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スアッペ臨海工業開発計画

資料No. 7

FIRST REVISION

TOME III

ECONOMIC STUDIES
Part 2 - TRANSPORT SYSTEMS
Part 3 - SECTORIAL STUDIES
Part 4 - ZONING OF THE INFLUENCE AREA AND BASIC INDEXES OF THE REGIONS

VOLUME 2

(7)

TOME III

PART 2

TRANSPORT SYSTEMS

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PART 2 - TRANSPORT SYSTEMS

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PART II - TRANSPORT SYSTEMS

INTRODUCTION

The Master Plan of Industrial-Port Complex of Suape is composed by several analysis and surveys of engineering and economy.

Those economical studies which accomplish the basic aspects and which were considered in the 1st part of this volume, are presented in this 2nd part.

The following subjects are taken into consideration:

- transport systems
- economy sectors, and
- zoning of the influence area.

1.0 ELEMENTARY PRINCIPLES

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The analysis of the regional transport system, which was accomplished in this report, has allowed us to evince that complementary activities are performed and the competition between the several modalities were decreased except the circunstances which are explained further.

Based on the initial stage of the studies which were accomplished by SUDENE in the fifties, we have supposed that the links of the area with Middle-South Region should be established through coast shipping.
However, coast shipping has become the principal obstacle to regional increase due to the virtual isolation of Northeast States. While efforts to its recuperation have failed, Rio-Bahia opening in the interior of Brazil during the sixies and the development of local highway have created hard flux of goods between South and Northeast Regions. Trucks have surpassed the traditional over capacity.

Thus, highway network had been especialized in the interchange of goods not very much concentrated between South and North region and, in the same way, between the principal regional poles (capitals of the States) and polarized areas.

Although it took so long, the recuparation of railroad transport had started in view of some dinamization of the harbors and due to the stimulation policy to exports. Both systems act mainly in a complementary way.

Other important peculiarity is the accomplishment between the harbors and highway network which is practically limited to petroleum products.

Briefly, goods relatively concentrated require the railroad-port scheme when they are destined to foreing States. Although interconnected, the railroad network does not have a large participation in the economical interchange between the States. The characterization of this phenomenon with special circunstances and some exceptions to this rule is shown further.

In relation to Port System, the study of its principal components in Northewestern Northeast evinces a satiation which hypothesis introduces a new dynamic through the export of industrialized primary products which require sets up that do not exist yet in the area; condition which becomes imperative to Suape set up.

Therefore, the reintegration of coast shipping system in a short distances and the viability of oceanic flatboat already accomplished between Vitoria, Espirito Santo and South coast allow us to point out the avaibility to set Suape up in the port system of the region. Therefore, Suape would supply other harbors of smaller capacity and would act as shipping harbor.

2.0 HIGHWAY TRANSPORT

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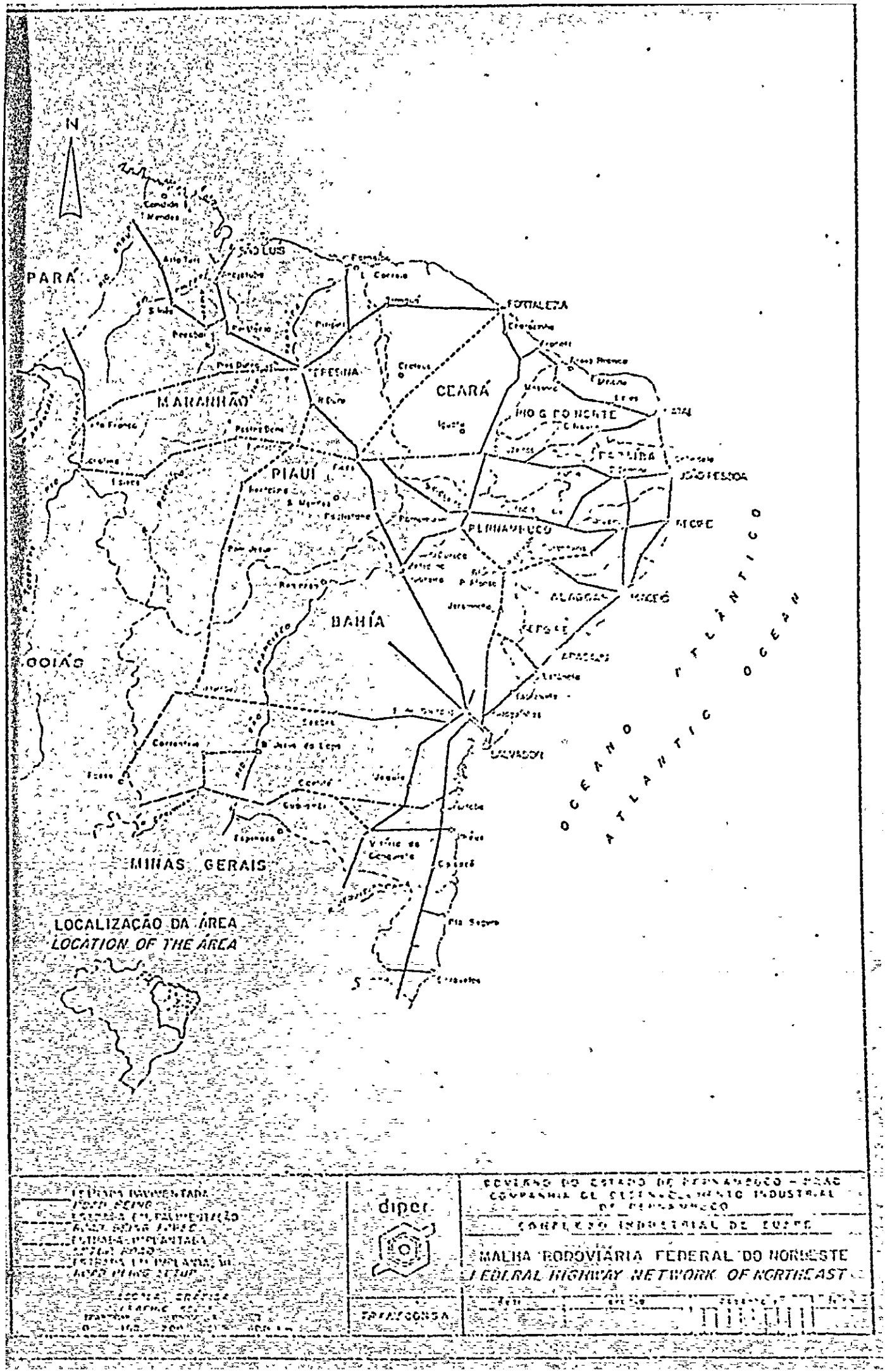
2.1 INDEXES ABOUT HIGHWAY NETWORK

Northeast highway network is composed by two large axes, of which extreme points are respectively Fortaleza and Natal and it is some 3 thousand km from São Paulo (Capital), such as: BR-116 and BR-101. Based on these two highways, we may establish the principal connections in the interior of the States: Feira de Santana-Salvador (BR-324), in Bahia, Salgueiro-Recife (BR-232) in Pernambuco, and Cajazeiras-João Pessoa (BR-230) in Paraíba and, finally, it is connected to Fortaleza by BR-304.

The scheme mentioned above is composed by other axes and finally by several connections which are presented by the municipal roads.

In 31/12/73 paved roads totalized, 17.4 thousand km, and they were basically limited to the scheme mentioned above. Other connections (not paved) surpassed, in the same date, more than 300 thousand km. Everything is explained according to principal parts in the board 2.1.

The following map (2.1) shows the Federal Highway Network in Northeast.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PARA
SÃO LUIS
FORTALEZA
TERESINA
MARANHÃO
CEARÁ
RIO G DO NORTE
PIAUI
PARAÍBA
JOÃO PESSOA
PERNAMBUCO
RECIFE
ALAGOAS
MACEIÓ
BAHIA
SERGIPE
ARACAJU
SALVADOR
GOIÁS
MINAS GERAIS
OCEANO ATLANTICO
ATLANTIC OCEAN
LOCALIZAÇÃO DA ÁREA
LOCATION OF THE AREA
diper
GOVERNO DO ESTADO DE PERNAMBUCO - BRASIL
COMPANHIA DE DESENVOLVIMENTO INDUSTRIAL
DE PERNAMBUCO
COMPLEXO INDUSTRIAL DE SUAPE
MALHA RODOVIÁRIA FEDERAL DO NORDESTE
FEDERAL HIGHWAY NETWORK OF NORTHEAST

2.2 HIGHWAY TRAFFIC

s Northeast economical increase has being mainly supported by Highway transport, the increase of trucks traffic in the region reachs levels of larger intensity than Brazil as a whole, we may observe this fact in the following board:

TRUCKS TRAFFIC (INDEXES)

Year	Northeast	Brazil
1960	100	100
1961	110	111
1962	133	118
1963	175	132
1966	212	157
1969	304	224
1970	346	250
1971	401	288
1972	473	332
1973	567	388

Source: Economic Conjuncture, May, 1974.

2.3 ANALYSIS OF THE PRINCIPAL FLUXES

2.3.1 METHODOLOGY

Based on official surveys of Source-Destine of trucks in traffic, the models of fluxes were elaborated to 1972.

These surveys were accomplished in the following posts:

States	Post nº	Location
Bahia	1	BA-093-Entre Rios-road-junction to Catu
Bahia	11	BR-116-Feira de Santana-Paraguaçu
Bahia	12	BP-116-Feira de Santana road junction with BR-324
Pernambuco	1	BR-101-Recife-road junction with PE-C
Pernambuco	2	BR-101-Igarassu-Arataca
Pernambuco	6	BR-116-Salgueiro-road junction with PE-460
Pernambuco	8	BR-232-Vitória de Sto.Antão-Moreno
Pernambuco	1	BR-122-Petrolina-Lagoa Grande
Ceará	3	BR-116-Fortaleza-Pacajus
Ceará	8	BR-222-Sobral-road junction with 059

At first, consistency tests of counting were accomplished in order to reach a coherent statistic of semanal moving which was registered. After the distortions were identified and corrected its development was accomplished in order to dispose of yearly models. Season aspects of several loads

were taken into consideration. Counting was accomplished by a computer and its principal results will be studied in the following items.

2.3.2 FLUXES MADE IN SÃO PAULO

Models of highway moving of goods, which proceed from São Paulo, indicate with large security the nature of such displacements though their yearly values are only indicatives Thus, yearly tons are relatively decreased. The largest volumes would be presented by cars (50,5 thousand tons.). Twelve (12) destines are consigned and among them the principal concentrations are Recife and Salvador, which would import respectively 20.5 and 12.2 thousand tons.

The six principal products would allow the folowing results:

THOUSAND TONS/PER, MADE IN SÃO PAULO

Products / Destine	Cars	Pneumatics	Home Electric Facilities	Meat Manufacture	Grains and Cakes	Chemical Products
Maceió	3.3	-	-	-	1.3	1.4
Recife	20.5	22.5	18.9	18.7	8.9	5.3
Interior of Pernambuco	-	-	-	1.6	1.2	-
João Pessoa	-	-	1.2	1.0	-	1.0
Interior of Paraíba	2.3	-	3.5	-	-	1.0
Natal	2.3	-	-	-	-	-
Fortaleza	5.2	10.2	5.5	1.5	6.6	-
Teresina	-	-	3.6	-	-	1.2
São Luiz	-	-	1.4	-	-	-
Salvador	12.2	5.1	1.4	4.3	1.3	-
Interior of Bahia	1.7	-	-	-	2.1	-
Aracaju	3.0	-	-	-	1.6	-
TOTAL	50.5	37.8	35.5	27.1	23.0	9.9

Source of Basic Data: Traffic Counting - 1972 (PRODEC/DNER)

The list is completed by the presence of the following items: fruits, rice, fire brick, heavy iron bars, pieces to vehicles, synthetic rubber, agricultural tractors, wood, fertilizers, caw cattle, and agricultural implements.

Model to 1972 is shown in board 2.2.

Although there are not historical series in relation to the list of Northeast imports, available data allow us to say that Northeast imports have being become more sophistical. In the past, furniture, confections, other goods of consumption, besides plywoods, heavy iron bars, etc. had an out standing position.

In the same time that local industry diversifies its offer, the interchange reverts other forms. We may register in accordance to the estimates existing in board 2.2, that fertilizers imports by highway would be very limited. As the volumes absorbed in Northeast (mainly by sugar-cane planting) have increased substantially the imports are done through the harbors. Also the heavy iron bars do not have any more a great importance as it had in the past. But the region shall become an exporter with the functioning of Usina Siderurgica da Bahia, USIBA, in 1974

2.3.3 FLUXES MADE IN OTHER SOUTH STATES

The phenomenon mentioned above - sophistication and specialization of the interchange between Northeast and São Paulo - is observed in relation to Middle-South Region. Thus, estiamtes associated to Guanabara show the importance of lubricant oils and meat manufacture, and from South (Paraná and Rio Grande do Sul) the important products are wood, rice, marble and grains. In relation to Minas Gerais, caw cattle and aluminium are important (to reducing unit which is functioning in the Industrial Center of Aratu).

The model of the State of Guanabara is shown in the following board:

THOUSAND TONS/PER YEAR

Destine	Grease and Lubricant Oil	Meat Manufacture	Cement	Wood	Cars	Heavy Iron Bars
Recife	5.5	1.6	3.3	2.3	1.9	-
João Pessoa	-	1.6	-	-	-	-
Fortaleza	1.5	1.9	-	-	-	-
Interior of Ceará	-	-	-	-	-	1.3
São Luiz	2.1	-	-	-	-	-
Salvador	14.1	-	-	-	-	-
TOTAL	23.2	5.1	3.3	2.3	1.9	1.3

Source of basic data: Traffic Counting - 1972 (PRODEC/DNER)

The estimates in relation to States of Paraná and Rio Grande do Sul will be shown as follows:

THOUSAND TONS/PER YEAR

Destine	Wood	Rice	Granite and Marble	Grain and Cake	Home Electric Facilities	Agricultural Implements
Maceió	-	-	-	-	1.2	-
Recife	3.6	-	4.4	5.9	-	1.8
Interior of Pernambuco	-	-	1.1	-	-	-
João Pessoa	2.2	-	-	-	-	-
Interior of Paraíba	1.7	-	1.2	-	-	-
Salvador	5.6	7.9	1.9	1.4	1.7	-
Interior of Bahia	1.4	1.4	-	-	-	-
TOTAL	14.5	9.3	8.6	7.3	2.9	1.8

Source of Primary Data: Traffic Counting - 1972

(PRODEC/DNER)

Finally, the following board shows the model of the States of Minas Gerais:

THOUSAND TONS/PER YEAR

Destine	Caw Cattle	Aluminium	Chemical Products	Grains and Cakes	Heavy Iron Bars	Wood
Maceió	1.2	-	-	-	-	-
Recife	-	-	-	-	-	1.6
Natal	1.0	-	-	1.0	-	-
Fortaleza	-	-	-	1.5	1.5	-
Interior of Piaui	-	-	-	-	1.0	-
Salvador	1.6	4.3	3.0	-	-	-
Aracaju	2.7	-	-	-	-	-
TOTAL	6.5	4.3	3.0	2.5	2.5	1.6

Source of Basic Data: Traffic Counting - 1972 - (PRODEC/DNER)

2.3.4 FLUXES MADE IN NORTHEASTERN NORTHEAST

Fluxes are mainly characterized by the great polarization performed by the capitals. The peculiarities are summarized further.

a. Fluxes in the Interior of Pernambuco

These fluxes are basically canalized towards Recife and they have a representative tons in relation to sugar (some 700 thousand tons in 1972), molasse (approximately 200 thousand tons) and cement (some 200 thousand tons).

