Chapter 5

AGRICULTURAL DEVELOPMENT OF THE CERRADOS REGION AND THE IMPACT OF PRODECER

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After the implementation of the projects “PADAP” and “POLOCENTRO” in 1973 and 1975 respectively, “Prodecer” started to be implemented in 1979. Mainly due to the incentives and influence of these projects, the Cerrados region added to the Brazilian productive process 10 million ha of annual crops and 2 million ha of perennial crops, in a period of a quarter of a century. The total exploited area in this region, including the pasture areas, represents more than 45 million ha, still with high possibility of expansion.

The crop that stimulated the most the development of the Cerrados region was soybean. The production rate of soybean in the region, in relation to the total national production, jumped from 4% in 1975 to 53% in 2000. The increase of soybean production in this region propelled Brazil to the 2nd position among the soybean producing countries, with the USA in the 1st position. This also induced the introduction of other crops, redefining the national map of agricultural production. Furthermore, the magnitude of Brazilian soybean production also influences the price fluctuation in the international market, guiding investment in infrastructure improvement, such as in the commercial corridors, and strongly contributing for national development in the agro-industrial sector.

The objective of this Chapter is to examine the actual situation of the Cerrados region agricultural development and to identify Prodecer impacts on this process. The actual situation of the Cerrados region will be described through figures that represent the evolution of main crop production, the evolution of multinational companies that work with grains, and the influence on the commercial corridor plans. The Prodecer impact on Cerrados region development process will be analyzed in two parts: direct impact and indirect impact. The direct impact will focus on analysis of Prodecer implementation effects on the economy, on the society and on the agricultural development of the locations where it was implemented. The indirect impact will focus on analysis of the influence of cultivation area and soybean production increase on the environment, on the national economy, on the country’s agriculture and on the international market.

5.1 PRESENT SITUATION OF THE CERRADOS REGION AGRICULTURAL DEVELOPMENT

5.1.1 Formation of a new agricultural potential based on soybean cultivation

Figure 5.1.1 shows the evolution of percent participation of the Cerrados region soybean, maize, coffee, and cotton production in relation to national production. Among these, the soybean production volume, in the Cerrados region, increased 38 times in the last 25 years, rising from 430,000 tons in 1975, to 16,660,000 tons in 2000. Meanwhile, the cultivation area increased almost 20 times, expanding from 330,000 to 6,450,000 ha in the same period, with a high increment of productivity through the incorporation of new technology. As a result, the percent participation of Cerrados region soybean in relation to the national production jumped from 4% in 1975 to 53% in 2000.

Maize production volume in Cerrados region increased from 4,560,000 tons in 1975, to 12,570,000 tons in 2000, increasing 2.8 times and with its percent participation in

relation to the national production jumping from 28% to 40%. Coffee and cotton production in the Cerrados region (traditional crops in Brazil) also increased, representing 50% and 80% of the total national production, respectively.

Soybean (preferential crop for the Cerrados region) showed the region's agricultural potential through its fabulous production increase, and also induced the increase of other crop productions. Hence, soybean played a leading role in the Cerrados region agricultural development.

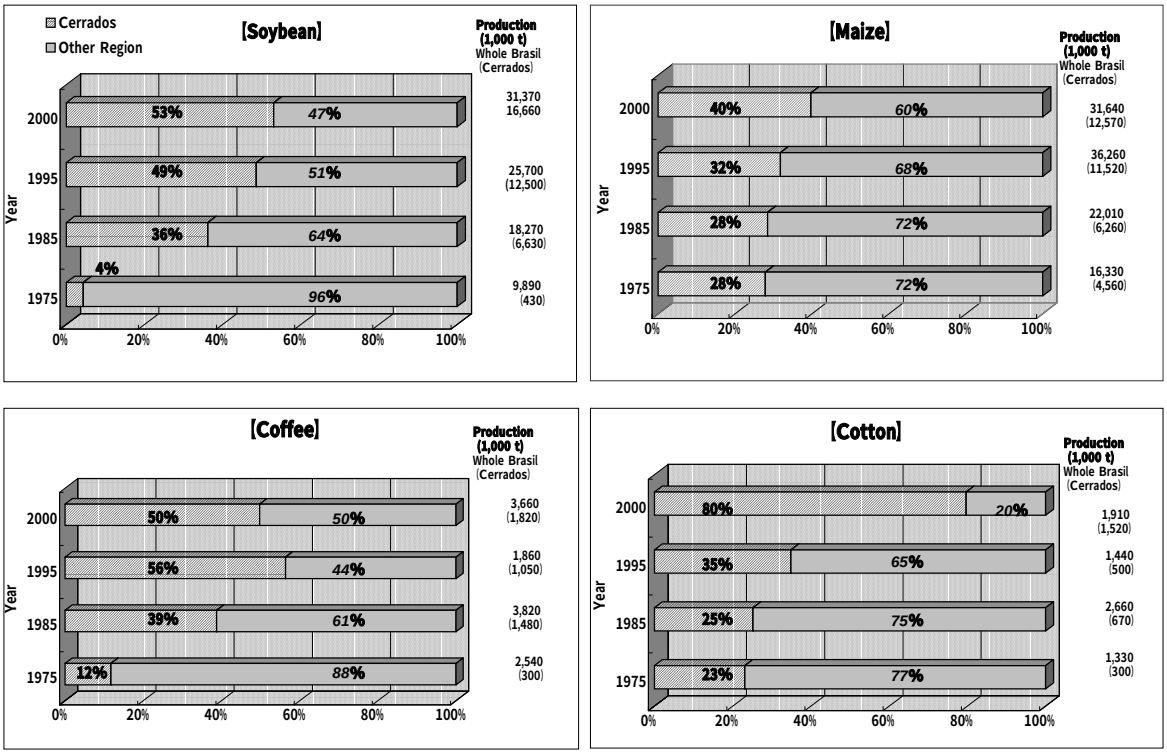


Fig. 5.1.1 Evolution of the Soybean, Maize, Coffee and Cotton Production in the Cerrados Region and their Participation in National Production

One of the main incentives for the expansion of soybean cultivation in the Cerrados region, as already described in Chapter 2, was the rise of international prices for primary products such as soybean and maize, which occurred in the beginning of the 70's. The measure adopted by the United States, to restrain the export of soybean, suddenly raised grain prices in the international market, resulting in the incentive to establish new production. On the other hand, the following soybean characteristics also influenced the increase of cultivation area and production volume and so should be considered:

a. Apart from the utilization for human consumption, soybean has a high utilization rate for agro-industrial purposes, mainly for the production of bran for animal feed and of vegetal oil. All of theses (grain, bran and oil) are considered as high-potential *commodities* both in the domestic and international markets.

b. Soybean is a crop well adapted to large and flat topographic areas, available in the Cerrados region, allowing the utilization of large size equipment, resulting in the economies of scale demanded on investment returns.

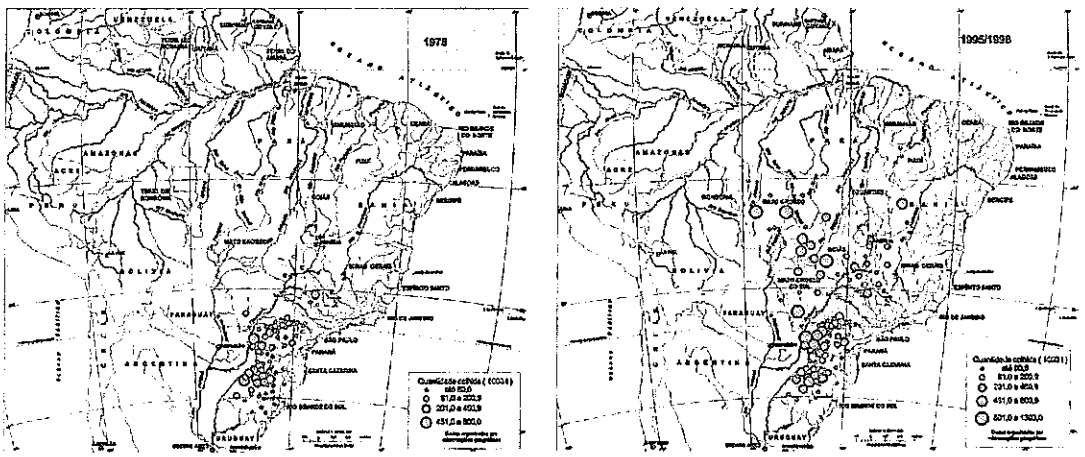
c. Brazil had the technological basis for the increase of this crop, mainly located at EMBRAPA-Soybean, in Paraná State, in the country's southern region.

d. Soybean adapted well to the low fertility Cerrados soil after its correction mainly by the high aerial nitrogen fixation capacity of the *rhizobium* (typical of leguminous crops) allowing the gradual improvement of these soils.

