecast for production, importation, prices at farmers level and on the international rice market, for an analysis of a quantitative trend scenario.

Results reveal that the yields of unhulled rice will be 161.4 thousand tons in 2000, an increase of 25.4 thousand tons, which correspond to an annual growth rate of 2.9%, while 57.5 thousand tons must be imported. The forecasted importation of rice is smaller than the production by Guinea-Bissau.

Prices paid to farmers and to imported rice will be, in 2000, respectively, US$ 175/ton and US$ 236/ton. It is interesting to note that by comparing the annual geometric growth rate in 1995 and 2000, we observe that domestic prices grew, while international prices decreased.

This tendency may be related with the reaction to the low levels of prices obtained by rice growers who, with the increase of domestic competition.

2. FUNCTIONAL RELATIONS BETWEEN RELEVANT VARIABLES OF RICE AGRIBUSINESS IN GUINEA-BISSAU

We selected fifteen variables to prepare this sub-item, chosen according to their relationship with rice agribusiness in Guinea-Bissau. Of all the variables tested in the many functions selected, only nine showed significance, were included and are presented on Table 2 and Annex 12. Even after more than four dozen adjustments, we left six variables out of the study because, in spite of their importance in the rice sector, they did not show significance at desirable rates or because they did not actually have a functional relation.

Two reasons can explain this situation: either the data did not reflect reality because of deficiencies during the gathering of the data, or because attaining a proper adjustment for them was impossible. They are price of rice in the international market, cashew nut price at the

producer level, revenues from cashew nuts, rice price at the consumer level, annual increment of rice production and annual increment in rice farming areas.

Table 10

GUINEA-BISSAU -Forecast* for Production, Importation, Prices to Producers and in the International Market, 1996 and 2000

In US$ 1.00

YEAR	Production unhulled (ton)	Importation hulled (ton)	Prices to Producer unhulled /ton	Price of Importation hulled/tons/FOB
	a) Current Amounts			
1994	131.017	33.870	112	262
1995	136,000	45,000	155	280
	b) Forecasted Amounts			
1996	141.086	47.500	159	271
2000	161.430	57.500	175	236

Source historical series: Table 12.
(*) These estimates were obtained by adjusting the linear functions according to the ordinary squared minimum process. For more details consult WONNACOTT & WONNACOTT(1981).

In spite of the short period of the series and the need to make the estimate of a few figures to fulfill existing missing data, the adjustments have demonstrated to be satisfactory, since:

a) there is coherence between theory and fact for the (three) selected models;

b) the signals from the estimators were as expected, except in one case;

c) the statistical tests are satisfactory.

Of the four functions that needed adjustments, according to the ordinary minimum squared method (Tables 11, 12 and 13) relations between only three of the selected variables could be established. The function that relates the growth of farming areas with other variables did not show significance for any of the variables tested, in spite of innumerous attempts.

The analysis of the function that relates rice production with selected variables (Table ll) demonstrates that rice production in Guinea-Bissau is influenced positively by import dues, but it was impossible to measure that influence, due to the unavailability of data.

The remaining variables have a negative impact on the volume of rice production as shown below:

a) considering rice production identical to domestic demand and relating it to prices paid to rice growers, we obtained the price-elasticity for the demand at -0.39. This coefficient indicates that, if rice growers increase the price of rice in 10%, the production, prices in the following year tend to fall -3.9%, showing a small sensitivity of the production/demand to variations in the prices due to the importance of rice in the Guinean diet.

In Brazil, according to BRANDT(1980), demand price-elasticity coefficient for rice is -0.10 and it is less sensitive in relation to the ratio for Guinea-Bissau (-0.39). In Brazil, the influence of rice importation on the demand is practically none, which is not observed in Guinea-Bissau because imported rice supplies approximately 35% of consumption.

b) on the other hand the elasticity-price coefficient, when crossed between imported rice and local production, was 1.35. This result indicates that if there is an increase of 10% in importation prices, local production will likely increase 13.5%. These numbers demonstrate that the Guinean rice grower reacts more strongly to the variations on importation prices than to internal prices.

c) the reaction to rainfall on rice production, which was expected to be positive, was in fact negative. Such unexpected phenomenon is likely due to the fact that water management is inadequate. The results showed that when annual rainfall increases 10%, production falls 6.3% whereas the opposite should take place, since rice is cultivated in flooded paddies. The coefficient of response to rainfall in rice production was -0.63.

Table 12 shows the relationship between the total supply of processed rice (production + importation) and price and volume of imported rice by Guinea-Bissau. For this function, the elasticity between the price of imported rice and total supply was -0.38. This coefficient indicates that for a 10% increase in price of imported rice, global supply falls only 3.8%. Currently, the coefficient of response of the global supply to variations in the volume of importation was 0.33, i.e., when importation grows 10% the global supply grows only 3.3%.