Sugar and Molasse moved by trucks are destined to export, therefore, they correspond loads which are relatively concentrated in relation to their destine. However, in relation to their sources, Northeast plants still operating with a very small scale, if we consider the development of this industry in accordance to International plan. There is only one plant which is able to accomplish 60 thousand tons per harvest, while the other plants have a decreased capacity. Besides these conditions, there are producer units which are not cut by railroad. For these reasons, we may suppose during a long period, that sugar moving will be done by the highway network.

Other goods are totally suited to highway transport. Some of them are exclusively destined to Recife though they are loaded in several places of the interior of the region.

Goods	Thousand tons/per year
Coal	22.2
Fruits	19.7
Wood	14.6
Clay	5.5
Castorbean	4.7
Castor-oil	2.9
Rock	2.7
Hydrated Lime	1.0

Based on those which show several destine, the six most important goods are shown in the following board:

Products / Destine	Sugar	Molasse	Cement	Gross Plaster	Limestone	Cow Cattle
Maceió	-	-	1.6	-	-	-
Interior of Alagoas	-	-	5.5	-	-	-
Recife	675.6	188.6	159.3	5.8	22.9	32.0
Interior of Pernambuco	4.7	2.1	10.2	29.2	4.5	3.0
João Pessoa	-	-	-	3.1	2.2	1.1
Fortaleza	-	-	-	-	1.2	-
Teresina	2.2	-	-	-	-	-
Interior of Bahia	6.9	-	13.6	8.5	-	-
Minas Gerais	-	-	-	6.7	4.2	-
State of Guanabara	-	-	-	4.2	11.4	-
São Paulo	-	-	-	12.3	14.4	-
South	-	-	-	-	5.6	-
TOTAL	689.4	190.7	190.2	69.8	66.4	36.1

Source of Basic Data: Traffic Counting - 1972 (PRODEC/DNER)

In the considered year, sugar exports accomplished by Northeast States have reached 950 thousand tons and molasse exports have reached 500 thousand tons. As the sugar harvest of that year has reached some 1.1 million tons, highway participation in sugar moving was somewhat more than 60%. Demerara sugar (some part destined to refining) is transported from Pernambucana plants to Recife through railroad network and in 1972 it has oscillated around 200 thousand tons.

Cement transport, though concentrated in its source, is fractionated in relation to the final destine. Furthermore, works are located in "Grande Recife" or in its periphery (Paulista and Goiana), therefore, it is a moving of short distances. In relation to gross plaster transport, the interference of railroad system is only justified by the supply of large cement works which demand monthly dispatch of reasonable quantities. The condition mentioned above seems to be adequate to its moving by higways and also in relation to limestone. The experience has also shown that trucks still being the most economic form in caw cattle transport since than it causes the smallest lost of animal weight.

The other products, which are shown in the following board, consist in tipical highway load due to the absence of concentration (even in the source as well as destine) or due to limited volumes.

Thousand tons/Per Year

Product / Destino	Manioc Flour	Grain and Castor Cake	Corn	Raw Cotton	Cotton Seeds	Sugar Cane Bagasse	Onion
Recife	5.6	15.5	14.4	1.2	2.9	7.5	1.1
Interior of Pernabuco	3.0	1.2	1.8	6.4	3.2	1.0	1.7
João Pessoa	-	-	-	1.7	-	-	-
Interior of Paraíba	-	-	-	1.0	-	-	-
Natal	-	1.0	-	-	-	-	-
Fortaleza	-	-	-	2.3	-	-	1.4
Interior of Bahia	13.1	-	1.4	-	-	-	-
Minas Gerais	-	-	-	-	1.1	-	-
São Paulo	-	-	-	-	1.8	-	-
South	-	-	-	4.4	1.8	-	-
TOTAL	21.7	17.7	17.6	17.0	10.8	8.5	4.2

Source: DNER-PRODEC.

b. Fluxes made in Grande Recife

The principal function of highway transport, which is created in the capital of the State of Pernambuco and its metropolitan area (Cabo, Jaboatão, Moreno, Olinda, Paulista, Recife, São Lourenço da Mata, Itamaracá and Igarassu), consists in the redistribution of petroleum products and fertilizers which arrived there by sea lanes, as well as to assure the supply of wheat flour in the interior of the region. This last case, is complementary function, considering that grain wheat is importe through shipping. Products according to their importance, thei distribution to the interior of the region and to other regional centers of goods offered by the Recifense industry

are shown as follows: (heavy iron bars, home electric facilities, marble, manufacture, wood and other less important products in terms of volume).

Highway transport must accomplish the representative moving in the metropolitan area, be it of raw material to total industry (limestone and clay) or be it of industrial goods.

The six principal products are shown in the following board:

THOUSAND TONS/PER YEAR

Product / Destine	Clay	Sugar	Gasoline	Cement	Limestone	Manures and Fertilizers
Maceió	-	-	-	6,3	-	-
Interior of Alagoas	-	-	1,2	20,8	-	1,1
Recife	350,2	130,9	3,7	13,8	149,8	6,1
Interior of Pernambuco	12,8	28,0	146,4	87,5	18,2	74,9
João Pessoa	-	1,4	17,0	2,3	2,6	3,9
Interior of Paraíba	-	2,4	20,0	2,3	5,1	-
Natal	-	-	1,0	4,4	-	1,0
Interior of R.G.do Norte	-	-	1,0	-	-	-
Fortaleza	-	8,0	-	-	-	-
Interior of Ceará	-	-	4,6	-	-	-
Teresina	-	4,6	-	-	-	-
Interior of Piauí	-	4,4	-	4,4	-	-
São Luís	-	-	-	3,3	-	-
Interior of Maranhão	-	-	-	4,0	-	-
Salvador	-	4,3	1,6	18,8	-	-
Interior of Bahia	-	15,3	1,8	25,3	-	-
Aracaju	-	-	-	-	-	12,2
Interior of Sergipe	-	-	-	-	-	1,9
State of Guanabara	-	-	-	-	2,5	-
São Paulo	-	-	-	-	5,6	-
South	-	2,6	-	-	2,0	-
TOTAL	363,0	201,9	198,3	193,2	185,8	101,1

Source of basic data: Traffic Counting- 1972 (PRODEC/DNER).

The register of limestone and sugar transport with destine to South Region should correspond to a sporadic events. Habitual loads to Middle South Region are: synthetic rubber (4.2 thousand tons in 1972 to São Paulo) and aluminium (5.3 thousand tons to São Paulo and 1.2 thousand tons to Guanabara), besides the sales of home electric facilities and agglomarate woods.

Countings relative to other products are shown in the following board.

THOUSAND TONS/PER YEAR

Product / Destine	Diesel Oil	Wheat Flour	Heavy Iron Bars	Granite and Marble	Home Electric Facilities	Wood
Interior of Alagoas	-	-	-	-	2.4	-
Recife	20.5	-	-	3.6	3.0	5.6
Interior of Pernambuco	60.3	20.4	4.1	8.8	1.0	1.7
João Pessoa	-	2.0	-	-	-	-
Interior of Paraíba	2.6	1.5	-	-	-	2.1
Natal	1.4	-	-	-	1.3	-
Fortaleza	-	-	2.0	-	-	-
Interior of Ceará	-	-	-	-	1.8	-
Teresina	-	-	2.4	-	-	-
Interior of Bahia	-	-	5.1	-	-	-
Aracaju	1.6	-	-	-	-	-
State of Guanabara	-	-	-	-	-	1.2
São Paulo	-	-	-	-	1.1	-
TOTAL	86.4	23.9	13.6	12.4	10.6	10.6

Source of primary data: Traffic Countings - 1972 (PRODEC/DNER)

c. Fluxes made in the State of Alagoas

Posts location did not allow to appraise the volume of the moving which is made in the interior of Alagoas and which is destined to the Capital. However, we know that sugar which is destined to export by Maceió harbor and fertilizerts which are unloaded there are transported by trucks. We believe that, in both cases, the railroad system might have a more positive participation. Just as an indicative title, since we do not have conclusive surveys, we may suggest that, in 1972, from 450 thousand tons of sugar loaded to foreign States, less th 20% had been transported by railroad. Fertilizers imports ha surpassed 100 thousand tons, and the railroad network has 10 thousand tons.

In relation to loads made in Maceió or in the Interior of Alagoas and which are destined to other States, and identified in the harvest posts of Pernambuco and Bahia, we may stand out the following products:

WITH SOURCE IN MACEIÓ, THOUSAND TONS/PER YEAR

Destine	Sugar	Wheat Flour	Molasse	Grain and Castor Cake	Wood	Manioc Flour	Fruits
Recife	2.1	9.7	4.2	3.7	2.7	2.1	1.4
Interior of Pernambuco	-	1.2	-	-	-	-	-
João Pessoa	-	2.5	-	-	-	-	-
Fortaleza	1.5	-	-	-	-	-	-
Salvador	19.0	-	-	-	-	-	-
Interior of Bahia	11.6	-	-	-	-	-	-
TOTAL	34.2	13.4	4.2	3.7	2.7	2.1	1.4

Source of primary data: Traffic Counting -1972 (PFODEC/DNER)

WITH SOURCE IN THE INTERIOR OF ALAGOAS, IN THOUSAND T/PER YEAR

Destine	Fruits	Wood	Sugar	Cotton Seeds	Raw Cotton	Molasse
Recife	2.3	3.3	2.9	-	-	1.0
Interior of Pernambuco	-	-	-	1.4	1.4	-
João Pessoa	1.1	-	-	-	-	-
TOTAL	3.4	3.3	2.9	1.4	1.4	1.0

Source of primary data: Traffic Counting-1972 (PRODEC/DNER).

d. Fluxes made in the States of Paraíba and Rio Grande do Nort

Based on the same exception mentioned above, i.e., without the identification of the fluxes in the interior of the States of Paraíba and Rio Grande do Norte, we may conclude that highway transport has an important position in Paraibana exports of sugar, cement, sisal and cotton, with destine to neighboring States or to South States.

In relation to loads made in João Pessoa, Grande Recife performs an outstanding polarization as we may see in the following board:

SOURCE: JOÃO PESSOA, THOUSAND TONS/PER YEAR

Destine	Cement	Sugar	Sisal Fiber	Raw Cotton	Fruits	Cotton Seeds
Maceió	2.5	-	-	-	-	-
Recife	70.2	9.2	2.6	1.6	2.1	-
Interior of Pernambuco	4.0	1.3	-	-	-	-
Fortaleza	8.3	3.0	-	-	-	-
Salvador	1.7	-	-	-	-	-
Interior of Bahia	-	1.9	-	-	-	-
Minas Gerais	-	-	1.6	-	-	-
State of Guanabara	-	-	-	3.4	-	1.0
São Paulo	-	-	1.9	-	-	-
South	-	-	-	-	1.5	-
TOTAL	86.7	15.4	6.1	5.0	3.6	1.0

Source of primary data: Traffic Counting-1972 (PRODEC/DNER).

Loads made in the interior of Paraíba and destined to other States are also polarized by Recife. Their estimates are shown in the following board:

THOUSAND TONS/PER YEAR

Destine	Raw Cotton	Fruits	Cotton Seeds	Corn	Cotton Oil	Sisal Fiber
Recife	9.6	12.5	2.9	3.6	4.1	3.0
Interior of Pernambuco	-	3.6	-	-	-	-
Interior of Bahia	-	-	-	1.1	-	-
Aracaju	1.5	-	-	-	-	-
Interior of Sergipe	1.5	-	-	-	-	-
Minas Gerais	3.2	-	-	-	-	-
State of Guanabara	5.1	-	1.9	-	-	-
São Paulo	8.6	-	2.1	-	-	-
South	1.4	2.5	-	-	-	-
TOTAL	30.9	18.6	6.9	4.7	4.1	3.0

Source of primary data: Traffic Counting-1972 (PRODEC/DNER)

In relation to loads created in the State of Rio Grande do Norte, through the counting is partial, we may stand out highw. participation in salt transport even to large distances as it is Minas Gerais, São Paulo and Guanabara cases. Although this question is really complex, we could study the availability of a larger interference in railroad and coast shipping. However, as it is a product of generalized

consumption (human and animal), the elimination of transport by trucks can not be intended.

Estimates of fluxes made in Natal are shown in the following board:

THOUSAND TONS/PER YEAR

Destine	Salt	Raw Cotton	Cotton Seeds
Maceió	6.6	-	-
Recife	17.0	3.2	1.6
Interior of Pernambuco	10.5	-	-
Salvador	1.4	-	
Interior of Bahia	3.0	-	-
Minas Gerais	3.5	-	-
Guanabara	3.2	1.1	-
São Paulo	9.0	2.5	2.6
South	1.8	-	-
TOTAL:	56.0	6.8	4.2

Source of primary data: Traffic Counting-1972 (PRODEC(DNER).

The following board will show those products which proceed from Rio Grande do Norte.

THOUSAND TONS/PER YEAR

Destine	Salt	Cement	Cotton Seeds	Raw Cotton	Gross Plaster	Cotton Oil
Maceió	2.6	-	-	-	-	-
Interior of Alagoas	2.3	-	-	-	-	-
Recife	4.9	-	3.1	2.7	1.7	1.1
Interior of Pernambuco	4.7	-	-	-	-	-
Fortaleza	1.6	26.0	5.5	1.1	-	-
Salvador	11.6	-	-	-	-	-
Interior of Bahia	35.3	-	-	-	1.4	-
Aracaju	2.7	-	-	-	-	-
Minas Gerais	51.8	-	-	1.6	2.5	-
State of Guanabara	8.4	-	-	-	-	-
São Paulo	23.6	-	3.9	1.7	-	-
South	22.2	-	-	-	-	-
TOTAL	171.7	26.0	12.5	7.1	5.6	1.1

Source of Primary Data: Traffic Counting-1972 (PRODEC/DNER)

2.3.5 OTHER NORTHEAST STATES

a) Bahia and Sergipe

Loads made in Salvador have similar characteristics to loads mentioned above, i.e., in view of the distribution of some goods such as gasoline and other petroleum

products, wheat flour, etc. and flowing of the local products, which are not very much concentrated, with destine to South and other States (aluminum, soda ash, sisal, etc.). These products are specificated in boards 2.2 and 2.4.

The following board shows the moving which proceeds from the interior of the region. The products demand mainly to the Capital or to other centers in the State.

Thousand tons/Per Year

Destine	Sisal Fiber	Caw Cattle	Sugar	Limestone	Corn	Granite and Marble	Fruits	Talc
Recife	-	9.0	-	-	-	-	1.0	-
Interior of Pernambuco	-	3.7	-	-	-	-	-	-
Salvador	79.2	24.9	1.4	10.3	3.0	1.5	4.4	2.9
Interior of Bahia	3.0	9.7	34.2	5.5	4.3	-	2.5	-
Minas Gerais	-	1.5	-	-	2.2	-	-	-
State of Guanabara	3.2	-	-	6.0	1.3	-	-	-
São Paulo	6.7	-	-	2.7	-	1.6	-	-
South	1.2	-	-	1.4	-	6.3	-	-
TOTAL	93.3	48.8	35.6	25.9	10.8	9.4	7.9	2.9

Source of Primary Data: Traffic Couting - 1972 (PRODEC/DNER).

We may observe that posts location did not allow us to estimate, according to same procedures, castorbean

moving. However, it is a representative load which has diversified sources, though it is basically destined to a large consumer (Sanbra Work, in Salvador). For this reason, in the most cases, highway transport has a large preference. But this space also extends towards cocoa of which moving has an area which is not served by railroad.