5.1.2 The trends of soybean cultivation expansion

Soybean production in Brazil has been migrating from the Rio Grande do Sul and Paraná States, since the 70's, to the Center-West Region (Mato Grosso, Mato Grosso do Sul and Goiás States, and Federal District) and also to the Minas Gerais State Cerrados, in the Southeast region. In the 80's, soybean production expanded to the Northeast Region, in the States of Maranhão and Bahia, and more recently to the North Region, in Tocantins State, and the production process also started in the Roraima State Cerrados, in the Amazon Region.

In the previous section, the evolution of the main crop productions in the Cerrados region was presented. Figures 5.1.2 (1)(2) shows the evolution, by State, of the main Cerrados crop production volumes over time: i.e. soybean, maize, coffee and cotton. The map shows the change of main crop production areas, migrating from the South/Southeast Regions to the Center-West, North and Northeast Regions, following the opening of the Cerrados region.



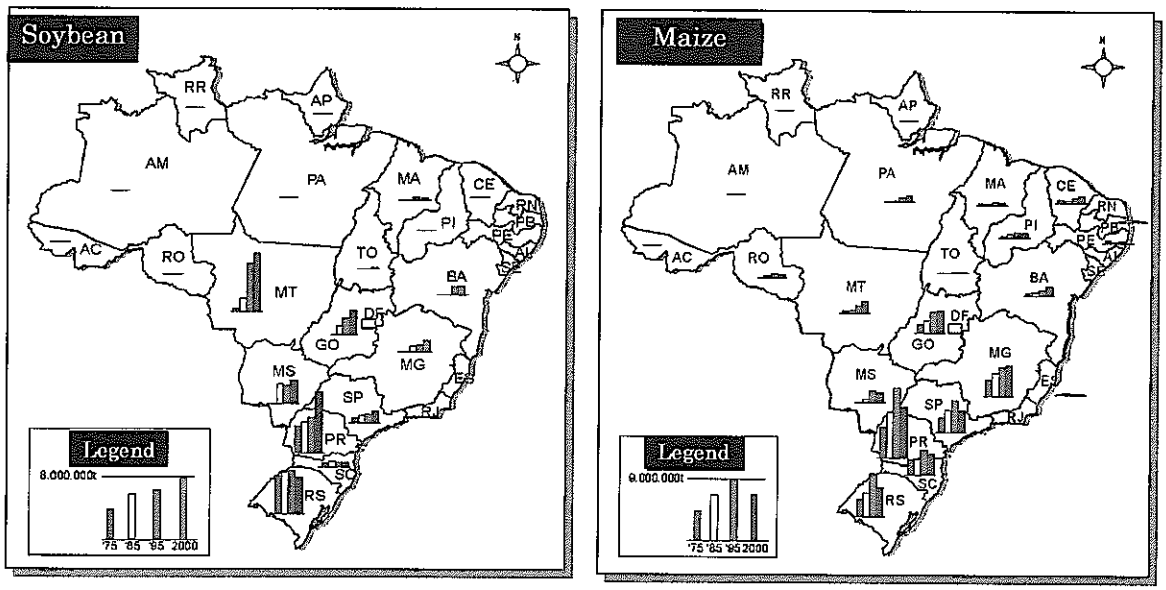
(1975) (1995)

Source : IBGE, Atlas Nacional do Brasil, 2001

Fig. 5.1.2. Evolution of soybean production area in Brazil

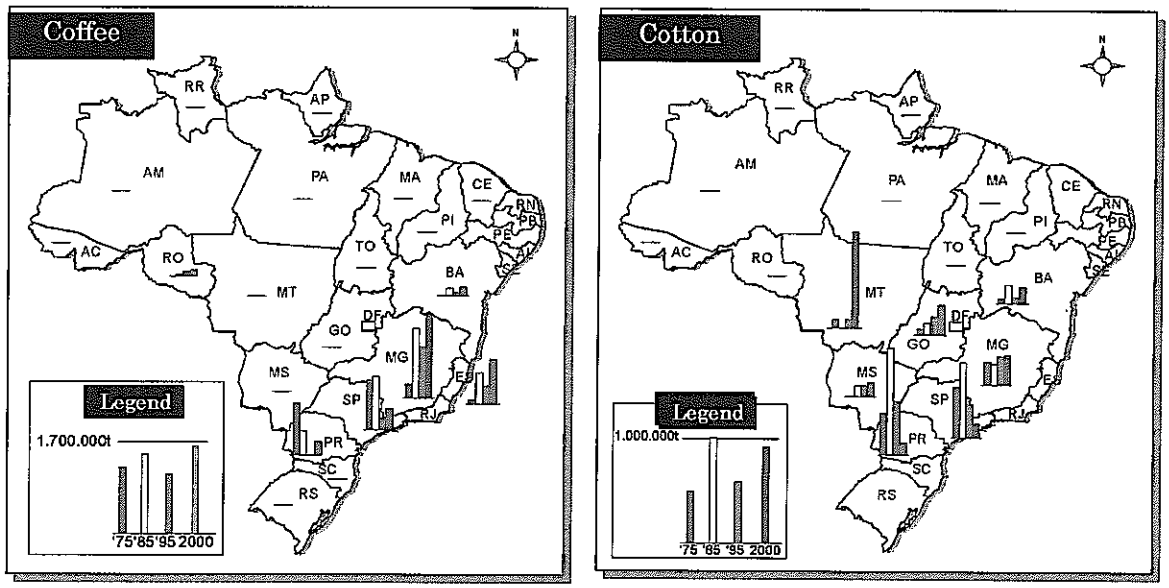
As a consequence of this expansion, the percent participation of the country's South Region (a traditional soybean producer region) in relation to the national total

production, dropped from 89% in 1975 to 42% in 2000. On the other hand, the soybean production in the Cerrados region increased very quickly, pulling other crop productions such as maize, feijão bean, coffee, cotton, etc., and thus redefining the map of the country's agricultural production.



Source: CONAB 2001

Fig. 5.1.3 (1) Evolution of the Production Volume of the Main Agricultural Products in the Cerrados Region, by State (soybean and maize)



Source: CONAB 2001

Fig. 5.1.3 (2) Evolution of the Production Volume of the Main Agricultural Products in the Cerrados Region, by State (coffee and cotton)

5.1.3 Influence of commercial and export corridors

(1) Diversification of commercial routes due to expansion of soybean production region

The expansion of the production towards the Cerrados region, mainly of soybean, has caused modifications in the commercial and export corridors of this *commodity* and its by-products. Until the 80's, when the South Region was the country's main producer, the main port for soybean export was the Port of Paranaguá, in Paraná State. However, due to the expansion of production from the South Region towards the Cerrados region, as shown in Figure 5.1.4, the commercial routes are diversifying. The main routes, since the 90's, are Itacoatiara port, in the Amazon River, and Ponta da Madeira port (this one utilizing the Carajás railway) for the commercial transport of the Cerrados region's products. These, together with Paranaguá port and the Rio Grande port in the South Region, and the port of Santos, in the Southeast Region, are the main alternatives for export.