Finally, we present the function that relates rice importation to the exchange rate, with cashew nut production and import dues. The coefficient was as expected (Table 13). From those coefficients we calculated the levels of response. Thus, the result showed that for a 10% variation in the exchange rate, the importation decreases 6.8% the following year. On the other

hand, when cashew nut production grows 10%, rice importation grows 12.6% the following year, reflecting actual transactions, translated by the strong relation between rice importation and cashew nut production. As it has been remarked earlier, a large part of cashew nuts is exchanged by imported rice, i.e., foreign countries use rice as exchange currency to purchase cashew nuts.

Table 11

Estimated Values of the Parameters of the Total Yields (QRITz)

of Unhulled Rice in Guinea-Bissau

- Linear Model -

VARIABLES	ESTIMATED COEFFICIENTS	STATISTICS BY STUDENTS
Intercept (A)	183.611,500*	11,829
Price of Imported Rice(Im-Pt)	-111,090*	-4,457
Pluviometric Precipitation (CHUVAt)	-12,539**	-1,800
Price of Rice at Producer Level (RIZPt)	-63,335***	-1,443
Importation Tax (DUMMY)	10.388,920****	1,173
$R^2 = 0.88$	F(4, 15) = 28,698	DW = 2,408

Sources of original data: Annex 12.

NOTE: Number of Observations = 20
Degree of liberty = 15
* Indicates that the coef. is significantly different from zero to 1% probability.
** Idem to 5% probability.
*** Idem to 10% probability.
****Idem to slightly more than 10% probability.

Y or QRIZ(t) = 183.611.5 - 111,090IM-P(t) - 12,539CHUVA(t) - 63.335RIZP(t) +

+ 10.388,920DUMMY

Table 12

Estimated Values of the Parameters of the Total Supply (Ott)

of Hulled Rice in Guinea-Bissau

-Linear Model -

VARIABLES	ESTIMATED COEFFICIENTS	STATISTICS BY STUDENTS
Intercept (A)	109.753.500*	8,993
Price of Imported Rice (IM-Pt)	-82,128*	-5,189
Imported Rice (RIZIt)	1,099*	5,906
$R^2 = 0.89$	F(2, 17) = 70.525	DW = 2.20

Source of original data: Annex 12 e Table 2.

NOTE: Number of Observations = 20

Degree of liberty = 17

* Indicates that the coef. is significantly different from zero to 1% probability.

Y or OT(t) = 109.753.500 - 82,128IM-P(t) + 1,099RIZIt)

Table 13

Estimated* Values of the Parameters of the Importation of Rice (RIZIt)

of Hulled Rice in Guinea-Bissau

-Linear Model -

VARIABLES	ESTIMATED COEFFICIENT	STATISTICS BY STUDENT
Intercept (A)	11,228,800**	3,026
Exchange Rate(CÂMBIOt-1)	-18,337*	-4,843
Cashew Nut Production(QCAJUt-1)	3,097*	4,857
Import Due(DUMMY)	10,838,110***	1,231
$R^2 = 0.83$	F(3, 15) = 25,047	DW = 2.26

Source of original data: Annex 12.

NOTE: Number of Observations = 19
Degree of liberty = 15
* Indicates that the coef. is significantly different from zero to 1% probability.
** Idem to 5% probability.
*** Idem to 10% probability.

Y or RIZI(t) = 11,228,8 - 18,337CAMBIO(t-1) + 3,097QCAJU(t-1) +

10.838,110DUMMY

3. QUALITATIVE SCENARIOS FOR RICE AGRIBUSINESS

3.1. Worldwide Scenario

The worldwide production of unprocessed rice is estimated at 540 million tons (1994/95) with China, India and Indonesia leading rice production. The largest exporters are Thailand, the United States and Vietnam.

Data from FAO and the United States Department of Agriculture, quoted by *"LAVOURA ARROZEIRA* (1995)," indicates that "between 1990/91 and 1994/95 the consumption of processed rice grew from 346 to 357 million tons representing a 3%-increment. With the increase of consumption greater than the population growth (1.7%) there is a reduction in the volume of final stocks that in 1990/91 used to be 59,219 tons and in 1994/95 it is estimated to reach 46,238 tons, representing 21% decrease."

According to the USA RICE COUNCIL, per capita consumption in the United States grew 3.4% from 1993/94 to 1994/95. It is important to report this phenomenon because that country is one of the three largest rice exporters worldwide, and its contribution to the international trade of rice is greater than 2,0 million tons, which causes a strong reflection in price increases in the international market. On a worldwide level, per capita consumption is also growing and estimates show that it will increase from the current 57.5 to 58.8 kg/year in the year 2000.

Other important trends on the international rice market have been: the fact that some large rice growing countries are encouraging the substitution of rice farming for crops that generate higher economic returns, by gradually cutting farm subsidies to rice growers.