In relation to Sergipe, we may only estimate the fluxes which have a destine to other States and which are almost totally made in Aracaju. The following board shows the estimates of these products.

Destine	Cement	Sugar	Salt	Gross Plaster	Corn	Limestone	Caw Cattle	Fruits
Recife	-	2.5	-	-	-	-	5.2	2.4
Salvador	16.0	9.1	1.9	1.0	1.0	5.9	-	-
Interior of Bahia	8.7	5.4	2.9	-	1.6	1.5	-	-
Minas Gerais	-	-	6.3	1.0	3.9	-	-	-
São Paulo	-	-	1.0	8.3	1.5	-	-	-
TOTAL	24.7	17.0	12.1	10.3	8.0	7.4	5.2	2.4

Source of primary data: Traffic Couting-1972 (PRODEC/DNER).

b. Ceará

Based on posts located in this State it was possible to create a representative model of the characteristics of highway fluxes.

In relation to the following products, which are made in the metropolitan area of Fortaleza (Aquiraz, Caucaia, Fortaleza, Maranguape and Pacatuba), the supply of the interior of Ceará and Neighbouring areas is made by trucks.

THOUSAND TONS/PER YEAR

Destine	Gasoline	Diesel Oil	Sugar	Wheat Flour	Cement	Grain and Castor Cake	Manure and Ferti-lizers	Chemical Products
Recife	-	2.1	-	-	1.9	-	-	-
João Pessoa	-	1.5	-	5.0	-	1.2	-	-
Interior of Paraíba	-	-	-	1.4	-	-	-	-
Natal	-	-	-	1.5	-	1.5	-	-
Interior of R.G.do Norte	17.2	13.5	-	8.7	-	-	-	-
Fortaleza	5.0	1.6	2.1	1.3	3.1	-	3.0	-
Interior of Ceará	65.0	20.2	29.0	13.1	11.0	11.9	7.2	5.5
Teresina	7.0	1.0	2.0	-	-	-	-	1.5
Interior of Piauí	2.8	-	-	-	1.4	-	-	-
São Luis	4.1	-	3.3	-	-	-	-	-
Interior of Maranhão	-	-	3.2	-	-	-	-	-
Salvador	-	1.4	-	-	-	-	-	-
TOTAL	101.1	41.3	39.6	31.0	17.4	14.6	10.2	7.0

Source of Primary data: Traffic Couting-1972 (PRODEC/DNER).

Besides this activity, trucks transport exported products mainly to longer distances, including Middle-South Region.

The following board shows the principal items.

THOUSAND TONS/PER YEAR

Destine	Raw Cotton	Salt	Gross Plaster
Recife	2.4	1.5	1.0
Interior of Pernambuco	-	1.4	-
Natal	-	-	3.6
Interior of R.G.do Norte	-	1.5	-
Fortaleza	-	1.9	-
Interior of Ceará	4.7	4.8	-
Interior of Bahia	-	3.4	-
Minas Gerais	2.1	7.0	-
Guanabara	3.9	2.9	-
São Paulo	17.7	3.8	6.9
South	3.0	-	1.4
TOTAL	33.8	28.2	12.9

Source of Primary Data: Traffic Couting-1972 (PRODEC/DNER).

Loads made in the interior of the State are destined mainly to Fortaleza as the following board shows:

	THOUSAND TONS/ PER YEAR
Limestone	102.8
Cow Cattle	16.9
Sugar	13.8
Wheat Flour	5.3
Rice	5.2
Bagasse of Coconut	5.1
Wood	3.3
Salt	1.5
Manioc Flour	2.5
Granite and Marble	2.5
Cement	2.3
Clay	1.5
Cars	1.5
Manioc	1.3
Grain and Castor Cake	1.2

Source of Primary Data: Traffic Counting-1972 (PRODEC/DNER).

The following board shows the fluxes with diversified destines:

THOUSAND TONS/ PER YEAR

Destine	Raw Cotton	Cotton Seeds	Corn	Fruits	Coal
Recife	2,8	-	-	3,2	-
Fortaleza	10,5	11,6	11,9	7,2	11,5
Interior of Bahia	-	-	4,4	-	-
Minas Gerais	1,2	1,0	2,6	-	-
State of Guanabara	-	1,6	-	-	-
São Paulo	8,1	4,6	-	-	-
South	-	1,8	-	-	-
TOTAL	22,6	20,6	18,9	10,4	11,5

Source of Primary Data: Traffic Counting-1972 (PRODEC/DNER).

BOARDS

BOARD 2.1

BASIC CHARACTERISTICS OF HIGHWAY NETWORK IN NORTHEAST

Part	Highway	Rolling Surface	Real Extension (Km)
Piritibá-Baixa Grande	BA-52	Set up	52
Campina Grande-Toritama	BR-104	Paved	115
Toritama-Caruaru	BR-104	Paved	34
Caruaru-Agrestina	BR-104	Paved	22
Agrestina-Quipapá	BR-104	Paved	80
Toritama-Carpina	PE-90	Paved	90
Carpina-Recife	PE-90	Paved	36
Carpina-Timbaúba	BR-408	Paved	43
Cruzeiro do Norte-Sertania	BR-110	Paved	32
Sertania-Monteiro	BR-110	Paved	26
Monteiro-road crossing BR-230	BR-412	Being Set up	146
Sertania-Patos	BR-110	Paved/Set up	138
Garanhuns-Catende	PE-177/126	Paved	83
Catende-Palmares	PE-126	Paved	13
Agrestina-Catende	PE-120	Paved	37
Mamanguape-Sapé	PB-3	Set up	37
Sapé-road crossing BR-230	PE-3	Set up	13
Sapé-Tacima	PB-1	Set up	99
Tacima-road crossing RN-7	RN-25	Set up	12
Road crossing RN-7-Tangará	RN-25	Set up	23
Road crossing BR-101-Road Crossing RN-25	RN-7	Set up	54
Natal-João Câmara	RN-4	Set up	78
João Câmara-Macau	RN-4	Set up	102
Road crossing BR-230-Itabaiana	PB-8	Set up	46
Cabo-Barreiros	PE-60	Paved	100
Maceió-Paracogi	AL-101	Paved	99
Floresta-Ibimirim	PE-360	Set up	101
Cedro de S.João-Feira Nova	SE-213	Set up	59
Feira Nova-Maurim	SE-3	Set up	73
Floriano-Road Crossing BR-316	PI-4	Set up	149
Solonópole-Lima Campos	CE-5	Set up	84
Iguatu-Lima Campos	BR-308	Set up	43
Lima Campos-Icó	BR-308	Set up	11
Road Crossing BR-234-Santana do Ipanema	BR-316	Set up	39
Santana do Ipanema-Palmeira dos Índios	BR-316	Set up	63
Palmeira dos Índios-Road Crossing AL-102	BR-316	Paved	42
Road Crossing AL-102-Satuba	BR-316	Paved	90
Santana do Ipanema-Road Crossing AL-409	AL-105	Set up	11
Road Crossing AL-409-Pão de Açúcar	AL-105	Set up	42
Road Crossing AL-105-Batalha	AL-405	Set up	26
Batalha-Arapiraca	AL-202	Set up	67
Arapiraca-Palmeira dos Índios	AL-103	Set up	45
Arapiraca-Road Crossing BR-316	AL-102	Set up	31
Arapiraca-Road Crossing BR-101	AL-102	Set up	26
Belém S.Francisco-Road Crossing BR-116	PE-460	Set up	54

BOARD 2.1 - continuation

Part	Highway	Rolling Surface	Real Extension (Km)
Angicos-road crossing BR-226	RN-23	Set up	98
Macaíba-Tangará	BR-226	Paved	51
Tangará-road crossing RN-23	BR-226	Paved	76
Road crossing RN-23-Acari	BR-227	Paved	61
Acari-Caicó	BR-227	Paved	115
S.Julião-Ouricuri	BR-316	Set up	120
Ouricuri-Parnamirim	BR-316	Set up	60
Parnamirim-road crossing PE-555	BR-122	Set up	91
Road crossing PE-4-Lagoa Grande	BR-122	Paved	33
Lagoa Grande-Petrolina	BR-122	Paved	47
Ouricuri-Road crossing BR-122	PE-4	Set up	57
Ouricuri-Exu	BR-122	Set up	28
Lagoa Grande-Cabrobó	BR-428	Paved	140
Belém S.Francisco-Floresta	BR-316	Paved	55
Floresta-Petrolândia	BR-316	Planned	72
Petrolândia-Paulo Afonso	BR-110	Set up	43
Paulo Afonso-Jeremoabo	BR-110	Set up	79
Jeremoabo-Ribeira do Pombal	BR-110	Set up	102
Ribeira do Pombal-Alagoinhas	BR-110	Paved	172
Alagoinhas-Salvador	BR-110	Paved	128
Feira de Santana-Salvador	BR-324	Paved	93
Juazeiro-Canudos	BR-235	Set up	146
Canudos-Jeremoabo	BR-235	Set up	110
Jeremoabo-Frei Paulo	BR-235	Set up	104
Frei Paulo-Aracaju	BR-235	Paved	105
Frei Paulo-Simão Dias	SE-207	Set up	34
Simão Dias-Poço Verde	SE-207	Set up	44
Simão Dias-road crossing BR-101	SE-103	Paved	65
Imbaúba-Itabaianinha	SE-102	Set up	32
Itabaianinha-Tobias Barreto	SE-101	Set up	33
Pernamirim-Salgueiro	BR-232	Paved	50
Salgueiro-Cruzeiro do Nordeste	BR-232	Paved	228
Cruzeiro do Nordeste-Arco Verde	BR-232	Paved	27
Arco Verde-S.Caetano	BR-232	Paved	105
S.Caetano-Caruaru	BR-232	Paved	20
Caruaru-Recife	BR-232	Paved	120
Arco Verde-Garanhuns	BR-424	Set up	85
S.Caetano-Garanhuns	BR-423	Paved	82
Cruzeiro do Nordeste-Ibimirim	BR-110	Set up	53
Ibimirim-road crossing BR-316	BR-110	Set up	33
Road crossing BR-316-Petrolândia	BR-110	Set up	57
Paulo Afonso-road crossing BR-316	BR-234	Being Set up	86
Road crossing BR-316-Garanhuns	BR-423	Being Set up	128
Road crossing BR-110-Road crossing BR-234	BR-316	Set up	77
Feira Grande-Feira de Santana	BA-52	Set up	156
Sobral-Olho de Água do Pagé	CE-55	Set up	31
Patos-Olho de Água do Pagé	CE-183	Set up	32
Olho de Água do Pagé-Catunda	CE-55	Set up	77
Catunda-Boa Viagem	CE-55	Set up	123
Boa Viagem-Poiba Branca	CE-55	Set up	41
Fortaleza-Boa Viagem	BR-020	Set up	218

BOARD 2.1 - continuation

Part	Highway	Rolling Surface	Real Extension (Km)
Crateus-Pedra Branca	BR-226	Set up	136
Pedra Branca-Mineirolândia	BR-226	Set up	15
Mineirolândia-Senador Pompeu	BR-226	Set up	15
Belém-Santa Maria	BR-316	Paved	107
Santa Maria-Santa Inês	BR-316	Paved	431
Santa Inês-Caxuxa	BR-316	Paved	136
Caxuxa-Peritoro	BR-316	Paved	25
Peritoro-Teresina	BR-316	Paved	187
Teresina-Road crossing PI-4	BR-316	Paved	84
Road crossing PI-4-Caturiano	BR-316	Paved	205
Santa Maria-Porto Franco	BR-010	Paved	616
Porto Franco-Presidente Dutra	BR-226	Set up	441
Peritoro-Presidente Dutra	BR-135	Set up	114
Presidente Dutra-Orosinho	BR-135	Set up	175
Caxuxa-Miranda	BR-135	Paved	70
Miranda-São Luis	BR-135	Paved	124
Santa Inês-Miranda	BR-408	Set up	98
Teresina-Piripiri	BR-343	Paved	171
Piripiri-Parnaíba	BR-343	Paved	167
Piripiri-Tianguá	BR-222	Paved	140
Tianguá-Camocim	CE-75 e CE-71	Paved	77
Camocim-Cinval	CE-2	Set up	47
Tianguá-Aprazível	BR-222	Paved	37
Aprazível-Sobral	BR-222	Paved	40
Sobral-Patos	BR-222	Paved	30
Patos-Umirim	BR-222	Paved	87
Umirim-Fortaleza	BR-222	Paved	87
Aprazível-P.Pessoa	CE-71	Paved	35
Sobral-Morrinhos	CE-59	Set up	64
Morrinhos-Acarau	CE-59	Set up	65
Umirim-Morrinhos	CE-16	Set up	104
Fortaleza-Chorosinho	BR-116	Paved	61
Chorosinho-B. do Cesário	BR-116	Paved	48
B. do Cesário-Icó	BR-116	Paved	153
Icó-Ipaumirim	BR-116	Paved	44
Ipaumirim-Slagueiro	BR-116	Paved	132
Salgueiro-Cabrobó	BR-116	Paved	58
Cabrobó-Belém de S. Francisco	BR-316	Paved	31
Belém de S.Francisco-Canudos	BR-116	Set up	133
Canudos-Tucano	BR-116	Set up	126
Tucano-road crossing BR-324	BR-116	Set up	127
Road crossing BR-324-Feira de Santana	BR-116	Paved	20
Feira de Santana-Conceição da Feira	BA-525	Paved	35
Orosinho-Floriano	BR-230	Set up	121
Floriano-Caturiano	BR-230	Set up	154
Caturiano-Picos	BR-230	Paved	38
Picos-São Julião	BR-230	Paved	64
Picos-Petrolina-Juazeiro	BR-407	Being Set up	306
Petrolina-Juazeiro-Capim Grosso	BR-407	Paved	235
Capim Grosso-Baixa Grande	BA-130	Set up	79
Baixa Grande-Itaberaba	BA-130	Set up	100
Jacobina-Capim Grosso	BR-324	Paved	62

BOARD 2.1 - continuation

Part	Highway	Rolling Surface	Real Extension (Km)
Capim Grosso-road crossing BR-116	BR-324	Paved	110
Seabra-Itaberaba	BR-242	Paved	158
Itaberaba-Argoim	BR-242	Paved	91
Argoim-Feira de Santana	BR-116	Paved	35
Senador Pompeu-Solonópole	BR-226	Set up	53
Fortaleza-Quixada	CE-01	Paved	151
Quixeda-Senador Pompeu	CE-01	Paved	91
Chorosinho-Quixada	BR-122	Paved	96
Mineirolândia-Mombaça	CE-55	Set up	46
Mombaça-Iguatu	CE-55	Set up	82
Iguatu-Várzea Alegre	CE-55	Set up	61
Várzea Alegre-Crato	CE-53	Set up	75
Crato-road crossing BR-116	CE-25	Set up	66
Mombaça-Tauá	CE-55	Set up	93
São Julião-Campos Sales	BR-230	Set up	60
Campos Sales-Iguatu	CE-84	Set up	166
Campos Sales-Várzea Alegre	BR-230	Set up	127
Várzea Alegre-Ipaumirim	BR-230	Set up	70
Ipaumirim-Cajazeiras	BR-230	Paved	54
Cajazeiras-Patos	BR-230	Paved	146
Patos-road crossing BR-412	BR-230	Paved	154
Road crossing BR-412-Campina Grande	BR-230	Paved	32
Campina Grande-road crossing PB-8	BR-230	Paved	60
Road crossing PB-8-road crossing PB-3	BR-230	Paved	20
Road crossing PB-3-road crossing BR-101	BR-230	Paved	35
Road crossing BR-101-João Pessoa	BR-230	Paved	17
João Pessoa-Cabedelo	BR-230	Paved	18
Paq. do Cesário-Mossoró	BR-304	Paved	140
Mossoró-Angicos	BR-304	Paved	104
Angicos-Macaíba	BR-304	Paved	149
Macaíba-Parnamirim	BR-304	Paved	26
Natal-Parnamirim	BR-101	Paved	21
Parnamirim-road crossing RN-7	BR-101	Paved	42
Road crossing RN-7-Mamanguape	BR-101	Paved	70
Mamanguape-road crossing BR-230	BR-101	Paved	/
João Pessoa-Recife	BR-101	Paved	
Recife-Cabo	BR-101	Paved	
Cabo-Palmares	BR-101	Paved	
Palmares-Maceió	BR-101	Paved	
Road crossing BR-316-Junqueiro	BR-101	Paved	
Junqueiro-Cedro de S.João	BR-101	Paved	
Cedro de S.João-Maruim	BR-101	Paved	
Maurim-road crossing BR-235	BR-101	Pave	
Road crossing BR-235-road crossing SE-103	BR-101	P	
Road crossing SE-103-Umbaúba	BR-101		
Umbaúba-Alagoinhas	BR-101		
Mossoró-Jacuri	BR-405		
Jacuri-road crossing BR-116	BR-405		7.
Jacuri-Cajazeiras	PB-25		
	RN-13		2??