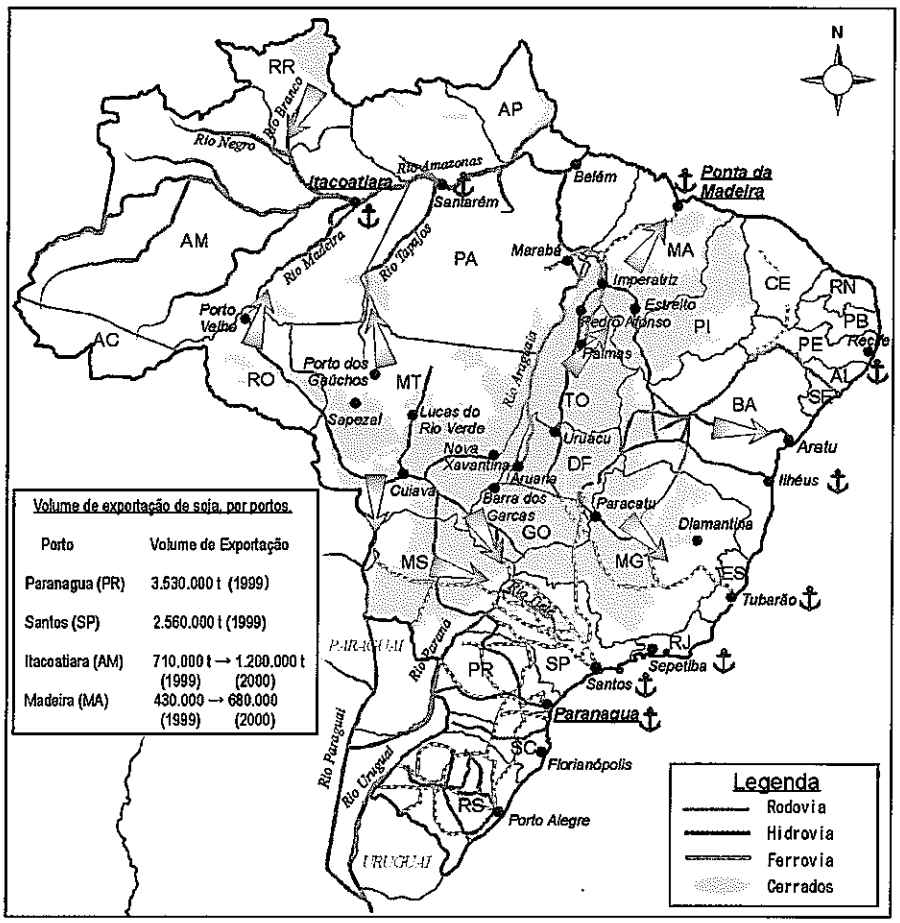
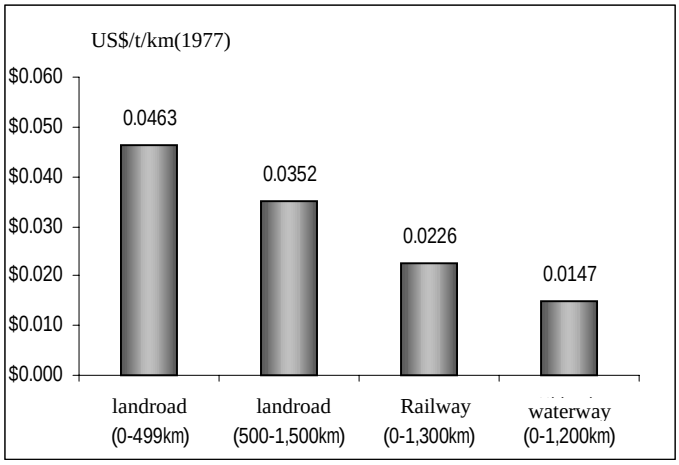


Fig. 5.1.4 Expansion of the Soybean Producer Region and Diversification of the Commercial and Export Routes

(2) Transportation means and cost

The opening of new commercial transport routes aims at the reduction of the so called "BRAZIL'S COST"[1]. Cargo transport in Brazil is carried out mostly via highways that represent 63% of the total transport means. Railways are second with 20% and then waterways, with 13% (GEIPOT, 2000). This heavy highway dependent system is the result of incentives to the automobile industry, which occurred during the 60's as part of the national policy for industrialization and of the highway network construction aiming at the development of the Brazilian inland, together with the creation and transference of the Federal Capital to Brasília.



Source: GEIPOT, 2000

Fig. 5.1.5 Cost per type of transportation modality

Figure 5.1.5 shows grain transport cost according to transport modality. For the reduction of the transport cost the modification of the present transport matrix is highly recommended by increasing the utilization of railways and waterways. The soybean producer regions in Brazil are in a very disadvantageous position in relation to the USA[2] due to their location in the Brazilian inland, thus increasing transport cost. In the USA, 61% of the grains are transported through waterways, followed by railways (23%) and highways (13%). According to estimations, with the implementation of waterway transport in the Cerrados region, soybean transport cost can be reduced 45% in the short-term, and 60% in the medium-term (FGV, Agroanalysis Magazine, vol. 20, 2000).

(3) New transportation corridors

Expecting the reduction of transport costs through the utilization of railways and waterways, public and private sectors in Brazil are developing multi-modal transport corridors, mainly for export. The implementation of these corridors, when oriented to the commercial transport and export of soybean, will be followed by the modernization

[1] The Brazil's Cost is the name given to the sum of production costs including those related to the long distances between the production area and the exportation port, besides port related, financial and tributary costs.

[2] The average distance between a soybean production site and an exportation port, in Brazil, is 1,400 km. The average transportation cost is US$ 50.00~60.00/ton. In the USA, the soybean transportation cost through the Mississippi river is US$ 6.60/ton.

and improvement of agricultural products commercial infrastructure in general, such as silos, storehouses, port facilities, etc., also generating expectations as for the general reduction of their costs. Such corridors already exist in some regions. However, there are still various challenges for a broad implementation of this type of corridor, such as the solution of environmental problems in some of the civil works, allocation of necessary resources, privatization of some facilities, consolidation of the management structures, etc.

The sections below present the general aspects[1)] of export corridors through a description of the Northwest, Northeast and Center-West Export Corridors, which are new corridors serving the respective regions where soybean production is being strongly incremented.

1) Northwest corridor

As shown in Figure 5.1.6, the Northwest Corridor is a soybean commercial route that connects the north of Mato Grosso State to Rondônia State and to the south of Amazon State. The unique quality of this corridor is river transport through the Madeira River, a tributary of the Amazon River. The final stop of this river transport system is Itacoatiara Port, located at the Amazon River, where granary ships are loaded with soybean for export, reaching the Atlantic Ocean through the Amazon River.

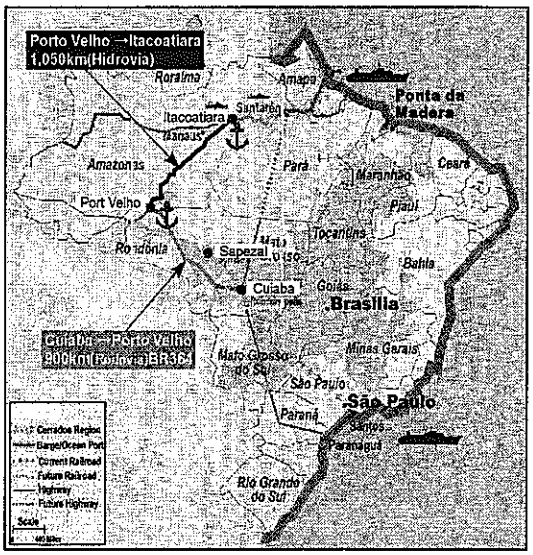


Fig. 5.1.6 Northwest Corridor

The soybean commercial route and this corridor's distances are as follows:

Origin: Sapezal Region, in the State of Mato Grosso - 900 km of highway transportation - Porto Velho Port, in the State of Rondônia – 1,050 km of waterway transportation – Itacoatiara Port, export gateway.