For all these reasons, we can affirm that the international prices for rice must increase reasonably. As a matter of fact, that has been happening for the past three years. In 1993 the quotation of the variety *Thai white rice 100% second grade, FOB, Bangkok* on the international market was set at 250 US$/tons, moving up to 289 US$/tons in 1994 and 292 US$/tons in 1995.

As a result of the scenario presented above, it is feasible to affirm that Guinean rice may become economically competitive, leading to the reduction of importation with ensuing increase of the domestic production motivated by higher returns to rice growers.

3.2. Scenarios for Rice Agribusiness in Guinea-Bissau

The sustainability of rice agribusiness in Guinea-Bissau will be founded on the increase of rice production and productivity profits resulting from the introduction of simple and efficient technology

such as the use of improved seeds (early and late), rational water management, reduction of losses by inadequate storage and reduction of inefficient segments in the commercialization system.

The pluviometric precipitation estimated for the next two decades favors rice farming due to volume and regularity. It is important to point out that in the last years, in spite of the lower rainfall level, drainage has been very precarious, which contributed for the reduction of productivity levels.

The increase in installed capacity of milling companies will stimulate and make the commercial system more efficient. The use of mortars will decrease drastically and women will be available for other tasks, such as cashew farming and replacing men in rice cultivation.

Prices to rice growers will certainly increase as a consequence of the rise in international prices, reduction of imports, greater efficiency in the commercialization system and increase in per capita consumption.

Import dues will likely to have different percent rates than current ones, because they have a positive impact on the production. Greater control must be put on the border to regulate the exportation of rice.

Rice agribusiness will tend to become more integrated and efficient and less dependent on cashew production, a trend that is already being noticed.

The Government will gradually withdraw from the sector and the country will take the position as the commercial entrepôt in sub-Saharan Africa as consequence of its political and economic stability, compared to its neighbors, which will face serious political-military problems.

SECTION IV

RECOMMENDATIONS

The most significant recommendation concerning the Agricultural Segment has to do with the use of selected seeds (early and late) to reduce the seasonality of supplies. The production of this supply can be done by modernized rice farmers - "ponteiros" - and the sale can be done by economic operators trading rice and cashew nuts.

Water management and terrain systematization in paddies must be urgently accomplished to avoid drastic revenue drops. Storage at the "tabanca" level must be motivated in order to reduce losses and maintain stocks for domestic consumption and sale after the harvest when prices are higher.

Increase in cultivated areas can be achieved at low costs by recovering extensive areas that have been abandoned because of rainfall shortage or because of improper water or soil management. The priority must be placed on freshwater paddies due to the little damage it causes to the environment.

Concerning the processing segment we recommend only the substitution of manual by mechanized rice hulling in view of the extended downtime in milling companies and release of a large labor contingent for more noble objectives.

Reduction of the downtime capacity in milling companies by reinstalling these equipments in the production zones or on mobile rice hulling services. To accomplish this goal, it is necessary to obtain credit for floating capital and silos.

In order to reduce sale deficiencies, it is necessary to cut transportation and storage cots by recovering roadways, boats and piers. Also, with the same purpose, it is necessary to reduce the level of correlation between rice and cashew, since rice is currently the main currency of exchange for cashew nuts.

Border trade must be directed and regulated so that Guinea-Bissau can lead the trade among CEDEAO-member countries. The major part of countries integrating this Council, with the exception of Guinea-Bissau are going through political and economic problems that hamper transactions with foreign countries.

Promote the organization of rice growers in associations and cooperatives in order to strengthen them whenever possible and avoid the reduction of their revenues that is occurring because of the decrease in prices paid to rice growers and increasing prices to consumers. Through these

organizations it would make it easier to obtain higher prices in consequence of the bargaining power and the possibility to sell rice in the period between harvests.

For the support system, the most urgent recommendations are: strengthening of technical assistance, agricultural aid agencies, training for rice growers and the adoption of more competitive and appropriate technologies, and advertise SIMA.

Establishment of a national strategy for the storage system that must be focused on building storage at the settlements, milling companies and consumer centers and to assist retailers.

Motivate private business operators to create a market for supplies aimed at agriculture. The lack of supplies for agriculture has created obstacles to the growth and modernization of the sector. Currently, there is demand for this market.

With the establishment of milling companies in the Southern region of the country, which have intensified rice farming there, paving the Buba-Catió road has become even more necessary since trade with that Region tends to increase from now on.

We highly recommend the creation of an association of all agents in rice agribusiness whose objective is to define a macroeconomic policy for rice production chain and stand for the creation tax incentives for milling companies and seed growers.