BOARD 2.2

NORTHEAST IMPORTS BY HIGHWAY NETWORK, OTHER PRODUCTS MADE IN SÃO PAULO

THOUSAND TONS/PER YEAR

Destine	Fruits	Rice	Fire Brick	Heavy Iron Bars	Pieces to Cars	Synthetic Rubber	Agricultural Tractors	Wood	Manures and Fertilizers	Cow Cattle	Agricultural Implements
Maceió	-	-	-	-	-	-	-	1.4	-	-	-
Recife	2.8	1.3	1.4	-	-	1.5	-	-	-	1.2	-
Fortaleza	-	-	-	-	-	-	1.5	-	-	-	-
Interior of Ceará	-	-	-	-	-	-	-	-	-	-	1.2
São Luis	-	-	-	-	1.1	-	-	-	-	-	-
Interior of Maranhão	-	-	-	1.5	-	-	-	-	-	-	-
Salvador	4.4	5.1	2.1	1.6	1.2	-	-	-	1.4	-	-
TOTAL	7.2	6.4	3.5	3.1	2.3	1.5	1.5	1.4	1.4	1.2	1.2

Source of Basic Data: Traffic Counting - 1972 (PRODEC/DNER).

BOARD 2.3

PRINCIPAL HIGHWAY FLUXES MADE IN SALVADOR

THOUSAND TONS/PER YEAR

Destine	Gasoline	Diesel Oil	Cement	Sugar	Wheat Flour	Wood
Maceió	1.4	-	-	-	-	-
Recife	13.6	1.5	-	-	-	-
Interior fo Pernambuco	1.8	1.6	-	-	-	-
Interior of Paraíba	1.0	-	-	-	-	-
Natal	2.6	-	-	-	-	-
Fortaleza	2.0	3.0	-	-	-	-
Interior of Piauí	1.4	-	-	-	-	-
Interior of Bahia	38.4	34.6	43.0	18.4	13.0	1.9
Aracaju	61.9	47.3	1.3	1.7		-
Interior of Sergipe	1.9	-	-	-	-	-
State of Guanabara	-	1.7	-	-	-	-
São Paulo	-	-	-	-	-	5.3
TOTAL	126.0	89.7	44.3	20.1	19.2	7.2

Source of Primary Data: Traffic Counting - 1972 (PRODEC/DNER).

III-2/2.33

BOARD 2.4

PRINCIPAL HIGHWAY FLUXES MADE IN SALVADOR

THOUSAND TONS/PER YEAR

Destine	Soda Ash	Grease and Lubricant Oils	Limestone	Manures and Fertilizers	Aluminium	Marble	Sisal Fiber
Recife	5.3	1.8	-	-	-	-	-
Fortaleza	-	2.7	-	-	-	-	-
Interior of Bahia	4.2	8.6	2.1	2.9	-	-	-
Aracaju	17.7	12.2	8.7	1.3	-	-	-
Interior of Sergipe	-	-	-	1.6	-	-	-
Minas Gerais	-	3.8	1.6	1.6	-	-	-
State of Guanabara	4.9	8.2	1.2	-	-	1.1	1.1
São Paulo	11.5	-	1.9	2.6	6.1	3.3	3.2
South	-	-	-	-	1.5	2.1	-
TOTAL	43.5	37.3	15.5	10.0	7.6	6.5	4.3

Source of Primary Data: Traffic Counting-1972 (PRODEC/DNER).

3.0 RAILROAD TRANSPORT

3.0 RAILROAD TRANSPORT

3.1 INDEXES ABOUT RAILROAD NETWORK

Northeast Regional system of "Rede Ferroviária Federal S/A." (Railroad network) works with four regions:

1st Maranhão-Piauí Region, which supplies the two States

2nd Cearense Region, which supplies the State of Ceará, including Paraíba (Souza) and Piauí (Castelo do Piauí)

3rd Northeast Region of which railroads extend through the States of Alagoas, Pernambuco, Paraíba and Rio Grande do Norte .

4th East Region which supplies Sergipe and Bahia.

The present system has an extension of 7,500 km and which is divided between the Northeast subregions as follows:

Region and State	Km	%
Northeastern Northeast	2,966	39.5
Alagoas	385	
Pernambuco	1,237	
Paraíba	698	
Rio Grande do Norte	646	
Northwestern Northeast	2,375	31.7
Ceará	1,423	
Maranhão	453	
Piauí	499	
Southern Northeast	2,162	28.8
Bahia	1,882	
Sergipe	280	
Northeast Regional System	7,503	100.0

Source: Railroad of Brazil - DNEF (1973)

In the map 3.1 we may observe that the railroad network is connected in all area. The connection with the system of Middle-South is accomplished through the 4th East-region, which reaches Minas Gerais (Monte-Azul).

Presently, the connection of Northeast railroad network with Middle-South railroad network is made through East railroad network, passing through Alagoas and Sergipe. There is a project to set up Salgueiro-Petrolina railroad and a road junction in Juazeiro.

The principal parts of Northeast Regional system of RFF S/A. (Federal Railroad Network) are shown in board 3.1.

3.2 GOODS MOVED BY THE 3rd NORTHEAST-REGION

Goods moved in the 3rd region in 1969/1973 period are shown in Board 3.2. Considering the transported tons, the products of mineral source are equivalent to 15% (cement and salt) and products of agricultural source, including wheat flour, are more than 70%. The list is completed by fuel oil and fertilizers.

Among agricultural products, sugar-cane transport has an outstanding position, a short distances, since then it is destined to supply the plants located in its periphery. The moving os this load shows the following results:

Years	Thousand T.	% Under the total	Million of T.km	% Under the Total
1969	551	40,1	13.8	4,9
1970	507	39,3	16.1	6,6
1971	321	28,7	13.2	5,7
1972	345	24,2	11.8	3,8
1973	367	23,2	10.9	2,9

In the considered cycle, sugar (refined and demerara) has the 1st place as the following board shows:

Years	Thousand T.	% Under the Total	Million of T.km	% Under the Total
1969	407	29,6	89.1	31,6
1970	405	31,4	86.2	35,5
1971	437	39,1	78.8	34,0
1972	630	44,2	102.8	32,7
1973	569	36,0	104.0	27,3

Taking into consideration gross volumes, sugar moving is distributed, in a percentage form, between the principal railroad as follows:

Specification	%
South of Pernambuco/Recife	45
Paraíba (Itabaiana)/Recife	15
Interior of Alagoas/Maceió	30
Others	10
TOTAL	100

Load which goes toward Recife is destined to refiner unit and also to export.

Other agricultural products have an irregular behavior and do not reach a representative quantities. We may observe this fact in the board 3.2.

Cement corresponds, in a proportion of 65%, the goods which are boarded in João Pessoa and the half part of the goods is destined to the own State and the remaining parcel is destined to Pernambuco and Alagoas. Salt is boarded mainly

in Mossoró, but one third of the goods is destined to Paraíba and Pernambuco and the remaining part is destined to Alagoas.

Fertilizers are destined to Sugar Plants, and they are boarded in Cinco Pontas Station. Petroleum Products are equivalent to fuel oil which is destined to industrial units in Paraíba and the interior of Pernambuco.

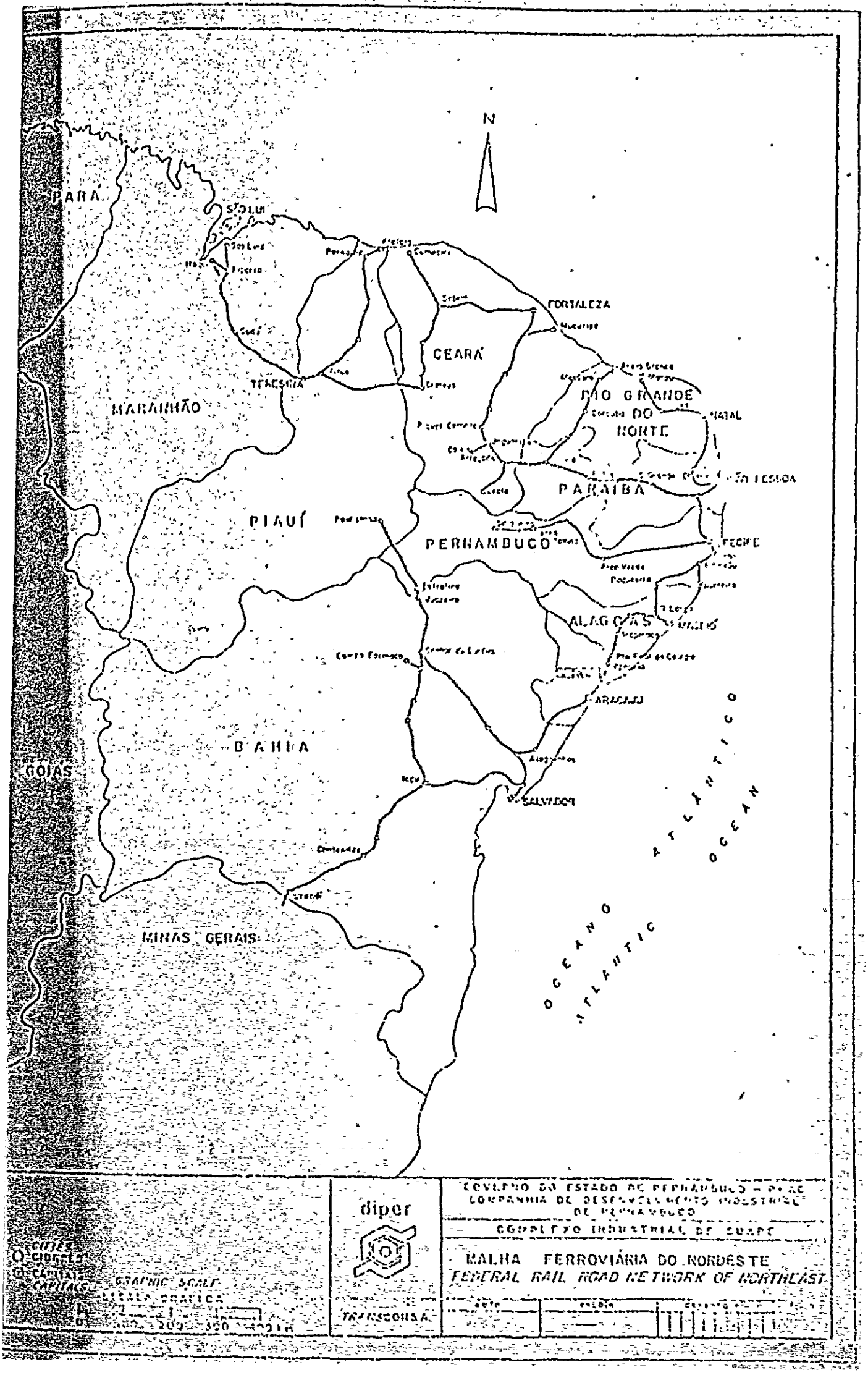
3 - GOODS MOVED BY OTHER NORTHEAST REGIONS

The regions are specificated in the boards 3.3, 3.4 and 3.5. The first (1st) region (Maranhão-Piauí) moves a small quantity of loads while the second region (Cearense) has cement, clay and sugar as principal goods. The last region (4th) has been increasing its transport and the principal goods are the products of mineral source.

INVESTMENTS PLANNED IN THE 3 rd REGION

Based on DNEF and GEIPOT support, Railroad Master Plan of Northeast is presently underway and which will benefit the railroad network. In relation to the 3rd region, which is more involved with Suape Complex, a complete reformation of the present technical-operational characteristi is foreseen and which is shown in board 3.6.

Minimum investments required in the 3rd Region totalize, according to the parts, an amount of Cr$ 612 million. These investments are shown in board 3.7.


N
PARÁ
MARANHÃO
PIAUÍ
CEARÁ
FORTALEZA
RIO GRANDE DO NORTE
NATAL
PARAÍBA
JOÃO PESSOA
PERNAMBUCO
RECIFE
ALAGOAS
MACEIÓ
ARACAJU
BAHIA
SALVADOR
GOIÁS
MINAS GERAIS
OCEANO ATLANTICO
OCEAN ATLANTIC
diper
TRANSNORDESTINA
GOVERNO DO ESTADO DE PERNAMBUCO – BRASIL
COMPANHIA DE DESENVOLVIMENTO INDUSTRIAL DE PERNAMBUCO
COMPLEXO INDUSTRIAL DE SUAPE
MALHA FERROVIÁRIA DO NORDESTE
FEDERAL RAIL ROAD NETWORK OF NORTHEAST
CIDADES
CAPITAIS
GRAPHIC SCALE
ESCALA GRÁFICA

BOARDS

BOARD 3.1

RFF-S.A. - PRINCIPAL PARTS OF THE REGIONAL SYSTEM OF NORTHEAST

REGION/PART	EXTENSION (KM)
1st REGION (MARANHÃO-PIAUI)	937.1
São Luiz - Piçarra	27.8
Piçarra - Teresina	425.1
Teresina - Altos	42.0
Altos - Parnaíba	296.0
Parnaíba - Atalaia	16.2
Altos - Castelo do Piauí	130.0
2nd REGION (CEARENSE)	1.452.1
Prof. João Felipe (Fortaleza) - Porangaba	9.1
Porangaba - Jaguaribe	415.2
Jaguaribe - Arrojado	53.1
Arrojado - Souza	98.8
Porangaba - Mucuripe	15.8
Jaguaribe -	32.9
Arrojado - Crato	123.2
Prof. João Felipe (Fortaleza) - Sobral	234.6
Sobral - Castelo do Piauí	340.5
Sobral - Camocim	128.9
3rd REGION (NORTHEAST)	2.706.9
Recife - Ribeirão	86.9
Ribeirão - Lourenço e Albuquerque	228.2
Lourenço e Albuquerque - Colegio	266.3
Lourenço e Albuquerque - Maceió	32.4
Ribeirão - Barreiros	55.3
Recife - Salgueiro	601.3
Recife - Souza	533.1
Triângulo - Macau	519.3
Paula Cavalcanti - Cabedelo	51.0
Souza - Mossoró	242.6
Lajes - São Rafael	90.5
4th REGION (EAST)	2.406.9
Salvador - Mapele	21.8
Mapele - São Francisco	100.8
São Francisco - Propriá	427.8
São Francisco - Senhor do Bonfim	316.8
Senhor do Bonfim - Paulistana	336.6
Senhor do Bonfim - Jaçú	338.5
Antonio Gonçalves - Campo Formoso	9.8
Mapele - Jaçú	279.1
Jaçú - Monte Azul	575.7
TOTAL	7.503.0

Source: Railroad of Brazil - D.N.E.F./1973.