For transport through the Madeira River Waterway, the Maggi Group (a national company working with grains) is carrying out the maintenance of the road connecting

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1) This information is based on the material "TRANSPORTATION INFRASTRUCTURE IN BRAZIL – TOWARDS THE MERCOSUL" of the Foundation for Foreign Investment and Financing 2000, and on interviews carried out during *on site* visits. The details about the Plan of Transport Infrastructure Implementation of Brazil can be found in the program "AVANÇA BRASIL – PLURI-ANNUAL PLAN OF DEVELOPMENT, 2000 ~ 2003".

the Sapezal Region (central location in the production area in the Mato Grosso State Western region) to the highway that goes to Porto Velho Port. Similarly, the same Group has installed its own Port (floating) through its subsidiary called Hermasa that manages the river transport using barges constructed with the necessary facilities for their reception, storage and expedition in the Ports of Porto Velho (RO) and Itacoatiara (AM). In Itacoatiara). The Group invested US$90 million in the total implementation of this Corridor, using their own resources and financing received from BNDES (National Bank of Economic and Social Development) and from SUDAM (Superintendent Office of Amazon Development), according to information obtained at an interview carried out at Hermasa. Part of the soybean exported by the Maggi Group is directly purchased by Japanese trading companies, and the loading is done at Itacoatiara Port.

The volume of soybean exported by the Maggi Group through this Corridor is increasing rapidly. From 320,000 tons in 1997, the volume increased to 1,200,000 tons in 2001, and there are plans to increase this volume to 1,500,000 tons/year in the near future. The utilization of this Corridor allowed to the Group to reduce the highway transport distance and transport costs by 30%, when compared with transport via Paranaguá Port, traditionally used for export before. The utilization of return freight with imported agricultural inputs contributes further to the increase of competitiveness in relation to other production and commercial companies in the region.

2) Center-north corridor

This corridor is also called the Multi-modal North-South Transport Corridor (Fig. 5.1.7) because it crosses part of the national territory in the north-south direction via the North-South Railway. This corridor utilizes multi-modal transport as follows:

- Waterway: Utilization of the das Mortes River (580 km tributary of the Araguaia River), of the Araguaia River (1,230 km) and of the Tocantins River (420 km) that together flow into the Amazon river near its mouth.
- Highway: Utilization of BR-153 that connects Brasília to Belém, until the Ports of Ponta de Madeira and Itaquí located in the State of Maranhão.
- Railway: Utilization of two railways, the Carajás Railway (600 km) and the North-South Railway (currently with 230 km).

The region under the influence of this Corridor encompasses the east of Mato Grosso State, the north of Goiás State, the south of Maranhão State and Tocantins State. The North-South Railway was completed up to the City of Estreito (border of Tocantins and Maranhão States), where a multi-modal transshipment yard for cargo is already installed.

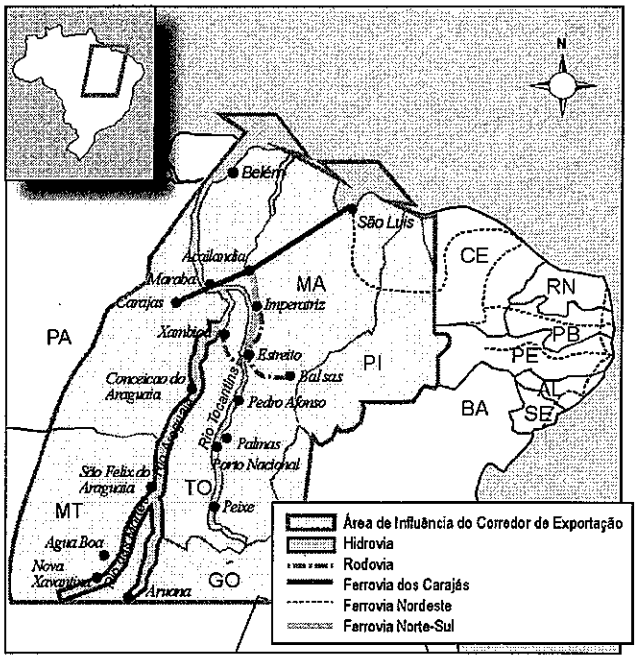


Fig. 5.1.7 Center-North Corridor

3) Northeast corridor

This Corridor is formed by the São Francisco River waterway and by the highways that connect the Pirapora Municipality, in Minas Gerais State, to the Petrolina Municipality, in Pernambuco State. The region under the influence of this Corridor encompasses the State of Minas Gerais, the west of Bahia State, the inland of Pernambuco State and the south of Piauí State.

The main canal of this Corridor is the São Francisco River and its tributaries that connect to the Southeast Region through Pirapora. This is an important Corridor for the domestic market. Part of the grains produced in the west of Bahia State and in Minas Gerais State are sent to the Northeast Region through this route.

5.1.4 Performance of multinational grain companies in the Cerrados region

(1) Installation of multinational grain companies due to increase of soybean production

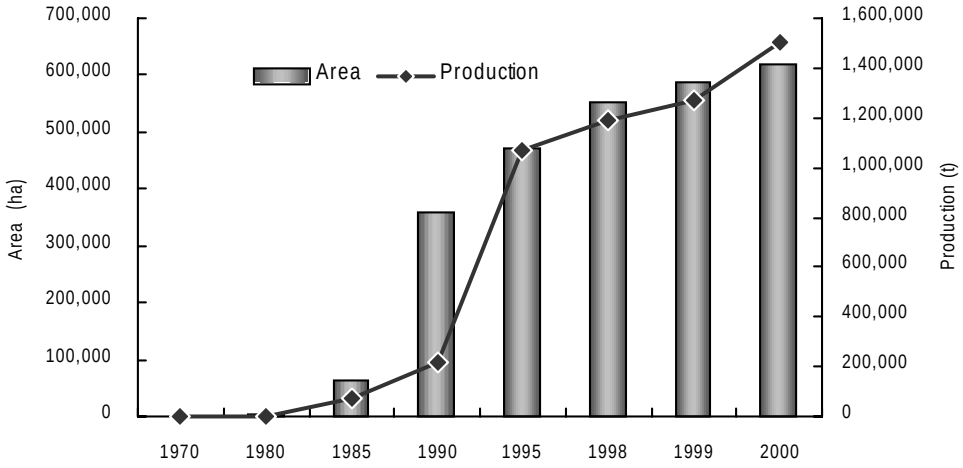
The vigorous expansion of the Cerrados producer region attracted the attention of multinational grain companies. These companies started their activities in Brazil in the beginning of the 70's, working with cotton and peanut processing, etc. Since the 80's, when soybean production started to expand vigorously in the Cerrados region, the following companies installed there successively: ANDERSON CLAYTON, CARGILL, CEVAL, SANTISTA, and more recently, ADM. There are also national companies such as Maggi Group, Caramuru, etc.

Cerrados soybean is produced in a period between Northern hemisphere harvests. It is

part of multinational companies' strategy to consolidate soybean supply during the whole year. This was one of the factors for their strong presence in Cerrados. As already mentioned in Chapter 3, most of the producers depend on "green soybean" resources offered by these companies to finance their crops, due to the producers difficulty in procuring official agricultural bank credit. Thus "green soybean" resources have become one of the main financing sources for the sector.

(2) Commercial / Processing of soybean and implementation of necessary infrastructure – The Bahia state west region case

In the west region of Bahia State, where there are Prodecer II projects, large-scale multinational companies such as BUNGE and CARGILL are installed. This region is becoming a great agricultural production center in the Brazilian Northeast (Figure 5.1.8): a process that started in 1983, coinciding with the implementation of Prodecer, and that attracts these multinational companies which are constantly expanding.



Source: Bahia State Gov.

Fig. 5.1.8 Evolution of the soybean cultivation area and production in the State of Bahia

The total cultivated area in Bahia State is 850,000 ha out of which 620,000 ha (70%) are for soybean. The production is of 1,550,000 tons, representing 5% of the national production (Source: Bahia State Government, year 2000). Table 5.1.1 shows volume of soybean handled by multinational companies in Bahia state. The companies BUNGE and CARGILL purchased 60% and 25% of the total production respectively, thus becoming responsible for the commerce of 85% of the State production.