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ANEXOS

Anexo 1

Planilha de Indicadores Financeiros e de Resultado Econômico da Exploração de l(hum) Hectare de Arroz em Guiné-Bissau

Sistema de Produção: SEQUEIRO(1)

Em US$≡PG 21.000

Discriminação	Valores Para Def. Níveis de Rendimento(2)		
	600 kg/ha	800 kg/ha	1.200kg/ha
Custo Total	114.00	114.00	114.00
Custo com mão-de-obra(3): a) operações culturais(74 jt)	88.09	88.09	88.09
b) operações pós-colheita e transporte(8 jt)	9.53	9.53	9.53
Outros custos(4)	16.38	16.38	16.38
Valor de l(uma) jornada de trabalho(5)	1.19	1.19	1.19
Preço médio de l(um) quilo de arroz em casca ao produtor(6)	0.16	0.16	0.16
Receita de l(um) hectare de arroz(rendimento x preço)	**96.00**	**128.00**	**192.00**
Margem Bruta(Receita - Custos)	-18.00	14.00	28.86
Renda do Trabalhador (receita - outros custos /82 jt)	0.97	1.36	2.14
Custo de Oportunidade de l(uma) jornada de trabalho	1.19	1.1	1.19
Receita da venda de arroz produzida com uma jornada de trabalho na:			
a) safra(fevereiro) - US$ 0.12/kg	0.87	1.17	1.76
b) entre-safra(setembro) - US$ 0.24/kg	1.74	2.32	3.48

FONTE DOS DADOS: Pesquisa direta e fontes secundárias.

NOTA: 1. Corresponde aos niveis atuais de exploração no País.

2. Estima-se que da área total cultivada, 60% responde pelo rendimento de 600kg/ha, 20% pelo de 800kg/ha e os 20% restantes pelo rendimento de 1.200kg/ha.

3. Operações culturas: preparação do terreno, plantio, mondas, adubação e colheita.
Operações pós-colheita: debulha no campo, limpeza/peneirar e transporte até o celeiro.

4. Instrumentos de trabalho.

5. Estimativa do preço médio anual de uma jornada de trabalho.

6. Preço médio anual ponderado para 1995(estimativa).

Anexo 2

Planilha de Indicadores Financeiros e de Resultado Econômico da Exploração de l(hum) Hectare de Arroz em Guiné-Bissau

Sistema de Produção: BOLANHA DE ÁGUA SALGADA(1)

Em US$ ≡ PG 21.000

Discriminação	Valores Para Diferentes Níveis de Rendimento(2)		
	1.200kg/ha	1.800kg/ha	2.200kg/ha
Custo Total(i+ii)	*107.75*	*107.75*	*107.75*
i) Custo com mão-de-obra(3): a) operações culturais(69jt)	84.52	84.52	84.52
b) operações pós-colheita e transporte(24jt)	14.28	14.28	14.28
ii) Outros custos(4)	8.95	8.95	8.95
Valor de l(uma) jornada de trabalho(5)	1.19	1.19	1.19
Preço médio de l(um) quilo de arroz em casca ao produtor(6)	0.16	0.16	0.16
Receita de l(um) hectare de arroz(rendimento x preço)	***192.00***	***288.00***	***352.00***
Margem Bruta(Receita - Custos)	84.25	180.25	244.25
Renda do Trabalhador sem custo social (Receita - outros custos/93 jt)	*1.97*	*3.00*	*3.69*
Renda do Trabalhador com custo social(7)	**1.82**	**2.85**	**3.54**
Valor da receita de arroz produzido em l(uma) jornada de trabalho na:			
a) safra(fevereiro) - US$ 0.12/kg	1.55	2.32	2.84
b) entre-safra(setembro) - US$ 0.24/kg	3.10	4.64	5.68

FONTE DOS DADOS: Pesquisa direta e fontes secundárias.

NOTA: 1. Corresponde aos níveis atuais de exploração no País.

2. Estima-se que da área total cultivada, 30% responde pelo rendimento de 1.200kg/ha, 50% pelo de 1.800kg/ha e o percentual restante pelo rendimento de 2.200kg/ha.
2. Operações culturas: preparação do terreno, plantio, mondas, adubação e colheita. Operações pós-colheita: debulha no campo, limpeza/peneirar e transporte até o celeiro.
3. Instrumentos de trabalho.
4. Estimativa do preço médio anual de uma jornada de trabalho.
5. Preço médio anual ponderado para 1995(estimativa).
6. Custo social corresponde ao valor do investimento comunitário. Se se considerar como custo do produtor entre na planilha como 1/30 de PG 8.750.000/ha.

Anexo 3

Planilha de Indicadores Financeiros e de Resultado Econômico da Exploração de l(hum) Hectare de Arroz em Guiné-Bissau

Sistema de Produção: BOLANHA DE ÁGUA DOCE MELHORADA(1)

Em US$≡PG 21.000)