BOARD 3.2

3rd REGION - NORTHEAST - RFF S.A. - GOODS TRANSPORT - 1969/1973

Specification	1969		1970		1971		1972		1973	
	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km
MINERAL PRODUCTS (1)	169	96,1	159	74,0	140	78,3	219	138,5	333	172,0
Cement	77	30,6	97	39,2	83	34,0	117	57,5	201	64,7
Salt	75	57,1	46	26,6	57	44,3	93	76,2	113	96,6
Plaster	-	-	-	-	-	-	4	1,6	19	10,7
Manganese Ore	-	-	-	-	-	-	5	3,2	-	-
Other Ores	17	8,4	16	8,2	-	-	-	-	-	-
AGRICULTURAL PRODUCTS	997	119,1	938	109,6	831	112,2	1.050	134,6	1.043	147,3
Sugar-Cane	551	13,3	507	16,1	321	13,2	345	11,8	367	10,9
Sugar	407	89,1	405	86,2	437	78,8	630	102,8	569	104,0
Wheat Flour	-	-	14	5,0	14	5,2	5	1,6	11	4,9
Cotton Seed	20	6,6	-	-	16	5,1	25	8,0	21	5,7
Castorbean	19	9,6	-	-	8	2,6	7	2,5	14	4,6
Vegetal Fibers	-	-	12	2,3	11	2,8	-	-	-	-
Fruits	-	-	-	-	3	1,8	-	-	-	-
Cotton	-	-	-	-	-	-	5	2,3	18	9,2
Vegetal Oil	-	-	-	-	-	-	6	1,7	-	-
Molasse	-	-	-	-	-	-	-	-	24	5,0
Cattle Food	-	-	-	-	21	2,7	27	3,9	19	3,0
PETROLEUM PRODUCTS AND OTHER INDUSTRIAL GOODS	71	20,7	74	21,6	72	19,4	77	18,1	97	28,2
GOODS NOT SPECIFICATED	136	45,7	120	37,4	74	21,9	78	22,8	107	33,5
TOTAL	1.373	281,6	1.291	242,6	1.117	231,8	1.424	314,0	1.580	381,8

III-2/3.12

BOARD 3.3

1st REGION - MARANHÃO - PIAUÍ - RFF S.A. - GOODS TRANSPORT - 1969/1973

Specification	1969		1970		1971		1972		1973	
	10^3 t.	10^6 t.km	10^3 t.	10^6 t.km	10^3 t.	10^6 t.km	10^3 t.	10^6 t.km	10^3 t.	10^6 t.km
MINERAL PRODUCTS (1)	11	3,7	14	5,0	23	7,7	42	13,6	32	11,5
Cement	3	1,2	4	2,0	6	2,7	23	7,8	26	9,1
Plaster	5	1,3	8	2,4	15	4,4	16	4,8	3	1,1
Salt	3	1,2	2	0,6	2	0,6	3	1,0	3	1,3
AGRICULTURAL PRODUCTS (2)	19	5,2	7	1,9	13	3,8	36	10,4	40	19,8
Rice	2	0,3	-	-	1	0,2	11	2,6	9	7,3
Sugar	-	-	-	-	2	0,7	5	1,3	12	4,7
Babaçu Palm Tree	6	1,2	3	0,6	4	1,0	8	1,7	-	-
Corn	-	-	-	-	-	-	1	0,3	3	1,6
Grain and Cakes	8	2,9	2	0,7	2	0,6	9	3,3	10	3,9
Vegetal Oil	3	0,8	-	-	2	0,4	-	-	3	0,9
Drinks	-	-	-	-	-	-	0	0,2	-	-
Wheat Flour	-	-	-	-	1	0,6	2	1,0	2	1,1
Manioc Flour	-	-	-	-	-	-	-	-	1	0,3
Coffee	-	-	2	0,6	1	0,3	-	-	-	-
PETROLEUM PRODUCTS AND OTHER INDUSTRIAL GOODS	4	1,8	3	1,3	3	1,3	8	2,4	9	1,1
GOODS NOT SPECIFICATED	19	5,2	14	3,6	19	4,7	21	4,7	13	5,9
TOTAL	53	15,9	38	11,8	58	17,5	107	31,1	94	38,3

Source: Federal Railroad Network S.A. - Statistic Year Book

(1) Including Cement
(2) Including Sugar, Drinks and Vegetal Oils

BOARD 3.4

2nd REGION - CEARENSE - RFF S.A. - GOODS TRANSPORT - 1969/1973

Specification	1969		1970		1971		1972		1973	
	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km
MINERAL PRODUCTS (1)	95	35,0	145	57,1	112	47,7	126	58,5	134	65,4
Cement	75	24,7	124	46,6	97	38,5	111	48,6	97	47,2
Plaster and Clay	20	10,3	21	10,5	15	9,2	15	9,9	31	14,4
Magnesite	-	-	-	-	-	-	-	-	6	3,8
AGRICULTURAL PRODUCTS	149	66,9	117	60,3	89	47,4	118	59,8	131	73,7
Sugar	59	31,7	71	39,3	45	23,7	37	22,6	57	38,6
Wheat Flour	21	11,8	23	12,9	16	9,2	19	11,0	21	12,5
Cotton	24	9,0	-	-	7	2,5	6	1,9	7	2,1
Cotton Seeds	10	2,5	-	-	-	-	4	1,0	4	1,2
Castorbean	21	6,6	-	-	14	6,2	-	-	20	7,0
Several Seeds	-	-	15	3,6	-	-	5	2,0	-	-
Vegetal Oils	14	5,3	-	-	-	-	13	4,4	9	3,3
Coffee	-	-	8	4,5	5	3,2	-	-	-	-
Babaçu Palm Tree	-	-	-	-	2	2,6	20	8,6	-	-
Rice	-	-	-	-	-	-	11	7,2	7	5,2
Corn	-	-	-	-	-	-	3	1,1	-	-
Molasse	-	-	-	-	-	-	-	-	6	3,8
Grain and Cakes	-	-	-	-	-	-	-	-	-	-
PETROLEUM PRODUCTS AND OTHER INDUSTRIAL GOODS	16	8,1	38	16,9	44	20,1	57	28,0	88	47,2
GOODS NOT SPECIFICATED	61	23,9	66	25,6	47	15,1	30	9,6	38	15,3
TOTAL	321	133,9	366	159,9	292	130,3	331	155,9	391	201,6

Source: RFF S.A. - Statistic Year Book

(1) Including Cement

BOARD 3.5

4th REGION - EAST - RFF S.A. - GOODS TRANSPORT - 1969/1973

Specification	1969		1970		1971		1972		1973	
	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km	10^3t.	10^6t.km
MINERAL PRODUCTS (1)	237	146,5	372	254,4	326	202,5	417	259,5	540	378,5
Cement	66	39,6	137	102,5	87	66,5	62	34,8	108	77,5
Magnesite	47	16,1	70	26,9	91	37,0	96	39,1	116	51,3
Manganese Ore	26	13,6	58	38,7	97	50,6	82	40,5	58	38,9
Lead Ore	19	10,0	-	-	-	-	-	-	-	-
Plaster	57	60,0	69	72,5	42	43,4	69	71,9	99	99,0
Chrome Ore	20	7,2	30	11,6	-	-	-	-	-	-
Quartz	-	-	8	2,2	-	-	-	-	-	-
Limestone	-	-	-	-	5	1,9	-	-	3	1,5
Several Ores	-	-	-	-	-	-	75	33,0	105	41,9
Iron and Steel	-	-	-	-	-	-	1	0,6	1	1,4
Salt	-	-	-	-	4	3,1	29	38,1	50	67,0
	-	-	-	-	-	-	3	1,5	-	-
AGRICULTURAL PRODUCTS	89	45,5	51	29,8	33	19,6	33	18,0	57	34,7
Drinks	18	15,7	11	9,2	-	-	-	-	-	-
Castorbean	50	19,2	22	8,7	7	2,8	11	4,8	31	13,3
Grain and Cakes	21	10,6	18	11,9	14	9,4	17	10,3	18	12,3
Corn	-	-	-	-	4	3,3	-	-	-	-
Sugar	-	-	-	-	5	2,5	2	1,7	5	3,9
Cotton	-	-	-	-	3	1,6	-	-	-	3,9
Cotton Seeds	-	-	-	-	-	-	3	1,2	3	1,3
PETROLEUM PRODUCTS AND OTHER INDUSTRIAL GOODS	-	-	-	-	-	-	14	11,5	18	10,4
GOODS NOT SPECIFICATED	133	55,4	76	33,4	108	59,3	64	39,0	65	36,8
TOTAL	459	247,4	499	317,6	467	281,4	528	328,0	680	460,4

Source: RFF S.A. - Statistic Year Book

(1) Including Cement

BOARD 3.6

RFF S.A. - 3rd REGION - NORTHEAST

PRESENT PHYSICAL AND OPERATIONAL CHARACTERISTICS OF THE RAILROAD NETWORK OF NORTHEAST

Part	Extension - Km			Maximum Lane (%)		Number of Curves	Minimum Reading (m)	Maximum Real Resistence-(Kg./t.)		Yearly Maximum Out_Flux (1.000 t)
	Total	Tangent	Curve	Import	Export			Import	Export	
Recife - Itabaiana	141,38	85,59	55,79	2,90	3,05	387	104,33	27,3	30,0	3.510
Itabaiana - Souza	390,60	293,17	97,63	3,00	1,89	628	119,92	30,4	21,6	1.944
Souza - Mossoró	242,59	180,73	61,86	2,22	2,06	298	191,07	18,0	18,5	1.155
P.Cavalcanti-Cabedelo	50,20	35,07	15,13	2,50	2,00	89	114,17	23,2	21,9	2.581
Itabaiana - P.Cavalcanti	38,82	23,33	15,49	2,16	2,50	143	106,40	16,3	17,3	1.701
P.Cavalcanti - Natal	236,34	160,00	76,34	2,70	2,60	440	100,00	28,8	29,6	901
Natal - Macau	239,35	176,23	63,12	2,30	1,86	420	100,00	23,9	19,6	1.231
Recife - Salgueiro	607,42	381,04	226,38	2,50	1,83	1.571	102,75	21,8	20,9	2.592
Recife - Ribeirão	87,13	48,04	39,09	1,41	1,41	119	169,45	14,7	15,3	2.773
Ribeirão-L.Albuquerque	228,10	126,09	102,01	2,47	3,28	717	83,04	24,6	30,3	1.215
L.Albuquerque - Maceió	34,79	21,19	13,60	2,00	2,00	89	99,96	20,2	25,4	6.224
L.Albuquerque-Colegio	264,32	166,46	97,86	2,00	2,72	781	100,01	23,9	23,8	1.153
Aracaju - Colegio	128,93	67,12	61,81	2,10	1,90	354	100,00	22,8	22,6	648

Source: Railroad Master Plan of Northeast Region.

BOARD . 3.7

RFF S.A. - 3rd REGION - NORTHEAST - SPECIFICATION OF PLANNED BETTERMENTS

in Cr$ 1.000

Part	Total	Filling in and Levelling with earth	Drainage	Super Structure	Engineering Art Craft	Telecomunication and Signaling	Fences
Recife - Itabaiana	17.323	3.434	3.288	8.883	92	659	967
Itabaiana - Souza	118.880	35.678	11.824	66.716	35	1.954	2.673
Souza - Mossoró	83.720	11.193	3.951	65.664	25	1.228	1.659
P.Cavalcanti - Cabedelo	8.042	263	1.234	5.564	387	251	343
Itabaiana - P.Cavalcanti	4.321	521	635	2.662	44	194	265
P.Cavalcanti - Natal	49.874	3.487	4.670	38.669	238	1.186	1.624
Natal - Macau	73.889	7.465	4.767	57.332	1.491	1.197	1.637
Recife - Salgueiro	129.961	14.220	7.585	100.717	248	3.036	4.155
Recife - Ribeirão	6.742	75	531	5.491	6	43	596
Ribeirão - L.Albuquerque	2.943	4.305	2.369	18.583	11	114	1.561
L.Albuquerque - Maceió	3.190	0	483	2.448	4	17	238
L.Albuquerque - Colegio	60.442	15.473	4.448	37.770	830	133	1.788
Aracaju - Colegio	28.853	3.671	4.516	18.314	1.455	61	836
TOTAL	612.180	99.785	50.301	428.813	4.866	10.073	18.342

Source: Railroad Master Plan - Northeast Region.

TOME III

PART 3

SECTORIAL STUDIES

1.0 PROSPECTS OF WHEAT SUPPLY

1.0 PROSPECTS OF WHEAT SUPPLY.

In the present study, hypothesis of centralization in Suape of wheat imports required by Northeastern Northeast is studied in order to receive the benefits of scale economy in cereal moving which port facilities may give. Similar purpose goes toward to governmental purposes to use the official monopoly in the commercialization of the product to assure a total rationalization of its transport.

In relation to the location of new miller enterprises required by the development of regional consumption, along the execution of the project, we may admit that it will become nearer to the comsumer areas, i.e., it will go toward the interior of Brazil instead of remaining set up alongside the coast. This project has already been accomplishing in the South Region of Brazil.

It is necessary to make an analysis of policy of wheat supply, which is coordenated by Wheat Department of SUNAB, in order to supply similar purposes.

Wheat "in natura" is not used to human or animal comsumption but it is transformed in wheat flour by the miller units. The most important secondary industry of wheat (processing of grains) consists mainly in milling process of this product in a relation of wheat in grain/wheat flour of some 0.75.

Paste industries as bread, etc., absorb almost the total offer of wheat flour.

1.1 CHARACTERIZATION OF BRAZILIAN CONSUMPTION.

1.1.1 DEVELOPMENT OF NATIONAL POSSIBLE CONSUMPTION.

Wheat, as paste forms, i.e., bread, wheat flour, etc, is presented as one of the principal ingredient of alimentary diet of Brazilians. It has a possible consumption lower only than manioc and rice consumption. However, its consumption is irregular in all country because alimentary customs of population differ from region to region in view of the large territorial extension, climatic diversity, consumers customs, different income levels, etc.

In the following board we may observe that Brazil is presented as traditional wheat import to supply the internal necessities of the consumption:

YEARS	PRODUCTION (1,000 t) (1)	IMPORT (1,000 t) (2)	POSSIBLE CONSUMPTION (1,000 t) (3) = (1) + (2)	YEARLY INCREASE (%)	RELATION (2)/(3) (%)
1955	1,102	1,676	2,768	-	60.5
1956	1,297	1,422	2,719	2.5	52.3
1957	781	1,441	2,222	18.3	64.9
1958	558	1,506	2,094	5.8	71.9
1959	631	1,820	2,431	16.1	74.9
1960	712	2,033	2,745	12.9	74.1
1961	316	1,881	2,197	20.0	85.6
1962	102	2,195	2,297	4.3	95.5
1963	305	2,175	2,481	8.2	87.7
1964	272	2,452	2,722	10.0	95.5
1965	253	1,876	2,129	22.0	88.1
1966	248	2,350	2,648	24.4	88.9
1967	338	2,446	2,784	5.1	87.9
1968	411	2,621	3,032	8.9	86.4
1969	770	2,562	3,332	3.3	76.4
1970	1,303	1,941	3,244	3.6	59.8
1971	1,544	1,855	3,399	2.0	53.3
1972	1,719	1,763	3,475	2.3	50.7
1973	456	3,103	3,559	2.3	87.3

SOURCE: [illegible]

Yearly increase rate of the consumption was of 1.7% in the 1960/1970 period and 3.1% in the 1970/1973 period.