Table 5.1.1 Volume of Soybean Handled by Multinational Companies in Bahia State

Companies	Volume (ton)	% participation
BUNGE	920,000	60.0
CARGILL	390,000	25.0
MATOSUL	96,200	6.2
CARAMURU	70,000	4.5
A.D.M.	18,000	1.2
Others	10,000	0.6
Soybean Seed	35,000	2.3
Available	10,000	0.2
TOTAL	1,549,200	100.0

Source: Data from BUNGE, 2000

According to BUNGE forecast, Bahia State will have, by 2005, 1,800,000 ha of cultivated area with soybean and an approximate production of 3,240,000 tons. With this expectation, BUNGE is planning to invest in new silos and storehouses.

At the same time, CARGILL estimates, based on their own survey, that Bahia has an arable area of approximately 1,730,000 ha. Today, it dominates 18% of the soybean national market and has a strategic target of reaching 20% in the short-term. In Bahia State, CARGILL's target is to purchase 30% of the produced soybean and so it is expanding its facilities with the construction of new silos and storehouses.

At present, CARGILL utilizes Ilhéus Port located in the south of Bahia State for the shipment of its products. The FOB soybean price (for grain) in this port, with destination to the USA, is US$229/ton. On the other hand, CARGILL is analyzing new commercial routes for its products, focusing on the city of São Luiz, in Maranhão State, where the port is being improved and the storage structure and port facilities are being expanded, and also because it is part of a new commercial Corridor. This port apart from being closer to the American, Asian and European markets in comparison with Ilhéus Port, also allows the mooring of big ships due to its deeper channel. According to CARGILL's estimation, at this port the soybean FOB price will be US$251/ton.

(3) Expansion of multinational company activities in the soybean processing sector

1) Migration of soybean crushing industries to the Cerrados region

The two multinational companies (CARGILL and BUNGE) installed in Bahia State, have besides grain storage silos, also soybean processing plants, mainly producing vegetal oils and bran for animal feed.

BUNGE has 10 storage silos (total capacity of 747,000 tons) and a soybean crushing plant (in Brazil, BUNGE has 10 factories). This company crushes a total of 12,000 tons of soybean per day. The plant in the west of Bahia State crushes 3,800 tons producing

700 tons of gross oil, out of which 350 tons are refined for the domestic market. The maximum crushing capacity of this factory is 5,000 tons/day, thus enough for the potential production increase in this region, considering that the west of Bahia State still has 1,730,000 ha of nonutilized land with productive potential. Table 5.1.2 shows the evolution of installed crushing capacity in Bahia State. In 1997, both BUNGE and CARGILL doubled their crushing capacity in this region.

Table 5.1.2 Soybean crushing capacity in Bahia State

Year	Crushing Volume (1,000 ton)
1995	650
1997	650
1999	1,500
	(BUNGE 1,000 tons and CARGILL 500 tons)

Source: Cargill data, 2000.

Currently, 72% of the bran produced by BUNGE is exported and the remaining 28% is used to supply the Brazilian Northeast region market (utilized in aviculture, swine husbandry and meat cattle husbandry). On the other hand, most of the CARGILL products are destined for the domestic market. An even higher increase is expected for the portion destined for the domestic market considering the trend of livestock husbandry expansion in the country.

As a Brazilian trading company, the Maggi Group, already mentioned, produces soybean, cotton, etc. on its own farms, mainly in Mato Grosso State, and also carries out the purchase, transport, commerce and export of soybean and its by-products, in a very integrated fashion.

This national Group almost completely by itself implemented a soybean shipment port in Itacoatiara, located in the middle of the Amazon River, final stop of the commercial route through the Madeira River waterway. At present, the Group is constructing one more 90,000 ton capacity silo near Itacoatiara Port, with a plan to soon construct another 105,000 ton silo. Apart from this, this Group intends to implement in this area, by 2004, an industry with capacity to process 2,000 tons of soybean/day and to expand their activities to the aviculture sector, utilizing their own bran, and aiming at the export of chicken meat to Europe. The investment for this enterprise is estimated at US$55 million.

The expansion of Maggi Group activities into the crushing sector for the production of oil and animal roughage, and for other sectors such as aviculture, is based on the “soybean product” as raw material. In this enterprise, the Group is backed by the productive potential of Mato Grosso State that alone presently produces 23% of the country’s total soybean production.

Despite this and other less important initiatives of the Brazilian private sector, the soybean productive chain in Cerrados (and also in the rest of the country) is strongly coordinated by foreign multinational companies that perform supply inputs for production, financing, and also processing/commerce/export.

Table 5.1.3 shows the evolution of the processing capacity, per State, of the soybean crushing plants. With the expansion of soybean production in the Cerrados region, these companies are moving their processing plants to that region, as shown in the Table. Until 1993, 80% of soybean crushing in Brazil was carried out in the South Region, but this percent dropped to 64% in 2000. During the same period, the soybean crushing carried out in the Cerrados region increased from 21% to 36%. This migration of crushing plants to the Cerrados region and/or expansion of the existing ones is mainly due to the reduction of transport costs and aims at assuring profitability through the solution of tax bottlenecks (ICMS - Tax on the Products Transit, etc.)

Table 5.1.3 Soybean Crushing Capacity, by State

Region/State	1993		1995		1997		2000	
	ton/day	%	ton/day	%	ton/day	%	ton/day	%
1. Traditional Region								
R.G do Sul	34,490	30.1	29,000	24.9	28,950	24.6	19,000	17.6
Santa Catarina	6,360	5.5	5,075	4.4	5,255	4.5	4,130	3.8
Paraná	32,440	28.1	35,370	30.4	35,720	30.3	31,500	29.2
São Paulo	17,330	15.1	13,565	11.7	13,460	11.4	14,700	13.6
Total	90,620	78.8	83,010	71.4	83,385	70.8	69,330	64.2
2. Frontier Region (Cerrados and other regions)								
Mato G. do Sul	7,400	6.4	6,980	6.0	6,730	5.7	7,330	6.8
Mato Grosso	5,150	4.5	8,330	7.2	8,550	7.3	10,820	10.0
Goiás	4,100	3.6	9,000	7.7	9,000	7.6	8,660	8.0
Minas Gerais	3,900	3.4	4,300	3.7	5,400	4.6	5,750	5.3
Bahia	2,000	1.8	2,500	2.2	2,750	2.3	5,200	4.8
Others	1,700	1.5	2,060	1.8	2,060	1.7	860	0.8
Total	24,250	21.2	33,170	28.6	34,490	29.2	38,620	35.8
Brazil	114,870	100.0	116,180	100.0	117,875	100.0	107,950	100.0

Source: Aguiar (1994)/ ABIOVE

2) Preponderance of multinational companies in the soybean processing sector

Table 5.1.4 shows the participation of soybean processing companies in the market (1997). Among the crushing companies in the country, the multinational BUNGE/SANTISTA is the biggest one with 24% of the market. As of August 2001, the crushing companies BUNGE, COIMBRA, SADIA and CARGILL together dominated 50% of the soybean crushing market in Brazil (according to ABIOVE data).

Table 5.1.4 Participation of Soybean Processing Companies in Crushing and Refining

Company	Crushing capacity		Refining capacity	
	ton/day	Part. (%)	ton/day	Part. (%)
Santista/Ceval (Bunge)	27,730	24	4,080	20
Coimbra - L. Dreyfus	8,650	8	600	4
Sadia	6,890	6	1,000	7
Cargill	6,700	6	1,220	8
Others	64	56	8,192	54
TOTAL	114,125	100	15,092	100

Source: ABIOVE (remark: includes rented plants)

The soybean processing plants migrated to the Cerrados region induced by the increase of soybean production in this region. They are expanding their facilities with the objective of increasing their gains through production economies of scale. The multinational companies are in an advantageous position in relation to the Brazilian ones considering that they have a solid financial basis and high investment capacity: necessary requisites for those willing to expand their processing capacity.

These multinational companies in Brazil have the strategy of reducing costs through the gains with production economies of scale, promoting mergers and acquisitions until controlling the whole process from production through financing, storage, processing, transportation and commerce of the soybean. Furthermore, they are consolidating an integrated and vertical structure, also reaching the commerce of agricultural inputs mainly through the acquisition of fertilizer industries, completely integrating the Cerrados region soybean production to the international market.