Discriminação	Valores Para Diferentes Níveis de Rendimento(2)		
	2.200kg/ha	2.800kg/ha	3.200kg/ha
Custo Total	*125.12*	*145.83*	*162.50*
Custo com mão-de-obra(3): a) operações culturais(66,5jt)	79.17	79.17	79.17
b) operações pós-colheita e transporte(27jt)	32.14	38.09	47.62
Outros custos(4)	23.81	28.57	35.71
Valor de l(uma) jornada de trabalho(5)	1.19	1.19	1.19
Preço médio de l(um) quilo de arroz em casca ao produtor(6)	0.16	0.16	0.16
Receita de l(um) hectare de arroz(rendimento x preço)	*352.00*	*448.00*	*512.00*
Margem Bruta(Receita - Custos)	216.88	302.17	349.50
Renda do Trabalhador sem custo social (Receita - Outros custos/93.7 jt)	*3.50*	*4.47*	*5.40*
Renda do Trabalhador com custo social(7)	**3.35**	**4.32**	**4.93**
Custo de Oportunidade de l(uma) jornada de trabalho	1.19	1.19	1.19
Receita da venda do arroz produzido em l(uma) jornada de trabalho na:			
a) safra(fevereiro) - US$ 0.12/kg	2.82	3.59	4.10
b) entre-safra(setembro) - US$ 0.24/kg	5.63	7.17	8.20

FONTE DOS DADOS: Pesquisa direta e fontes secundárias.

NOTA: 1. Corresponde aos niveis atuais de exploração no Pais.2. Estima-se que da área total cultivada. 20% responde pelo rendimento de 2.200kg/ha, 70% pelo de 2.800kg/ha e o percentual restante pelo rendimento de 3.200kg/ha.

3. Operações culturas: preparação do terreno, plantio, mondas, adubação e colheita.
   Operações pós-colheita: debulha no campo, limpeza/peneirar e transporte até o celeiro.
4. Instrumentos de trabalho.
5. Estimativa do preço médio anual de uma jornada de trabalho.
6. Preço médio anual ponderado para 1995(estimativa).
7. Custo social corresponde ao valor do investimento comunitário. Se se considerar como custo do produtor entre na planilha como 1/30 de PG 8.750.000/ha.

Anexo 4

Planilha de Indicadores Financeiros e de Resultado Econômico da Exploração de l(hum) Hectare de Arroz em Guiné-Bissau

Sistema de Produção: BOLANHA DE ÁGUA DOCE TRADICIONAL(1)

Em US$ ≡ PG 21.000

Discriminação	Valores Para Diferentes Níveis de Rendimento(2)		
	800kg/ha	1.200kg/ha	1.800kg/ha
Custo Total(i + ii)	*108.09*	*108.09*	*108.09*
i) Custo com mão-de-obra(3): a) operações culturais(59jt)	70.24	70.24	70.24
b) operações pós-colheita e transporte(20jt)	23.80	23.80	23.80
ii) Outros custos(4)	14.05	14.05	14.05
Valor de l(uma) jornada de trabalho(5)	1.19	1.19	1.19
Preço médio de l(um) quilo de arroz em casca ao produtor(6).	0.16	0.16	0.16
Receita de l(um) hectare de arroz(rendimento x preço)	*138.00*	*192.00*	*288.00*
Margem Bruta(Receita - Custos)	19.91	83.91	179.91
Renda do Trabalhador (Receita - outros custos/70 jt)	*1.63*	*2.54*	*3.91*
Custo de Oportunidade de l(uma) jornada de trabalho	1.19	1.19	1.19
Receita da venda de arroz produzido em l(uma) jornada de trabalho na:			
a) safra(fevereiro) - US$ 0.12/kg	1.37	2.06	3.08
b)entre-safra(setembro) - US$ 0.24/kg	2.74	4.12	6.17

FONTE DOS DADOS: Pesquisa direta e fontes secundárias.

NOTA: 1. Corresponde aos níveis atuais de exploração no Pais.

2. Estima-se que da área total cultivada, 60% responde pelo rendimento de 800kg/ha, 20% pelo de 1.200kg/ha e o percentual restante pelo rendimento de 1.800kg/ha.

3. Operações culturas: preparação do terreno, plantio, mondas, adubação e colheita. Operações pós-colheita: debulha no campo, limpeza/peneirar e transporte até o celeiro.

4. Instrumentos de trabalho.

5. Estimativa do preço médio anual de uma jornada de trabalho.

6. Preço médio anual ponderado para 1995(estimativa).

Anexo 5

Planilha de Custos e Receitas na Prestação de Serviços de Beneficiamento de Arroz
- Unidade de descasque com capacidade técnica de 250 kg/ano
- Em US$ 1.00 ≡ PG 21.000

Discriminação	Capacidade Ociosa(1)		
	75% (62,5t)	50% (125t)	35% (162,5t)
CUSTO TOTAL (a+b)	1,096	1,469	1,742
a. Custos fixos(2)	848	972	1,096
b.Custos variáveis(3)	248	497	646
RECEITA 1 (com 5% do arroz)(4)	725	1,451	1,886
RECEITA 2 (com 10% do arroz)(4)	1,451	2,902	3,772
LUCRO 1 (Receita 1 - C. Total)	- 371	- 18	144
LUCRO 2 (Receita 2 - C. Total)	355	1,433	2,030
LUCRO 1 (POR T) em US$(5)	-9.13	- 0.22	1.77
LUCRO 2 (POR T) em US$(5)	8.74	17.64	24.99