The participation of national wheat production in the total consumed in Brazil is relatively small reaching only 4.5% in 1964. By this way, the behavior of historical series of possible wheat consumption was very much irregular in the 1955/1967 period, be it by vacillation of external offer of this cereal, be it by the internal lack of exchange value or, yet, by the oscillation in the national harvest.

However, a more continuous and regular increase of the consumption, placed around 3% a.a., has being verified since 1967.

National wheat consumption per capita is very distant from the other consumptions registered in other countries and we may observe a coefficient of only 36.9 kg per inhabitant in 1973 while 58 kg in North America and 95 kg. in Southern Western Europe was verified. The following board shows the development of real wheat consumption per capita in Brazil.

YEARS	CONSUMPTION PER CAPITA (kg/year)
1966	29.1
1967	30.1
1968	32.3
1969	31.4
1970	32.1
1971	33.0
1972	33.7
1973	36.9

SOURCE: SUNAB and TRANSCON.

Wheat sub-consumption is explained by the alimentary habits of the population which shows a preference by corn, manioc or rice.

1.1.2 STATE CONSUMPTION

Levels of wheat consumption per capita in different Brazilian regions are very much irregular. The following board will show as it was in 1973:

REGIONS	REAL CONSUMPTION (t)	DISTRIBUTION IN PERCENTAGE	REAL CONSUMPTION PER CAPITA (kg/year)
North and Northeast	799,387	21.0	22.9
Middle - North	835,883	22.0	35.2
Middle - South	1,602,220	42.2	47.1
South	561,923	14.8	54.4
TOTAL	3,799,413	100.0	36.9

SOURCE:- SUNAB and TRANSCON.

In Middle-South and South region, wheat as bread, flour or paste is very much used and it absorbs 57.0% of wheat which is consumed in Brazil, though it is used by 42.1% of the Brazilian population. Taken together they register a consumption per capita around 50.2 kg/year.

In the rural areas and other regions we may observe a retraction of wheat consumption and which is substituted by manioc or corn. In North and Northeast, where 34.2% of Brazilian population is centered, wheat consumption is equivalent to 21.0% of Brazilian total and what results

a consumption per capita of only 22.9 kg/year.

The importance of the alimentary habits of Brazilian population, in view of level variance of wheat consumption per capita has being remarked in several opportunities. Thus, between 1961 and 1963, "Instituto Brasileiro de Economia" (Brazilian Department of Economy) has ventured an inquiry about familiar costs registering habits as matter of alimentary products consumption. The inquiry mentioned above has established some rules of comparision which allowed us to identify products which may substitute wheat in Brazil. The following board shows these products.

Consumption Per Capita - kg/Year

SPECIFICATION	RIO DE JANEIRO	SÃO PAULO	CURITIBA	SALVADOR	RECIFE	FORTALEZA	BAHIA
Rice	43.95	57.12	35.97	14.45	26.63	40.31	25.59
Wheat Flour	4.28	6.79	15.87	2.18	1.53	1.33	0.76
Manioc Flour	6.58	3.02	3.02	34.01	23.74	24.22	58.32
Corn Meal	3.78	2.72	5.53	1.78	5.17	6.23	0.46
Bread	42.09	55.84	51.09	50.57	70.81	31.46	28.51
Paste	4.91	5.99	5.76	2.07	2.48	5.65	4.74

SOURCE:- FGV - IBE - "Inquiry about familiar costs - habits of alimentary consumption"

Although limited the inquiry allows to make clear, in relation to North's and Northeast's capitals, the substitution of wheat flour and rice by the consumption of manioc flour. In these regions, nutrition is based on manioc, corn, raw brown sugar and bean and it corresponds a traditional custom which will be hardly changed in a middle period.

1.2 WHEAT COMMERCIALIZATION

The responsible sector for the activities of wheat commercialization and industrialization is SUNAB through its Wheat Department (OTRIG), and Banco do Brasil is the financial agent. Wheat production is acquired by Banco do Brasil directly to the producers and gives them wheat commercialization even national and imported. Wheat is distributed between several mills according to systematics of pre-established quotas which are fixed in proportion to the consumption of the area to be supplied by the mill.

Decree-law of February 27, 1967 has changed all the policy relative to wheat supply in order to decrease the lazy capacity which was around 75%. Therefore, the allowance to set up new industrial units in the sector and stimulus to the incorporation and reassemblage of mills were forbidden in order to allow the use of silos and storehouses. The increase of ensilage and storage systems is of great interest to SUNAB since then adequate wheat stocks do not allow prices oscillations which arise out from the lack of offer. Wheat quotas related to each region were divided in two kinds, general and specific, the latter being to mills which show larger capacity of ensilage or storage, in order to regard, mainly the mills with good capacity of ensilage.

The scheme foresees an arithmetical decreasing progression to general quota and inversely an increase progression to specific quota. By this way, around 1977, the mills which will not have silos or storehouses will stop acting in wheat flour production.

The following board shows wheat quotas in 1973.

REGIONS	QUOTAS (T)	DISTRIBUTION IN PERCENTAGE	MILLING CAPACITY (t/yearly)	LAZY CAPACITY (%)
North - Northeast	750,000	21.1	906,854	17.3
Middle - North	780,000	22.0	980,799	20.5
Middle - South	1,495,000	42.1	2,422,620	38.3
South	525,000	14.8	962,251	45.4
TOTAL	3,550,000	100.0	5,272,524	32.7

SOURCE:- RURAM and TRANSCON.

The specification according to the States is shown in Board 1/1. Quotas of 1974 and which have increased to 4.2 million tons are shown in board 1/2.

Based on previous statments we may affirm that the Government will hardly allow the set up of new mills in view of the verified lazy capacity which reaches 45.4% in the South region. When this lazy capacity does not supply anymore the consumption it is possible that the development of industrial units already existing will be prefered at least in the majority. However, this rule will be adapted to local balance of offer and demand. Therefore, set up of new mills very much dimensioned and modern placed in port areas will be suggested in order to perform casual local deficits.

1.3 WHEAT SUPPLY IN NORTHEAST

Northeast consumption is supplied by foreign imports. The following board shows the source and the respective quantities of imported wheat and according to States in 1973.

(values in thousand tons)

HARBORS	ARGENTINE	UNITED STATES	CANADA	REMAINING PART OF 1972	TOTAL	QUOTAS (STATES)
Aracaju	12.2	2.0	2.0	1.5	17.7	22.4
Belem	32.0	17.5	-	5.8	55.3	61.7
Cabedelo	13.1	2.2	2.0	3.5	20.8	27.6
Fortaleza	42.6	82.4	14.0	22.0	161.0	147.4
Itaqui	17.1	13.0	-	5.0	35.0	31.9
Maceio	40.4	25.4	-	6.8	72.5	70.6
Natal	15.6	2.5	2.0	3.0	23.1	31.4
Recife	42.5	112.4(1)	32.8(1)	23.0	210.7	195.6
Salvador	27.5	78.5(2)	22.0(2)	13.0	147.0	138.0
TOTAL	243.0	335.9	80.8	83.6	743.1	726.6

SOURCE:- SUNAB.
1 - Quantities destined to Aracaju were discounted
2 - Quantities destined to Cabedelo and Natal were discounted

1.4 PROJECTION OF WHEAT CONSUMPTION IN PERNAMBUCO

The historical series of the consumption of wheat in grain in Pernambuco shows a continuous increase though rates are very much fluctuant as we may observe in the following board:

YEAR	CONSUMPTION IN TONS	YEARLY INCREASE (%)
1966	127,951	-
1967	138,103	8.0
1968	143,266	3.7
1969	162,957	13.7
1970	167,119	2.6
1971	175,770	5.1
1972	183,405	4.3
1973	209,144	14.0

SOURCE:- SUNAB and TRANSCON.

Wheat consumption per capita in the State turns around 37.0 kg/year and it is larger than Northeast average of 22.9 k and it is equivalent to the national average (36.9 kg). However, it is much lower than the consumption per inhabitant in South of Brazil which is 54.4 kg/year.

The methodology adopted to the projection of wheat consumption is based on the study "Projeção da Demanda de Produtos Agrícol of Fundação Getulio Vargas, where two estimates were considered:

a - real consumption

b - potential demand

The first one is supported in the historical development of liquid availability of foods and it shows an eventual lack of offer. The second one, in an inquiry of familiar costs, results coefficients which are not affected by the limitation in the offer of some products.

In the present study, the second model of projection was taken into consideration in view of the agricultural policy relative to the wheat growing which intends to produce in Brazil a sufficient quantity of wheat to self-supply.

The output of wheat in Brazil has being increased very much, changing from 480 kg/ha up to 1,041 kg/ha in 1971, though it is very distant from the productivity of developed countries as France (3,660 kg/ha), Sweden (4,330 kg/ha) and Italy (2,240 kg/ha) in 1968.

It was supposed that before 1975, the supply of the internal demand by wheat through the national production would not be possible, by this way, the elasticity of the real consumption of 0.27 will be used. From 1975 we may admit an elasticity of potential demand of 0.33 and after 1980 a potential demand of 0.32.

The consumption per capita of São Paulo was taken into consideration because it was necessary to adopt a maximum limit of consumption per capita. Thus, in 1990 when it is expected that Pernambuco reaches the present income per capita of São Paulo, wheat consumption would reach 68 kg/ /inhab., and increasing according to the increment rates of the population.

The projections of wheat consumption in Pernambuco up to 1990 were obtained through the following equation:[1]

$$C_i = C_o \left[1 + \left(E_i \frac{X_i - X_o}{X_o}\right) \frac{P_i}{P_o}\right], \text{ where}$$

C_i = "i" - yearly consumption

C_o = "o" - yearly consumption

E_i = elasticity in "i" year

X_i = Income per capita in "i" year

X_o = Income per capita in "o" year

P_i = Population in "i" year

P_o = Population in "o" year

The following board shows the results of the projections to the years of final accomplishment:

YEAR	CONSUMPTION IN THOUSAND TONS	CONSUMPTION PER CAPITA (kg/year)
1975	260.0	44.8
1976	270.0	45.6
1977	280.0	16.5
1980	312.2	49.0
1985	385.9	55.4
1995	566.2	68.0
2005	647.1	68.0

SOURCE:- TRANSCON.

1 - Projections of income per capita and population of Northeast States are shown in a document of volume I.

1.5 OPPORTUNITY TO SET UP A NEW MILL

Milling capacity of Grande Recife Mills is presented as follows:

SPECIFICATION	T/DAY	THOUSAND t/year (1)
Company of Pilar - Recife Products	32.5	10.0
Large Mills of Brazil (Recife Mill)-Recife	656.8	205.0
Pernambuco - Olinda Mill	180.0	55.0
TOTAL	869.3	270.0

(1) 310 days of operation were taken into consideration.

Based on previous projections we may observe that set up of new milling unit will be necessary in 1976, according to the hypothesis mentioned above (310 days of operation per year), or around 1980 (with milling during 360 days to accomplish 312 thousand tons,i.e., estimate quantities to the consumption).

Considering that the first hypothesis is the most possible and oblige it to supply the deficit of state consumption new unit would grind the following wheat quantities:

YEAR	THOUSAND TONS.
1980	42.2
1985	115.9
1995	296.2
2005	377.1

From the point of view of lay-out the mill would be dimensioned to have a capacity of 240 thousand t/ year with space supply to its duplication along the execution of the project.

1.6 CENTRALIZATION OF THE IMPORTS IN SUAPE

1.6.1 PROJECTION OF WHEAT CONSUMPTION IN ALAGOAS, PARAÍBA AND RIO GRANDE DO NORTE.

The consumption of wheat in grain in the remaining parcel of Northeastern Northeast (States of Alagoas, Paraiba and Rio Grande do Norte) shows an irregular development as we may observe in the following board:

(in 10^3 tons)

STATE \ YEAR	1966	1967	1968	1969	1970	1971	1972	1973
Alagoas	32.5	33.1	49.1	53.1	54.3	57.6	65.8	74.6
Paraiba	19.4	22.4	31.4	24.5	24.0	25.3	26.7	29.8
R.G.Norte	10.4	13.9	20.6	12.9	23.0	28.2	25.1	30.7
TOTAL	62.3	69.4	101.1	90.5	101.3	111.1	117.6	135.1

SOURCE:- SUNAB.

The following data result from those which were mentioned above.

YEAR	YEARLY INCREASE %
1967	11.3
1968	14.5
1969	- 11.7
1970	11.9
1971	10.9
1972	10.6
1973	11.5
Average	11.7

If we take the period as a whole, Regional consumption will increase in an yearly rate of almost 12%. The irregularity is explained by the constant adjustments in the quotas of the mills and which are accomplished by controler sectors of the product; the phenomenon which may be observed in the possible consumption per capita.

By all means, middle rates of increase are higher than the rates which were observed in other units of the Federation and what should result from the urbanization process and, simultaniously, from the betterments of income patterns. The repressed demand in the following cycle is not excluded.

By any way, rate of the last period (12%) may be taken into consideration to the States mentioned above and from which the following increases would occur.

STATE \ YEAR	1975	1980
Alagoas	81.7	103.2
Paraiba	43.1	109.7
Rio Grande do Norte	41.3	87.9
TOTAL	166.1	300.8

Considering the necessity of an adaptance of a maximum limit of consumption per capita, São Paulo was taken as best quantity (68 kg/inhab.). Based on these levels, the development of the consumption would follow the increase rates of the population.

By this way, due to its larger consumption per inhabitant, Alagoas would reach this quantity in 1990.

Paraiba and Rio Grande do Norte will reach this limit when the income per capita is equivelent to present income of São Paulo, corresponding the years of 1992 and 1995, respectively.

According to previous data, projected consumption would increase as follows:

THOUSAND T.

STATES	1985	1995	2005
Alagoas	127.7	173.1	197.9
Paraiba	146.8	263.6	301.4
Rio Grande do Norte	114.1	173.7	198.6
TOTAL	388.6	610.4	697.9

1.6.2 ESTIMATE OF TOTAL IMPORTS BY SUAPE

Supposing that Suape would centralize the acquisitions destined to the States of Northeastern Northeast, total imports of wheat in grain would reach the following levels:

THOUSAND T.