5.2 PRODECER IMPACT ON REGIONAL DEVELOPMENT

5.2.1 Position of Prodecer in the Cerrados region

Table 5.2.1 compares data of the main agriculture crops produced in the Prodecer projects with the crops from the Cerrados region, regarding aspects such as cultivated area, volume of production and productivity (data from 1999/2000). In the Prodecer projects, the production volume of soybean, maize and feijão bean is 257,000 tons, 210,000 tons and 20,000 tons, and these crops represent 1.6%, 1.7% and 1.6% of the Cerrados Region total production, respectively. As for productivity, Prodecer is 10% more productive in the case of soybean and more than double productivity in the case of maize and feijão bean in relation to the Cerrados Region.

Since its beginning, Prodecer has occupied an area of approximately 350,000 ha, which is relatively small when compared to the Brazilian Cerrados total area of 204 million ha, from which, as mentioned before, around 12 million ha are being cultivated with annual and perennial crops. The volume of soybean, maize and feijão bean produced in

Prodecer projects reaches a little over 2.5% of the Cerrados total present production. The production volume as per 1981 (the first soybean production year from Prodecer I) reached 22,000 tons, which corresponded, at that time, to 1% of the total soybean production in Cerrados of 2,200,000 tons.

A large number of producers settled down in the surroundings of Prodecer, on a larger or smaller scale, coming from that same region or from other places. Their goal was to develop agriculture activities, encouraged by Prodecer success and by the projects development potential. As a result, those areas presented an astonishing increase on agriculture production, especially that of soybean. In the last years, however, new technologies, especially in field irrigation, has supported the introduction of a countless number of other crops, promoting therefore the so much expected diversification in the properties and the region. It can be assumed that Prodecer has contributed significantly to confirm the agriculture production capacity of those areas, making them development pilot projects and by playing the role of the catalysts in the rising of new agriculture production regions.

Table 5.2.1 Comparison between Production Area, Production Volume and Productivity of the Cerrados Region Main Crops. (1999/2000)

PROJECT	Soybean			Maize			Feijão bean		
	Area (ha)	Prod, (ton)	Product. (ton/ha)	Area (ha)	Prod. (ton)	Product. (ton/ha)	Area (ha)	Prod. (ton)	Product. (ton/ha)
PRODECER I PILOT									
PC Irai de Minas	1,717	4,773	2.78	3,864	23,318	6.03			
PC Mundo Novo	2,4	5,5	2.29	800	4.8	6.00	450	830	1.84
PC Coromandel	1,2	3,2	2.67	420	2.6	6.19			
PC PER I				1.8	12.4	6.89	1	1.95	1.95
Sub total	5,317	13,473	2.53	6,884	43,118	6.26	1.45	2.78	1.92
PRODECER II PILOT									
PC Ouro Verde	7,375	22,658	3.07	580	4,929	8.50			
PC Brasil Central	10,49	27,882	2.66	820	4,846	5.91			
PC Ana Terra	4	12,5	3.13	2	12.6	6.30			
PC Piuva	6,4	20,5	3.20	1.95	10.8	5.54			
Sub total	28,265	83,54	2.96	5,35	33,175	6.20			
PRODECER II EXP.									
PC Guarda Mor	2,165	6,318	2.92	2.03	8,343	4.11			
PC Bonfinopolis	2,5	6,2	2.48	3.6	19.5	5.42	2.2	4.35	1.98
PC Piratinga	5,89	16,325	2.77	6.32	55,808	8.83	3.44	8,506	2.47
PC Buritis	3,8	10,1	2.66	2.9	14.1	4.86	120	220	1.83
PC Paineiras	2,8	7,5	2.68	1.2	7.15	5.96	400	780	1.95
PC Cristalina	2,3	5,3	2.30	800	4.62	5.78	470	1.09	2.32
PC Buriti Alto	3,15	7,3	2.32	1.4	8.5	6.07	1.2	2.45	2.04
PC Alvorada	11,772	25,334	2.15	300	1,371	4.57			
Sub total	34,377	84,377	2.45	18.55	119,392	6.44	7.83	17,396	2.22
PRODECER III PILOT									
PC Gerais de Balsas	11,851	34,879	2.94	2,196	12,249	5.58			
PC Pedro Afonso	16,869	41,004	2.43	642	2,154	3.36			
Sub total	28,72	75,883	2.64	2,838	14,403	5.08			
TOTAL	96,679	257,273	2.66	33,622	210,088	6.25	9.28	20,176	2.17
Cerrados Region									
Bahia	588,122	1,270,345	2.16	660	1,010,900	1.53	794.5	542.1	0.68
Distrito Federal	36,548	88,445	2.42	34	146.6	4.31	14	29.8	2.13
Goiás	1,373,719	3,461,772	2.52	840.4	3,412,200	4.06	108.4	191.5	1.77
Maranhão	152,237	319,698	2.10	317.9	284.1	0.93	70	31.5	0.45
Mato Grosso	2,669,210	7,340,328	2.75	553.9	1,251,700	2.26	31.4	26.2	0.83
Mato Grosso do Sul	1,115,422	2,342,386	2.10	513.7	1,682,400	3.28	25	23.9	0.96
Minas Gerais	633,697	1,457,503	2.30	1,328,600	4,061,600	3.06	433.7	359.9	0.83
Piauí	30,236	60,321	2.00	277.7	236	0.85	208.3	87.5	0.42
Tocantins	42,402	84,804	2.00	53	112.4	2.12	4.3	1.5	0.35
Total	6,641,593	16,425,602	2.47	4,579,200	12,207,900	2.67	1,689,600	1,293,900	0.77
BRAZIL	13,710,622	32,664,373	2.38	12,513,000	32,393,400	2.59	4,617,200	2,895,700	0.63
PRODECER/CERRADOS	1.46%	1.57%	108%	0.73%	1.72%	234%	0.55%	1.56%	284%
CERRADOS/BRAZIL	48%	50%	104%	37%	38%	103%	37%	45%	122%

Source: 1) Basic data from the Prodecer projects CAMPO, 2000.
2) Brazil Statistics Yearbook, IBGE, 1999/2000.

5.2.2 Prodecer impact on regional development

In this section, Prodecer direct impact on the places where it was implemented is analyzed, regarding the social and economic aspects and the agriculture development. The analysis was carefully organized and is based, as much as possible, on objective data. However, it was extremely difficult to obtain data at the municipal level since they may not have had or still may not have organized services of data files and statistics. For that reason, the municipalities of Paracatu (Prodecer I), Barreiras (Prodecer II) and Balsas (Prodecer III) were selected, where it was possible to obtain more reliable data,

which was confirmed during on site visits. On this subject, the recent work prepared by Mr. Regis Bonelli, researcher from DIMAC/IPEA, for EMBRAPA entitled "Long Term Economic and Social Aspects of the Agriculture and Livestock Husbandry Expansion in Brazil: Invisible Revolution and Social Inclusion" must be mentioned. In this work, he evaluates, from a quantitative point of view, the long term impact of the agriculture and livestock husbandry development on income, population growth and on the human development / life standards of selected geo-economic areas, among which the municipalities of Barreiras and Luiz Eduardo Magalhães – BA, Balsas – MA and Paracatu – MG are purposely included.

The present study on Prodecer impact was accomplished focusing on diversified information such as: population growth, urban development, tax revenue increase and the implementation of various urban infrastructure facilities (schools, piped water, sewerage system, housing, etc.).

(1) Urban development and population growth in Prodecer project surrounding regions

1) Migration and population growth to Cerrados regions

Until the 80's, approximately 50% of the Brazilian population was concentrated in the States of São Paulo, Rio de Janeiro and in the three States of the South Region. However, this concentration was reduced to 45% in 1990, revealing a population decentralization tendency. Table 5.2.2 shows that in 1996, the population of the States where most of the Cerrados Region is located, was 46 million, which corresponded to approximately 30% of the national total. The population growth of this region, in the period of 1980 to 1996, was 1.34 times more than the national average, while the population growth of the Center-West Region, located in the middle of Cerrados, was 1.55 times more, indicating the strong population attraction power of the region in this period.