NOTA: 1. A capacidade operacional máxima possível é de 65% e a mínima verificada foi de 25%.
2. Amortização de 10, 13 e 16% do valor do equipamento para os níveis de ociosidade de, respectivamente, 35, 50 e 75%.
Salário do operador/gerente
Imposto semestral.
3. Peças de reposição, conservação, combustíveis e lubrificantes.
4. Quantidade de arroz(sem casca) recebido em pagamento pelos serviços prestados multiplicado pelo preço médio ponderado anual de venda (PG 7.500).
5. Lucro total dividido pela quantidade de arroz beneficiado que corresponde a 65% do peso do arroz em casca.

Anexo 6

Planilha de Custos e Receitas na Prestação de Serviços de Beneficiamento de Arroz

- Unidade de descasque com capacidade técnica de 900 kg/ano
- Em US$ 1.00 ≡ PG 21.000

Discriminação	Capacidade Ociosa(1)		
	75% (225t)	50% (450t)	35% (585t)
CUSTO TOTAL (a+b)	2,315	3,614	4,467
a.Custos fixos(2)	1,105	1,186	1,310
b.Custos variáveis(3)	1,210	2,428	3,157
RECEITA 1 (com 5% do arroz)(4)	2,612	5,223	6,790
RECEITA 2 (com 10% do arroz)	5,223	10,446	13,580
LUCRO 1 (Receita 1 - C. Total)	297	1,609	2,323
LUCRO 2 (Receita 2 - C. Total)	2,908	6,832	9,113
LUCRO l (POR T) em US$(5)	2.03	5.50	6.11
LUCRO 2 (POR T) em US$(5)	19.88	23.36	23.96

NOTA: 1. A capacidade operacional máxima possível é de 65% e a mínima verificada foi de 25%.

2. Amortização de 10, 13 e 16% do valor do equipamento para os niveis de ociosidade de, respectivamente, 35, 50 e 75%.
   Salário do operador/gerente
   Imposto semestral.
3. Peças de reposição, conservação, combustíveis e lubrificantes.
4. Quantidade de arroz recebido em pagamento pelos serviços prestados multiplicado pelo preço médio ponderado anual de venda do arroz sem casca (PG 7.500).

Anexo 7

Planilha de Custos e Receitas de Beneficiamento de Arroz com Compra da Matéria-Prima a Terceiros de uma Unidade de Descasque com Capacidade Técnica de 250t/ano

Em US$ 1.00 ≡ PG 21.000

Discriminação	Capacidade Ociosa(1)		
	75% (62.5t)	50% (125t)	35% (162.5t)
CUSTO TOTAL 1(a+b+c)	8,536	16,350	21,087
a. Custos fixos(2)	848	972	1,096
b Custos variáveis(3)	248	497	646
c. Custo da Matéria-Prima(PG 2.500/kg).	7,440	14,881	19,345
CUSTO TOTAL 2(a+b+c)	15,997	31,231	40,409
a. Custos fixos(2)	848	972	1,096
b. Custos variáveis(3)	248	497	646
c. Custo da Matéria-Prima(PG 5.000/kg).	14,881	29,762	38,667
RECEITA (4)(a+b)	15,179	30,357	39,512
a. Com venda do arroz	14,509	29,018	37,771
b. Com venda do farelo	670	1,339	1,741
LUCRO 1(Receita - Custo l)	6,643	14,007	18,425
LUCRO 2(Receita - Custo 2)	- 818	- 874	- 897
LUCRO 1 (POR T) em US$(5)	163.52	172.39	174.44
LUCRO 2 (POR T) em US$(5)	- 19.65	-10.75	- 8.94

NOTA: 1. A capacidade operacional máxima possível é de 65% e a mínima verificada foi de 25%. Rendimento industrial de 65% de arroz descascado.

2. Amortização de 10, 13 e 16% do valor do equipamento para os níveis de ociosidade de, respectivamente, 35, 50 e 75%, Salário do operador/gerente
Imposto semestral.
3. Peças de reposição, conservação, combustíveis, lubrificantes e matéria-prima.
4. Preço médio ponderado anual do arroz descascado e do farelo multiplicado pelas suas quantidades ao nível local das descascadora.
5. Lucro total dividido pela quantidade de arroz beneficiado que corresponde a 65% do peso do arroz em casca.