YEAR	MILLING UNIT	OTHER STATES	TOTAL
1980	312	300	612
1985	386	389	775
1995	566	610	1,176
2005	647	698	1,345

BOARDS

BOARD 1.1

QUOTAS RELATIVE TO WHEAT MILLS, ACCORDING TO STATES

- 1973 -

AREAS OF CONSUMPTION	Capacity of Regional Milling (t/24 hs)	Quotas (t)		
		General	Specific	Total
1st Area				
Amazonas	87,804	9,339	14,009	23,348
Pará	232,196	24,697	37,046	61,743
Maranhão	120,000	12,761	19,145	31,909
	440,000	47,000	70,000	117,000
2nd Area				
Ceará	654,880	58,940	88,409	147,349
Rio Grande do Norte	139,727	12,575	18,863	31,438
Paraíba	122,760	11,048	16,573	27,621
Pernambuco	869,291	78,237	117,355	195,592
	1,786,658	160,800	241,200	402,000
3rd Area				
Alagoas	243,366	28,243	42,365	70,608
Sergipe	77,140	8,953	13,430	22,383
Bahia	475,667	55,204	82,805	138,009
	796,173	92,400	138,600	231,000
4th Area				
Espírito Santo	160,281	18,861	28,291	47,152
Minas Gerais (excluding Triângulo Mineiro)	714,387	74,739	112,109	186,848
	874,668	93,600	140,400	234,000
5th Area				
Rio de Janeiro	580,849	53,421	80,132	133,553
Guanabara	1,793,812	164,979	247,468	412,447
	2,374,661	218,400	327,600	546,000
6th Area				
Distrito Federal	60,000	5,719	8,579	14,298
Goiás	131,070	12,489	18,733	31,222
Mato Grosso	52,448	4,999	7,499	12,498
Minas Gerais (only Triângulo Mineiro)	197,156	18,793	28,189	46,982
	440,674	42,000	63,000	105,000
7th Area				
São Paulo	6,935,603	503,299	754,945	1,258,243
Paraná	699,172	52,701	79,055	131,757
	7,634,775	556,000	834,000	1,390,000
8th Area				
Santa Catarina	858,361	56,020	84,030	140,050
Rio Grande do Sul	2,349,146	153,980	230,970	384,950
	3,207,507	210,000	315,000	525,000
General Total	17,575,000	1,420,000	2,130,000	3,550,000

SOURCE: SUNAB

BOARD 1.2

QUOTAS RELATIVE TO WHEAT MILLS, ACCORDING TO STATES

\- 1974 -

AREAS OF CONSUMPTION	Capacity of Regional Milling (kg/24 hs)	Quotas (t)		
		General	Specific	Total
1st Area				
Amazonas	87,804	8,800	20,534	29,334
Pará	232,196	23,273	54,302	77,575
Maranhão	120,000	12,027	28,064	40,091
	440,000	44,100	102,900	147,000
2nd Area				
Ceará	654,808	50,803	118,540	169,343
Rio Grande do Norte	139,727	10,839	25,292	36,131
Paraíba	122,760	9,524	22,220	31,744
Pernambuco	869,371	67,434	157,348	224,782
	1,786,666	138,600	323,400	462,000
3rd Area				
Alagoas	261,510	25,231	58,872*	84,103
Sergipe	107,482	10,389	24,242	34,631
Bahia	507,667	48,980	114,286	163,266
	876,659	84,600	197,400	282,000
4th Area				
Espírito Santo	180,281	17,229	40,200	57,429
Minas Gerais (excluding Triângulo Mineiro)	714,357	68,271	159,300	227,571
	894,638	85,500	199,500	285,000
5th Area				
Guanabara	1,793,812	140,050	326,785	466,835
Rio de Janeiro	580,849	45,350	105,815	151,165
	2,374,661	185,400	432,600	618,000
6th Area				
Distrito Federal	60,000	5,392	12,582	17,974
Goiás	131,020	11,775	27,475	39,250
Mato Grosso	52,448	4,714	10,999	15,713
Minas Gerais (only Triângulo Mineiro)	197,156	17,719	41,344	59,063
	440,624	39,600	92,400	132,000
7th Area				
São Paulo	6,981,603	438,303	1,022,709	1,461,012
Paraná	653,172	45,897	107,091	152,969
	7,634,775	484,200	1,129,800	1,614,000
8th Area				
Santa Catarina	858,363	53,994	125,985	179,979
Rio Grande do Sul	2,268,414	144,006	336,015	480,021
	3,126,777	198,000	462,000	660,000
General Total	17,575,800	1,260,000	2,940,000	4,200,000

* Including 37,000 kg/24 hs. of milling capacity, in suspense, which is equivalent to total quota of 18,251 t.

Source: SUNAB

2.0 CELLULOSE AND PAPER

2.0 CELLULOSE AND PAPER

Inquiries accomplished around this sectorial group had as principal purpose the discovery of opportunities of investment, as consequence of market appraisal, in such way that it was possible to study the relevancy of industrial units which are entailed to Suape Complex. These inquiries should observe wood activities or, yet, cellulose and paper production because this group is the most important when the purpose is to promote the industrialization of wood or other fibrous materials.

Immediate results which were found have justified the abandonment of orthodoxes methods of appraisal and for this reason, ideas, definitions and ascertainings of qualitative nature were preferred to be selected in this study. It is supposed that we had managed, with this methodological way, to trace the Brazilian board and trends in relation to internal production of cellulose and paper and, yet, to place Northeast in the general board.

2.1 CHARACTERISTICS OF CELLULOSE AND PAPER SECTOR IN BRAZIL

In spite of to be endowed of large internal market in the sense of justify set up of units with adequate capacity . Brazil has shown a timid compliance in terms of entrepreneurial position in the cellulose and paper sector, giving place to the appearance of a productive park relatively inefficient and with arcaic characteristics.

The board of structural obsolescence of the sector was shown by some isolated indexes. In the same time, indixes which shaved excellent potentialities to Brazil entrance, in large terms, in international market of paper and mainly of cellulose of short fibers were available since then:

- it had, and still having, abundant lands and for this reason with low cost in relation to countries of Europe, United States and Asia. These lands are favorable to the reforestment with kinds of fast increase as eucalyptus;

- The internal cost of labour-hand is also placed in low levels, mainly the one which is not qualified.

- Brazil was able to promote, in the cellulose of short fiber sector, technologic inovations using mainly the national experience.

These ascertainings have aroused the interest of Banco

Nacional do Desenvolvimento Econômico and Associação Paulista dos Fabricantes de Celulose e Papel to accomplish an inquiry in a national ambit (*) which is destined to promote a hard study of the sector and indicate the parameters which allowed, in a federal sphere, the fixation of adequate rules to the sector.

At first, the inquiry has foreseen, observing all sectorial universe, the accomplishment of 376 interviews and after it would be increased to include more 60 informers totalizing 436 interviews (units connect to sector, graphic companies and equipments manufacturer). Thus, the largest investigation about this activities has resulted arousing technical, economical, financial, administrable and institutional problems. Obtained informations have allowed us to trace the sector's profile in its most important aspects, and indicating its not modern characters.

Thus, a producer park of paper composed of 154 works was identified, i.e., an offer very much pulverized, what obstructed the obtainment of scale gains. This producer park had an exaggerated number of set up machines, in a total of 302, and in its majority with small unitary capacity. Park distribution of paper machines mentioned above, according to their capacity, has been presented in January of 1967 as follows:

(*) "Brazilian Structure of Production and Consumption of Cellulose and Paper" - BNDE, 1966.

CAPACITY (t/day)	[illegible]
up to 5	191
More than 5 up to 10	110
More than 10 up to 15	49
More than 15 up to 20	21
More than 20	23

SOURCE:- "Revista do BNDE" - nº 2, Vol. VI, 1969

This, the board shown above was sufficient to indicate the inadequateness of Brazilian park of paper machines, in its majority composed by equipments of individual capacity extremely low because in the period, the elements of conviction have shown to be convenient that minimum capacity was around 50 t/day per machine.

By this way, we may conclude that at least 93% of all machines set up in Brazil did not show adequate characteristics. It were machines of small capacity unable to allow its operation according to modern patterns of technical and administrable efficiency.

The same panorama was in relation to producer sector of cellulose. From 65 existing works in January of 1967, five (5) were paralysed - CELUBAGAÇO, Papeis Alcântara, SEMICEL, PAPASA, LUTCHER - and only seven (7) had their production capacity placed in satisfactory levels, i.e., above 100 t/per day. The following board shows the brazilian capacity of cellulose production in January of 1967, according to their capacity.

CAPACITY t/day	[illegible]
Up to 5	21
More than 5 up to 10	[illegible]13
More than 10 up to 50	13
More than 50 up to 100	5
More than 100	6

[illegible], op. cit.

The decreased middle seize of Brazilian works of cellulose and paper has not allowed that the sector operated in modern technical and administrable conditions, thus, not using substantial scale economy which sector offers.

Furthermore, and even by consequence, this industrial segment has shown in Brazil the following aspects which were presented in its not modern nature:

- almost the inexistence of vertical integration (reforestment/cellulose production with recovery of chemical products/paper production), when this is the natural tendency of the sector;
- low quality of products (paper and cellulose) if it is compared with american and european products;
- inefficiency relatively high with substantial lost of raw-material along the productive processes;
- absence of quality control, be it in terms of products or be it in terms of technical inspection of the equipment and productive sets up.

- almost the inexistence of modern and enable entrepreneurs in the sector.

The survival of exaggerated number of companies with low midium capacity has resulted from distortion in the system of present prices in Brazil, according to inquiries which were already accomplished. It was benefited and supported by the inflation which has existed in the period in which part of producer park of cellulose and paper was constructed.

The panorama traced above did not have generalized modifications as it was desirable; only in the last years, as it will be shown, hard structural modifications in the sector have occurred with the entrance of new entrepreneurs and in a general way without tradition in this kind of activity.

2.2 BASIC CONDITIONS TO THE APPEARANCE OF THE SECTOR IN MODERN TERMS;

World panorama relative to cellulose and paper shows an existence of few regions in condition to support large volume of production and supply, in large scale, the consumption which increases high rates. North hemisphere a traditional producer and exporter of cellulose and paper shows unfavourable expectations in this sector due to the tendency of an accentuated lack of woods and new lands to be occupied; furthermore, species of trees recommended to the weather of referred regions (for example, pine tree) require a long increase period to they are ready to the cutting.

However, countries as Brazil which have abundant lands and by consequence available to a low price, appropriated to planting of adequate trees to cellulose production (eucalyptus for example) and which require a period relatively short to increase (1/3 or less than the period required by pine tree), they may require increase parcels of international market mainly because they have also large contingent of labour-hand.

The entrance of Brazil in a list of large producers and exporters of cellulose and paper requires the accomplishment o purposes of high sectorial efficiency, which will be enclosed the conception and dimension of enterprises. These purposes, which are already tested in a world scale, suggest that the sector is dimensioned according to the following principal parameters:

Integration Level

It is advisable that activity looks for maximum of vertical integration, i.e., reforestment/cellulose production/paper production. Self-sufficiency of cellulose works in terms of wood and other fibrous materials results from the necessity to assure adequate fluxes of raw-material which must be perfectly homogeneous to give cellulose of good quality to smaller costs. Cellulose works which acquire wood and other fibrous materials without choice of self-supply are liable to the contigencies of manipulated prices and do not manage to obtain homogeneity of the product.

Raw-material cost.

A good part of the efficiency of cellulose and paper sector results from the possibility to obtain its principal raw-material in a supportable costs. By this way, reforestment activities must be cared according to more advanced patterns of agricultural technology including preliminary stages to final stages of tree cutting, i.e., choice of lands, selection of trees, formation of experiment gardens, planting according to patterns of forest engineering, cultural cares, cutting and mechanized transport, etc.

Scale Economies.

Cellulose and paper production is the most sensible activity to scale economies and it is convenient to use this characteristic, avoiding the set up of units with

small or middle capacity. According to present studies accomplished to world average and suitable to Brazilian costs conditions of productive factors, we may reach up to 50% of economy (in middle unitary investment and costs of production) when it changes from 100 t/day up to 500 t/day of capacity of cellulose production. The same phenomenon occurs in relation to general papers and, mainly, in classes of printing paper, writing paper and wrapping paper. *

One of the most evident example of economy resulting from scales is in realtion to chemical products. Several chemical products are used in cellulose production, some of them of large incidency in production costs and which may be recovery and return to the process, as it occurs whith causti soda. But it is antieconomic the set up of recovery boiler to units of small or middle capacity. It is clear, for example, that set up of these equipment to works with capacity below 200 t/per day is not compensetory.

* According to studies accomplished by international engineering companies and cellulose and paper producers as Jakko Pony (Finnish) Elof Jansen (American) and Bilexnud (Swedish).

2.3 FEDERAL POLICY IN RELATION TO THE SECTOR.

In reason of the ascertainings studied in previous itens, Federal Government has decided to fix clear conductresses to stimulate Brazilian production of cellulose and paper in entrepreneurial and advanced technological bases to change in a short period productive structure of this activity and to create conditions to manage good parcel of international market.

Banco Nacional do Desenvolvimento e Economia was the first institution which has taken practical decisions in order to raise difficulties to set up works of small and middle capacities and has established, at first, the following parameters of minimum capacity.

SPECIFICATION	T/DAY
Cellulose	200
General papers	50
Journal Papers	250
Thin Papers	(Examined in each case).

During the time, BNDE has increased implicitly these limits of minimum capacity, giving preference to projects of new works which present the following levels:

SPECIFICATION	T/DAY
Cellulose	500
General Papers	100
Journal Papers	300
Thin Papers	25

Previous limits deserve other qualifications in BNDE since then the minimum limit, in practice, to new works of cellulose with short fiber is of 1,000 t/day, but admiting that they start with 500. In the same way, the tendency is to accept a new work of journal paper with capacity of 500 t/day and not 300 t/day. Finally, works of thin papers must show plans of long period to reach at least 50 t/day.

Development cases of existing works may be studied independetly from limits of capacity since then the project presents hard structural alterations in the company to improve its efficiency.

This decision of BNDE, under the way of sectorial policy, is also adopted by its financial agents, including FINAME.

In the same way of BNDE, Ministry of Industry and Commerce has established an explicity policy to the sector and it had the same purposes to create conditions to increase Brazilian efficiency and prepare Brazil to ingress in the international market of cellulose and paper. By this way, Council of Industrial Increase -(CDI),of that ministry, has fixed, at first, minimum capacity of 1,000 t/day to set up new

works of cellulose with short fiber. This capacity might be reached in two stages of 500 t/day.

However, CDI allows new projects with initial capacity of production of 750 t/day and in relation to existing works, which want to increase their capacity will have to show a plan of defined investments to reach at least 500 t/day, although it is admited that it may be accomplished per stage.

Therefore, we may observe the existence of purposes of sectorial policy clearly defined to give Brazil a pole position in cellulose and paper sector. (*)

(*) Results have already given the first effects, Brazil has already units with similar capacity to the largest world works.

2.4 MODERNIZATION TENDENCIES OF THE SECTOR

Policy decisions already referred have started to have positive effects in recent years since then they have stimulated some entrepreneurs of the sector to promote large developments of capacity; furthermore, new entrepreneurs have started to ingress in the sector leading projections of bolder conception. We try to show, in a brief way, the principal enterprises which present a line of new entrepreneurial concerns in this activity. They are:

Cia. Suzano de Papel e Celulose

It is located in São Paulo and has a work of bleaching cellulose with short fiber and a nominal capacity of 250 t/day. This work has deserved rationalization rules and has already reached 320 t/day of real production. Suzano Company has accomplished and set up a new work, besides the present work, with a nominal capacity of 500 t/day and it may reach 600 t/day of real production, totally integrated. The old work is being totally modernized to reach a production around 400 t/day. Therefore, final capacity of the group will reach 900 t/day (nominal) and more 1,000 t/day (real) what will place it as one of the largest world works of this kind of cellulose. Furthermore, the company has set up the largest Brazilian machine to cards and light cardboards production and it may also dry cellulose. Suzano company is totally integrated, having large reforested areas in the State of São Paulo.

Ripasa S/A.

It is located in São Paulo and constitutes one of the largest integrated groups of cellulose and paper production. It is increasing its bleaching cellulose with short fiber to 400 t/day with recovery of chemichal products. Based on engineering tests, it may reach up to 500 t/day of real production without necessities of aditional investments. In the same time, RIPASA is acquiring the second largest Brazilian machine of writing paper with nominal capacity of 160 t/day. This company is self-sufficiency in wood and it is a detainer of the best reforestment plan which is being accomplished in the State of São Paulo, in a plane lands and near to the work.