Table 5.2.2 Population Evolution in the Cerrados Region and in Other Regions

(1.000 persons)

Region	1980	1990	1996	Growth 80/96 in %
1. Brazil	118,562	144,723	157,070	32
2. Cerrados Region	34,239	42,238	45,662	34
Tocantins	736,000	896,000	1,048	42
Maranhão	3,981	4,860	5,222	31
Bahia	9,416	11,686	12,541	34
Minas Gerais	13,341	15,565	16,672	25
Center-West Region	6,764	9,230	10,500	55
3. Other Regions	84,322	102,485	110,360	30

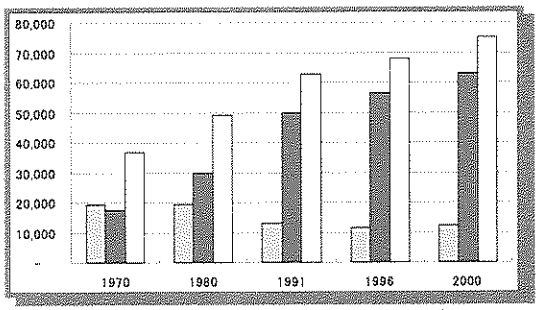
Source: Brazil in numbers, IBGE, 1998.

2) Population growth and urban development in some municipalities where Prodecer projects were implemented

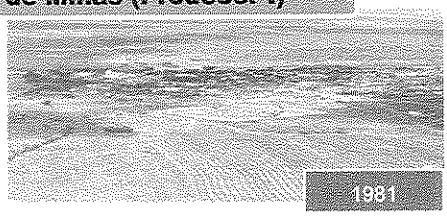
Prodecer producers are mainly from the following States: São Paulo, Paraná, Santa Catarina and Rio Grande do Sul. There was also the important participation of farmers from Minas Gerais State, where precursor programs of Cerrados region development were implemented, such as PADAP and POLOCENTRO.

Figure 5.2.1 shows the population evolution in three municipalities where Prodecer projects were implemented: Paracatu (Prodecer I), Barreiras (Prodecer II) and Balsas (Prodecer III). As shown in the Figure, there was significant population growth in all the municipalities after the implementation of these projects.

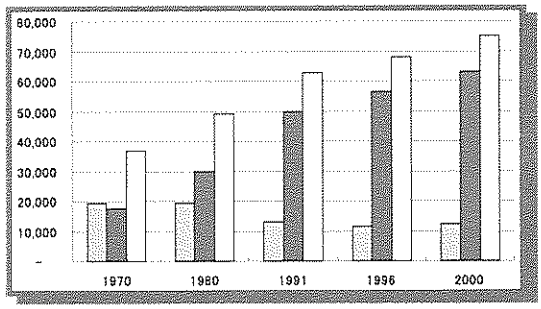
Prodecer I –Population Evolution of Paracatu Municipality
(Population data from Paracatu and photos from Irai de Minas city)



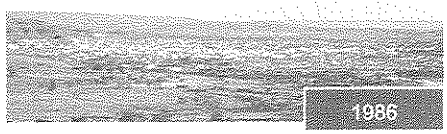
Irai de Minas (Prodecer I)

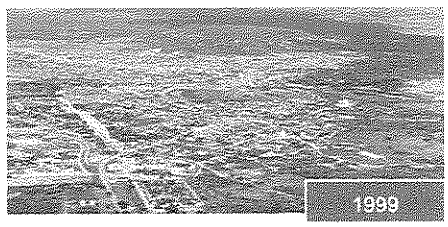


Prodecer II – Population Evolution of Barreiras Municipality

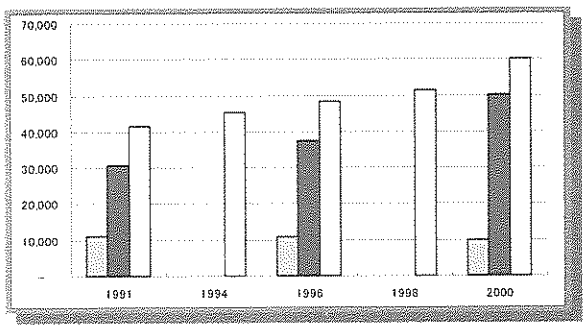


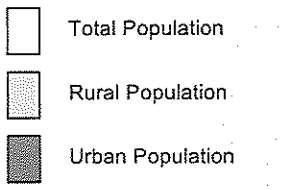
Barreiras (Prodecer II)



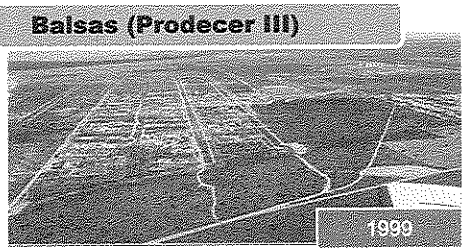


Prodecer III – Population Evolution of Balsas Municipality





Balsas (Prodecer III)



Source: Population data from IBGE, CAMPO files, 2001

Fig. 5.2.1 Population Evolution of Municipalities, per Project

(2) Influence in the municipal district finance

Figure 5.2.2 shows the great development in the urban area of the place, which today is the Luis Eduardo Magalhães Municipal District. This municipal district was the district of Minoso do Oeste, which belonged to the municipal district of Barreiras (it was separated since 01.01.2001) and showed a population jump, mainly after the implantation of the Ouro Verde Project of Prodecer II in 1981. The population that was approximately 1,000 people in 1981, went to 3,000 in 1989, reaching 20,169 people in 2000. The urban perimeter of this municipal district continues to show vigorous expansion.

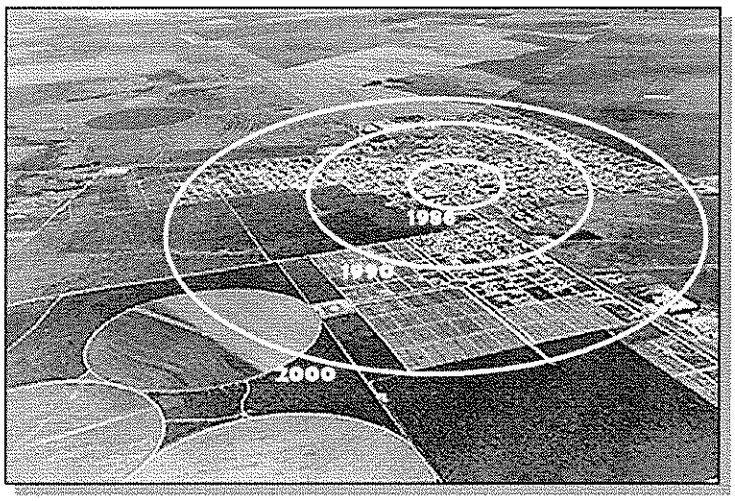


Fig. 5.2.2 Urban Perimeter Expansion of the Luis Eduardo Magalhães Municipality

This growth occurred, fundamentally, due to the continuous development of agriculture activity in this region, which started since the first studies on Prodecer implementation from 1983. At that time there was a large migration of producers from the South and Southeast regions, most of them connected to the Agriculture Cooperative of Cotia (CAC), which was later responsible from its own initiative for the Ouro Verde Project and other projects. The multiplier effect on this region was impressive. Therefore, there was and agricultural production increase in the whole region centered in Barreiras, but nowadays the attraction has been shared with the new Municipality of Luis Eduardo Magalhães, where a great number of companies have become established selling fertilizers, agro-industry products, machinery and equipment, as well as offering services. Even BUNGE company has constructed its storage and industrial processing unit, etc. there. As a consequence, the increase of municipality revenue has consolidated the financial basis of the Municipality as shown below.

PERCENTAGE OF THE MUNICIPALITY REVENUE SOURCES

a) FPM – Municipality Participation Fund – distributed by the Federal Government and constituted by Income Tax contribution (IR) and from the Industrialized Products Tax (IPI) - 22%

b) ICMS (Tax on the Products Transit) in the case of this municipality it is composed almost exclusively of agriculture and livestock products and is distributed by the State Government: 40%.

c) Municipal Taxes (IPTU, ITBI inter vivos, ISSQN): 38%.