Anexo 8

Planilha de Custos e Receitas de Beneficiamento de Arroz com Compra da Matéria-Prima a Terceiros de uma Unidade de Descasque com Capacidade Técnica de 900t/ano

Em US$ 1.00≡PG 21.000

Discriminação	Capacidade Ociosa(1)		
	75% (225t)	50% (450t)	35% (585t)
CUSTO TOTAL 1(a+b+c)	29,101	57,185	74,110
a.Custos fixos(2)	1,105	1,186	1,310
b.Custos variáveis(3)	1,210	2,428	3,157
c.Custo da Matéria-Prima(PG 2.500/kg)	26,786	53,571	69,643
CUSTO TOTAL 2(a+b+c)	55,886	110,757	143,753
a.Custos fixos(2)	1,105	1,186	1,310
b.Custos variáveis(3)	1,210	2,428	3,157
c.Custo da Matéria-Prima(PG 5.000/kg)	53,571	107,143	139,286
RECEITA (4)(a+b)	54,643	109,285	142,071
a.Com venda do arroz	52,232	104,464	135,803
b.Com venda do farelo	2,411	4,821	6,268
LUCRO 1(Receita 1 - Custo 1)	25,542	52,100	67,961
LUCRO 2(Receita 2 - Custo 2)	- 1,243	- 1,472	- 1,682
LUCRO 1 (POR T) em US$(5)	174.64	178.12	178.73
LUCRO 2 (POR T) em US$(5)	- 8.50	- 5.03	- 4.42

NOTA: 1. A capacidade operacional máxima possível é de 65% e a mínima verificada foi de 25%. Rendimento industrial de 65% de arroz descascado.

2. Amortização de 10, 13 e 16% do valor do equipamento para os níveis de ociosidade de, r respectivamente, 35, 50 e 75%, Salário do operador/gerente Imposto semestral.
3. Peças de reposição, conservação, combustiveis, lubrificantes e matéria-prima.
4. Preço médio ponderado anual do arroz descascado e do farelo multiplicado pelas suas quantidades ao nível lo local das descascadora.
5. Lucro total; dividido pela quantidade de arroz beneficiado que corresponde a 65% do pelo do arroz em casca.

Anexo 9

DESCASQUE MANUAL DE ARROZ POR EQUIPE DE TRÊS MULHERES
Planilha de Custos e Receitas

- Capacidade Técnica de Processamento: 19 t/ano≡250 jt de 6 horas/dia

(Em US$≡PG 21.000)

Discriminação	% da Força de Trabalho não Utilizado(1)		
	75% (4,75t)	50% (9,5t)	35% (12.35t)
CUSTO TOTAL 1(a+b+c)	664.43	1,324.90	1,721.19
a. Custos fixos(2)	5.38	5.38	5.38
b. Custos variáveis(3)	93.57	188.57	245.57
c. Custo da Matéria-Prima (PG 2.500/kg)	565.48	1,130.95	1,470.24
CUSTO TOTAL 2(a+b+c)	1,229.90	2,455.85	3,191.43
a. Custos fixos(2)	5.38	5.38	5.38
b. Custos variáveis(3)	93.57	188.57	245.57
c. Custo da Matéria-Prima (PG 5.000/kg)	1,130.95	2,261.90	2,940.48
RECEITA(4)(a+b)	1,256.29	2,510.71	3,263.91
a. Com venda de arroz	1,188.43	2,375.00	3,087.48
b. Com venda de farelo	67.86	135.71	176.43
LUCRO 1 (Receita - Custo Total 1)	591.86	1,185.81	1,542.72
LUCRO 2 (Receita - Custo. Total 1)	26.39	54.86	72.48
Renda Individual 1			
- por jornada de trabalho(em US$)	3.14	3.14	3.14
- por ano(em US$)	197.29(62,8 jt)	395.27(125,7 jt)	514.24(163 jt)
Renda Individual 2			
- por jornada de trabalho(em US$)	0.14	0.14	0.14
- por ano (em US$)	8.48(62,8 jt)	18.28(125,7 jt)	24.16(163,4 jt)

NOTA: 1. Estima-se que o máximo de utilização do esforço da equipe é de 65% tendo em vistas outros afazeres.
2. Depreciação do pilão.
3. Remuneração de mão-de-obra.
4. Preço médio ponderado do arroz descascado e do farelo multiplicado pelas quantidades na região do descasque.
5. Numa jornada de trabalho(jt) de uma mulher é descascado 25,2 kg de arroz.

Anexo 10

Planilha de Custos por Tonelada com Transporte de Arroz nos Principais Canais de Comercialização

Em US$ ≡ PG 21.000

Trecho	Meio de Transporte		
	Rodoviário	Hidroviário	Rodohidroviário
Catió/Bissau(1)	28.43	23.33	---
Catió/Bissau(2)	46.62	---	---
Catió/Bafatá(1)	30.95	---	---
Catió/Bafatá(2)	48.52	---	---
Bissau/Bafatá(1)	14.86	---	---
Bissau/Bafatá(2)	23.33	---	---
Catió/Bissau/Bafatá(1)	33.62	---	38.19
Catió/Bissau/Bafatá(2)	52.76	---	46.67
Bissau/Bissau(3)(1)	3.19	---	---
Bissau/Bissau(4)(2)	5.81	---	---

Nota: (1) Transporte estatal(PG 2.095/km).
(2) Transporte privado(PG 3.289/km).
(3) Camião de 20 t.
(4) Camião de 10 t.