The Paracatu Municipality has developed significantly due to the implementation of the Mundo Novo Project, Prodecer I. This municipality, as shown in Table 5.2.3, has increased its revenue more than 10 times within twenty years. As a consequence the per capita income of the population, which was less than the Minas Gerais State average, where the Municipality is located, has surpassed it in a little more than 10 years. Just like Luis Eduardo Magalhães, Paracatu has consolidated a good financial situation with the tax revenue increase as well, due to the agriculture production expansion and the population growth, which caused a broader circulation of money and goods.

Table 5.2.3 Evolution of the Population, Annual Budget and Production Value in Paracatu Municipality

Item/Year		1980	1997	Remark
Population (people)		51,047	75,185 (year 2000)	
Annual Budget		US$1.3 million	US$16 million (years 1999)	
Production Value		R$97 million	R$319 million	Annual growth rate 7.5% (85~94) Growth rate in MG State 1.5%
Per capita	Paracatu	R$1,680 (1985)	R$4,200	
	Minas Gerais State	R$3,000 (1985)	R$3,640	

Source: Paracatu City Hall, 2000.

(3) Influence on basic infrastructure implementation

The development of the Cerrados' agricultural frontier has demanded the implementation of some basic infrastructure facilities in order to assist producer settlements in the area. According to the P/A (Project Agreement), the construction of access roads and the supply of electricity in the projects are the responsibility of the Brazilian side. The provision of infrastructure by the Federal, State and even Municipality governments, right after Prodecer project implementations, decisively contributed to the expansion and the upgrade of Municipality infrastructure that hosted the program.

Table 5.2.4 presents the actual situation of some infrastructure items in Paracatu Municipality which are relatively satisfactory in terms of electricity, piped water, sanitary sewerage as well as education, health, sanitary system, communication, etc.

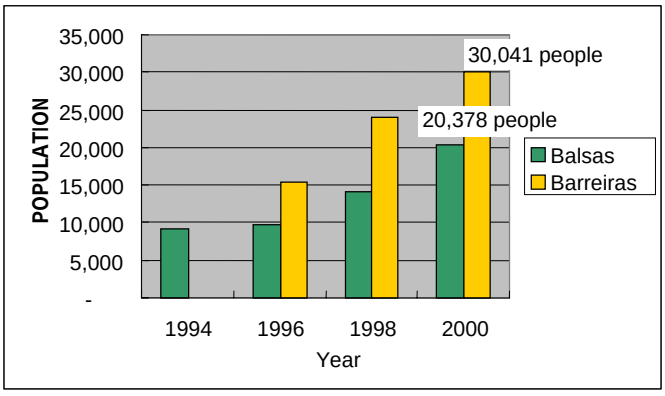
The social infrastructure facilities built in Balsas Municipality, especially in the region where Prodecer III project was established 200 km from the Municipality City Hall, also contributed positively to the development of the region. However, some producers and their Cooperatives went through difficulties and suffered some losses, due to the delay of electricity availability, of construction of better quality roads, as well as due to the lack of some social facilities which were mainly the State Government's responsibility. It is not rare to have seen situations where producers and Cooperatives divide or even incorporate direct costs of the implementation or maintenance of some essential infrastructure basic items. It happens mainly in view of the State and Municipality financial difficulties which they have been facing over the last few years.

Table 5.2.4 Infrastructure Situation in Paracatu Municipality (2000)

Water	Sewage	Electric Energy	House	Number of beds in hospitals
Piped 96%	Public system 98%	Public Distribution 72%	Own 78%	Public and Private 109
Cistern 2%	Concrete cesspit 1%	Own generator 19%	Rented 16%	
Others 2%	None 1%	None 9%	Others 6%	

Source: Data from CAMPO, 2001.

It is clear that the population growth also contributed to the increase in the number of children. The evolution of the number of students in Balsas and Barreiras Municipalities in the last few years is shown in Figure 5.2.3. Figure 5.2.4 presents photos of the school and the sports stadium built in the project Prodecer III agro-village, located in Balsas Municipality, Maranhão State.



Source: Data from CAMPO, 2001

Fig. 5.2.3 – Evolution on the Number of Students in Barreiras and Balsas Municipalities

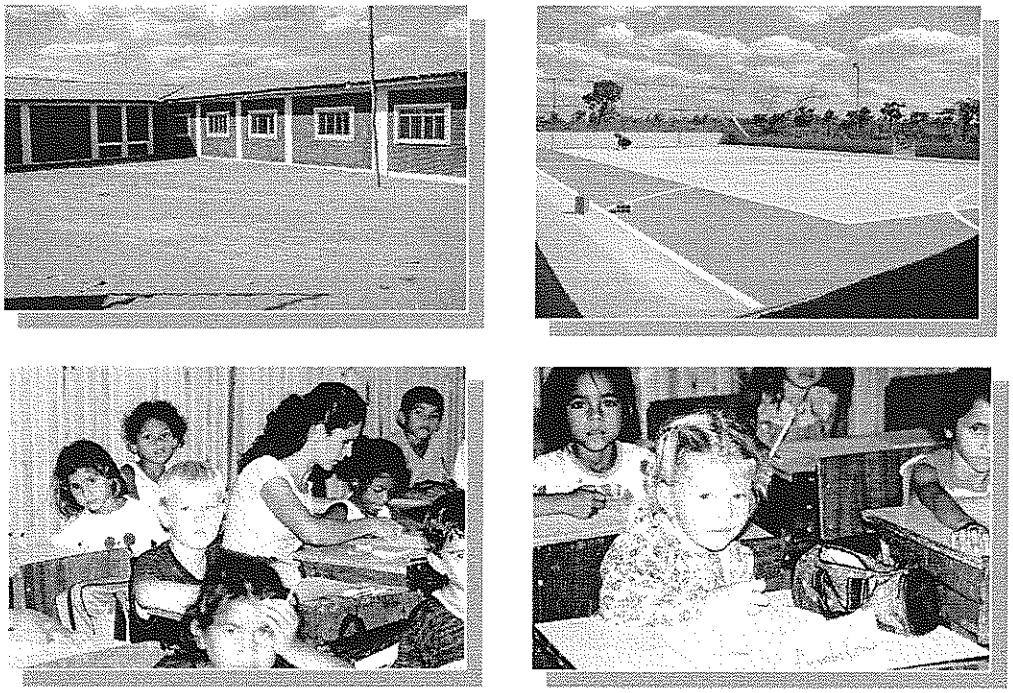


Fig. 5.2.4 – Photos of Balsas' school

5.2.3 Impact on regional agriculture

(1) Agriculture production increase in Prodecer surrounding region

Local producers as well as farmers coming from other regions, have acquired new areas in the surrounded region of Prodecer implementation sites, increasing the cultivated area of the municipalities that hosted Prodecer. Table 5.2.4 shows the growth of the total number of farmers in some municipalities that were part of the Prodecer projects.

Table 5.2.5 Number of Participant Producers of Prodecer and Number of Producers Settled on their Own

Project	Municipality	Farmers settled through the project	Farmers settled on their own	Accumulated Total 1985、1989	1996
Prodecer I					
Irai de Minas	Irai de Minas	26	39	65 (1985)	347
Mundo Novo	Paracatu	48	15	63 (")	1.491
Coromandel	Coromandel	18	70	88 (")	1.687
Prodecer II					
Alvorada	Água Clara	56	49	105 (1989)	—
Paineira	Campo Alegre	29	250	279 (")	—
Entre Ribeiros, I, II, III	Paracatu	89	161	250 (")	1.491

(Remark: Paracatu Municipality includes the Entre Ribeiro area)

Source : 1) Prodecer, JADECO - 1986
2) Prodecer II Expansion Project – Evaluation Report JADECO, 1989
3) Ministry of Finance, National Treasury Secretariat (STN), 1996/1998
4) IBGE, 1998