Anexo 11

Custos de Alguns Serviços de Apoio à Comercialização de Arroz em Guiné-Bissau, 1995.

Custo com Armazenagem (em US$ 1,00)

Tipo	Custo/t/mês	Custo/t/dia
Armazéns no Mercado de Bandim	2.86	0.095
Armazém Comercial de 1.500 t	1.00	0.033
Armazém Comercial de 3000 t	0.83	0.028

TAXA PORTUÁRIA

Bissau	6.25

CUSTOS AUXILIARES DE TRANSITO

(armazém/barco/armazém)

Catió	5.71/t
Bissau	9.52/t

Anexo 12

Dados Estatísticos Utilizados para Estimar as Funções Apresentadas nas Tabelas 11, 12 e 13

ANO	QRIZ	RIZI	CHUVA	RIZP	CAMBIO	QCAJU	D	IM-P
1976	61.109	10.891	2.866	467	30	1.500	0	468
1977	37.000	13.309	1.057	365	34	3.000	0	945
1978	60.010	28.107	2.450	319	35	3.200	0	710
1979	42.200	13.094	1.618	433	34	2.350	0	913
1980	20.800	11.948	1.615	436	34	2.900	0	810
1981	85.000	33.046	2.365	363	37	3.500	0	611
1982	85.000	16.782	1.683	351	40	4.100	0	559
1983	70.000	22.878	1.859	324	42	4.700	0	500
1984	115.581	17.658	1.340	181	105	6.000	0	267
1985	125.000	10.513	1.340	200	120	8.000	0	285
1986	121.200	41.123	1.651	237	133	7.000	0	330
1987	146.000	38.000	1.411	112	279	9.000	0	350
1988	88.384	37.489	2.601	93	447	10.000	0	363
1989	105.859	39.000	2.064	108	809	10.000	0	371
1990	118.834	43.270	1.378	111	1.076	19.450	1	293
1991	123.564	59.650	2.363	114	1.695	28.080	1	304
1992	123.612	75.720	2.247	96	2.873	30.160	1	312
1993	125.987	66.270	1.738	107	4.259	32.240	1	278
1994	131.017	33.870	2.420	112	4.905	34.320	1	262
1995	136.000	45.000	1.849	155	6.368	36.000	1	280

FONTE: Tabela 2, Centro de Meteorologia de Guiné-Bissau, FRANÇA (1994), Banco Central de Guiné-Bissau e Ministério do Comércio.

Significado das Siglas:

QRIZ = produção de arroz em casca em Guiné-Bissau(t).
RIZI = quantidade importada de arroz sem casca por Guiné-Bissau(t).
CHUVA = precipitações pluviométricas em Bolama - Guiné-Bissau(mm/ano).
RIZP= Preço do Arroz em casca a nivel de produtor(US$/t).
CAMBIO = taxa de câmbio de Guiné-Bissau - valores médios.
QCAJU= produção de castanha de caju de Guiné-Bissau(t).
D (DUMMY) = imposto de importação. Atribuiu-se 0(zero) para o período sem imposto e 1(hum) para o período em que foi cobrado imposto.
IM-P = preço do arroz importado por Guiné-Bissau(US$/t).

Pessoal Contactado para Efeito de Elaboracão do Documento sobre Arroz em Guiné-Bissau

1. Nelson Dias - UICN (União Internacional para a Conservação da Natureza)

2. Carlos Schwarz da Silva - AD (Ação para o Desenvolvimento)

3. Malan Djassi - Governador da Região de Tombali - Zona Sul da Guiné-Bissau

4. Victor Silva Nabuna - Comerciante, Presidente do Conselho Fiscal da Câmara do Comércio da Região de Tombali e Quínara

5. José Pereira Saldanha - Comerciante residente em Catió

6. Carlos Amarante - Diretor do Gabinete de Planejamento do Ministério do Desenvolvimento Rural e Agricultura

7. Filinto Barros - Consultor da USAID (Agência Americana para o Desenvolvimento Internacional)

8. Apa Patrão da Costa - Diretor da Zona Agrícola III em Tombali

9. Domingos Monteiro - Gerente de uma unidade de descasque em Catió

10. Luciano Buli Camará - Comerciante de arroz

11. Hipólito Djata - Diretor da Zona Agrícola II em Bafatá

12. Mamadu Julde Baldé - Produtor, comerciante e proprietário de uma descascadora

13. Peter Mendy - Presidente do INEP (Instituto Nacional de Estudos e Pesquisa)

14. Rui Ribeiro - Sociólogo do INEP (Instituto Nacional de Estudos e Pesquisa)

15. João Nandingna - Produtor, comerciante e proprietário de uma descascadora

16. Malam da Silva - Agente do Serviço Meteorológico Nacional

17. Jim Bryon - Titular da Tropic International, Recife-Brasil.