Industria de Celulose BORREGAARD

At first, it was conceived to use black acacia as raw-material; it was obliged to accomplish a large reforestment program with eucalyptus (more than 40,000 ha.). It is located in Rio Grande do Sul and it is the largest Brazilian work of cellulose with short fiber under operation - and it is also one of the largest of the world, - and it is the most important in the sector of cellulose with short fiber not whitened. Its production program presents also the alpha-cellulose which is the principal raw-material to rayon production. Its nominal capacity of production is of 650 t/day and it may reach around 800 t/day in terms of real production. The company

exports all the production to Europe.

Olinkraft.

It is located in Santa Catarina and it is the one of the largest works of cellulose with long fiber, since pine tree to Kraft paper (wrapping paper). It is increasing its present units and it has just concluded a project of a new work in the State of São Paulo where it is associated to one of the largest Brazilian groups of reforestment. The new work had its capacity fixed in 1,000 t/day, but it may start with a first stage of 500 t/day.

Aracruz S/A.

It is located in Espírito Santo and its purpose is to set up the largest Brazilian work of whitened cellulose with short fiber (eucalyptus) and, safely, it is the largest in world terms with a nominal capacity of production of 1,200 t/day in the first stage. The programs of investment of ARACRUZ foresee developments to reach 3,000 t/day of capacity of production. The company will be self-sufficiency in wood (it has large reforestment areas in Espirito Santo) and its project is already being set up and has already sold all its production to Europe and Japan.

Cenibra S/A.

It is located in Minas Gerais and is led by Vale do Rio Doce Company. Its first project, which is already being

accomplished, foresees the set up of an work of whitened cellulose with short fiber (eucalyptus) with nominal capacity of production of 750 t/day (international capacity) and it is also self-sufficiency in woods. Cenibra's program foresees the set up of more two works, which will be located in Espirito Santo, with a capacity of production of 1,000 t/day each one. A large program of reforestment is already being accomplished to these works. Cenibra's production has already the guaranty of total placement in Japonese market.

Revealment of these projects and their characteristics allow us to conclude by the appearance of an advanced entrepreneurial enterpises in cellulose and paper sector - set up of works with international capacity and totally integrated -, that it is not possible to think in terms of units with small or middle capacity and of which hope of life would be certainly decreased.

2.5 THE POSITION OF NORTHEAST

Based on previous statments, we may observe that, in a middle period, projects under execution are dimensioned to supply the internal demand and to create exportable surplus. The creation of large cellulose and paper sector in Northeast should be examined in relation to the largest period and in dependence with the accomplishment of the following events.

1 - Based on eucalyptus and results of programs of reforestme which were started by Petrobras in the State of Bahia, we should appraise the results and try to know the availabilities to do them again in other areas of the region. Such results will be collected and available to an analysis in 5 or 6 years when the trees will be ready to the first cutting.

2 - The highest point of present inquiries aiming to identify precocious species which are able to support the climatic conditions existing in the region.

In relation to sisal, specie which gives a long fiber of good quality, the present system of use of field bush is not able to support the necessities of works with large capacity. Therefore, the work of reunion of this raw-material along the several sisal fields conducts to the distance of the work in relation to admissible economic extension what provokes undesirable additions in production costs.

For this reason, it is convenient to wait the experiences which will be accomplished by Cellulose Company of Bahia which intends to use all sisal leaf and not only field bush. If this first experience is economic it will be possible to repeat it in other areas of the region.

Finally, we have the hard use of cane-thrash as raw-material of cellulose production in large scale. Although the experience of Celubagaço Company has failed - which is located in Campos-RS and which has operated for only some months, remaining paralized several years up to be dismounted - we could examine the hypothesis of use of cane-thrash which is created in sugar mills of Pernambuco and Alagoas. In present level of sugar production, mills of these States create yearly a quantity above 5 million tons of cane-thrash of which the majority has fuel as use in the mills.

A superfitial analysis of studied hypothesis shows that, in substitution terms of cane-thrash to fuel oil, cellulose production would result a cambial superavit of US$ 10 to each ton of thrash transformed in cellulose. If we suppose an use of 20% of thrash which is created by pernambucanas mills, yearly cambial superavit would be of US$ 9 million and cambial income would be above US$ 60 million/year.

Besides these favorable conditions to the project, there are difficulties such as raw-material transport, trading agreement of thrash, conversion or refinement of thermic system of mills, etc. Thus, only a detailed analysis of critical aspects included in the project will be able to make clear the economical advantages to be set up in Suape Complex.

3.0 TENDENCIES OF THE SYNTHETIC ELASTIC RUBBER SECTOR

3.0 TENDENCIES OF THE SYNTHETIC ELASTIC RUBBER SECTOR

In the present chapter the possibilities of local set up of synthetic elastic rubber units will be examined. It is necessary to explain the model of set up of this industry in Brazil as well as defined ways to its development in short and middle periods in view of synthetic elastic rubber production is placed in the sector of petrochemical industries.

Therefore, the methodology used in this question has taken into consideration the institutional mechanisms of sectorial programming practiced in Brazil and basic studies which have justified its practice.

Among the studies and definitions which were considered we may stand out the following statments:

- "Brazilian Market of Petrochemical Products": search of excellent level and it was accomplished by IPEA - Intitution of Economic-Social Planning, of Ministry of Planning and General Coordenation, and it was published in December of 19

- "Petrochemical Sector" - excellent search accomplished by Ministry of Industry and Commerce, Economic Adviser, and it was published in September of 1973.

- "Industries Cadaster": was published by Intitution of Economic-Social Planning of Ministry of Planning and

General Coordenation, in its most recent form, the magazine of 1973.

- "Development of Petrochemical Industry in the State of Bahia - Brazil": Study accomplished by French Institution of Petroleum and it was supported by Ministry of Industry and Commerce of Brazil and it was published in February of 1972.

- "Brazilian Market of Synthetic Elastic Rubber": the most modern study accomplished by IPEA - Intitution of Economic-Social Planning of Ministry of Planning and General Coordenation, and it was published in January of 1974.

As we have already referred the elements we will be able to propose the conclusions to the topics under examination.

3,1 BASIC CHARACTERISTICS

The appraisal of elastic rubbers market requires that its several uses are characterized since then they show areas which may be substituted among them. In relation to elastic rubbers which are more known and has a diffused use, the following statments may be registered:

Natural Rubber:

In the beginning of this century it was mainly and with exclusiveness produced in Brazil. This Brazilian position was being gradually dislocated in a such way that Brazil, presently, is presented as marginal producer and it has changed from large exporter to large import. The largest world producers of natural rubber are Malaya, Indonesia, Thailand, Ceyland, Vietnan People's Republic and Nigeria. The presentention of the product in international market is accomplished according to the classification of source and processing form; in Brazil, 15 kinds are identified by "Superintendência da Borracha". Chemically, natural rubber may be defined as as polymer composed of polyisoprene molecules. It is largely used in pneumatics production to heavy vehicles (trucks, buses and tractors) sector in which, due to the large resistance to consuming which shows and to the easy dispersion of heat, it does not find perfect synthetic substitutes and competitive prices.

S B R ("STYRENE - BUTADIENE Rubber").

It is an elastic rubber with the largest use in the world scale. Its industrial use has started during II World War and the inquiries and developments were accomplished by German and American Government. The products obtained with these inquiries were: BUNA-S (butadiene and styrene rubber, catalized by sodium) in Germany and GR-S (Government Rubber Styrene) in United States. It is a butadiene and styrene copolymer and the copolymerization may be accomplished in solution or emulsion, the latter may be hot or cold. SBR may be presented in a pure form or added with oil of aromatic or naphtenic extension when it is called of extended SBR. Generally, polymers, which are more used, embody 76.5% of butadiene and 23.5% of styrene. Good resistance which shows to traction and consuming suggests its use in tread of cars. The plasticity of extended SBR allows that rubber products are used in large diversities and including the production of slight goods. Clear kinds of SBR which show facility of pigmentation are used in several productions of rubber. The large limitation which shows to the use in pneumatics of heavy vehicles - (bus, trucks and tractors) - results from its inadequate coefficient of dispersion of heat.

Poly-isoprene

Polymer chemically obtained from isoprene, reason why it is called "natural synthetic rubber". It has similar characteristics with natural rubber and, as substitute of

the same, it is used to several purposes (manufacture of heavy pneumatics, rubber spun, stuffing boxes, gloves, etc.). Its trade production was started in the United States in 1959; the development of its use depends on the possibility to substitute, in practic economical terms (list of prices) the natural rubber. High cost of isoprene monomerous has been obstructing the increase of poly-isoprene market.

Butylic Rubber

It is a synthetic elastomer which is obtained through the copolymerization of isobutlane and isoprene. It shows high elasticity and impermeability reason why it substitutes with some advantage the natural rubber in the manufacture of inner tube and this is its relevant use.

EPR and EPT (Ethylene and Prolene Rubber).

It is a copolymer which is obtained from ethylene and propile and it has excellent characteristics such as: resistance to heat, oxidation and flexibility in low temperatures; however, it does not show a degree of regularity as it is fou in the elastomers of poly-butadiene and poly-isoprene. Both kinds are EPR (ethene and propane rubber), copolymer essentially saturated and EPT (ethene-propane-Rigid Thermo Polymer), resulting from ethylene and Prolene copolymerization with small quantities of diolefin not joined. Due to the possibility of more perfect vulcanization, EPT has easily increased the market and what did not occur with EPR. Part of american market of EPT (some 50%) is center

in automobilistic industry, excluding pneumatics, where its use is limited to lateral parts and internal shelters. The application assumes an expressiveness in the production of threads, cables, rubber hoses, and similar products.

Nitrite Rubber.

It is obtained by butadiene and acrylohitile copolymerization. The remaining polymer shows an excellent stability and for this reason it has a large use in manufacture of tubes to gasoline, oils, etc., and which has a possibility to be chemically used in other kinds of rubber.

Neoprene.

It is obtained through the polymerization of chloroprene. Its market is relatively limited to the production of specified itens as stopping joints and rubber hoses.

3.2 BRAZILIAN MARKET

3.2.1 DEVELOPMENT OF POSSIBLE CONSUMPTION

Elastomers consumption is composed of natural rubbers, synthetic rubbers and a parcel of reproduced rubbers, i.e., which are recoveried after its use. The following board shows the development of consumption in Brazil to the 1960/1972 period and according to their kinds:

YEAR	POSSIBLE CONSUMPTION (IN T)				YEARLY INCREASE (%)
	NATURAL RUBBERS	SYNTHETIC RUBBERS	REPRODUCED RUBBERS	TOTAL	
1960	44,550	16,611	10,278	71,439	-
1961	39,343	20,775	10,212	70,330	- 1.6
1962	40,722	29,237	12,293	82,252	16.9
1963	36,068	34,365	13,778	84,231	2.4
1964	32,729	40,906	12,666	86,301	2.4
1965	26,554	37,859	9,752	74,165	- 14.1
1966	30,662	51,408	12,323	94,593	27.5
1967	32,133	57,024	14,474	103,631	9.5
1968	38,156	70,542	18,131	126,829	22.4
1969	35,071	71,121	18,128	124,320	- 2.0
1970	36,085	84,681	19,983	140,749	13.2
1971	41,202	97,254	22,567	161,023	14.4
1972	44,037	114,031	24,195	182,263	13.2

SOURCE:- Brazilian Market of Elastomers - IPEA - 1974.

As first remark, we may register the tendency of increase consumption, except the year of 1965 which has shown a substantial fall because it was characterized as crisis year and small falls have occurred in 1961 and 1969.

Based on previous board we may compose the participation in percentage of elastomers in the total consumption:

(in percentage)

YEAR	NATURAL RUBBERS	SYNTHETIC RUBBERS	REPRODUCED RUBBERS	TOTAL
1960	62.4	23.2	14.4	100.0
1961	55.9	29.6	15.5	100.0
1962	49.5	35.5	15.0	100.0
1963	42 8	40.8	16.4	100.0
1964	37.9	47.4	14.7	100.0
1965	35.8	51.0	13.2	100.0
1966	32.6	54.3	13.1	100.0
1967	31.0	55.0	14.0	100.0
1968	30.1	55.6	14.3	100.0
1969	28.2	57.2	14.6	100.0
1970	25.6	60.2	14.2	100.0
1971	25.6	60.4	14.0	100.0
1972	24.2	62.6	13.2	100.0

SOURCE: Brazilian Market of Elastomers - IFEA - 1974.

We may clearly observe that lost of position of natural rubber in the general board of elastomers consumption of 62% in 1960 down to 24% in 1972, and it gave place to synthetic rubbers which have changed from 23% in 1960 up to 63% in 1972. Reproduced rubbers still maintaining, during the years, a stable participation in the total consumption (143).

The following board shows the Development of Brazilian consumption of synthetic elastomers per kind:

BRAZILIAN CONSUMPTION OF SYNTHETIC ELASTOMERS

(in tons)

YEAR	SBR	POLY-BUTADIENE	NEOPRENE	NITRILE	BUTYLIC	OTHERS (1)	TOTAL
1960	12,756	-	353	270	2,154	1,078	16,611
1961	15,966	-	388	487	3,186	548	20,775
1962	22,168	-	924	431	3,328	2,456	29,217
1963	27,253	1,356	920	576	3,603	657	34,365
1964	30,395	4,425	1,112	364	3,018	1,592	40,906
1965	29,039	3,959	810	382	2,806	856	37,859
1966	37,473	6,527	1,690	809	4,859	50	51,408
1967	42,285	7,704	1,519	450	3,500	1,566	57,024
1968	52,348	8,742	2,055	655	5,605	1,137	70,542
1969	51,066	8,357	2,462	805	5,280	3,150	71,120
1970	62,186	10,719	2,535	755	5,617	2,869	84,631
1971	67,044	12,606	3,564	1,047	6,939	6,054	97,254
1972	77,654	14,749	4,639	1,110	7,670	8,209	114,031

SOURCE:- "Brazilian Market of Elastomers - IPEA - 1974.
(1) Including Synthetic LATEXES.

Previous amount may be expressed, in terms of composition in percentage, as follows:

(in percentage)

YEAR	SBR	POLY-BUTADIENE	NEOPRENE	NITRILE	BUTYLIC	OTHERS	TOTAL
1960	76.8	-	2.1	1.6	13.0	6.5	100.0
1961	76.9	-	2.8	2.3	15.3	2.7	100.0
1962	75.9	-	3.2	1.5	11.0	8.4	100.0
1963	79.3	3.9	2.7	1.7	10.5	1.9	100.0
1964	74.3	10.8	2.7	0.9	7.4	3.9	100.0
1965	76.7	10.5	2.1	1.0	7.4	2.3	100.0
1966	72.9	12.7	3.3	1.6	9.4	0.1	100.0
1967	74.1	13.5	2.7	0.8	6.1	2.8	100.0
1968	74.2	12.4	2.9	0.9	8.0	1.6	100.0
1969	71.8	11.8	3.5	1.1	7.4	4.4	100.0
1970	73.4	12.7	3.0	0.9	6.6	3.4	100.0
1971	68.9	13.0	3.7	1.1	7.1	6.2	100.0
1972	68.1	12.9	4.1	1.0	6.7	7.2	100.0

SOURCE:- Brazilian Market of Elastomers - IPEA, 1974.

The participation of SBR in the total of synthetic elastomers consumed in Brazil is placed in levels relatively high and it is equivalent to the one which is verified in the United States in the 1964/1968 period and it is also superior than the world average. The introduction of this elastomer in a systematic form in Brazilian market was responsible to the fast development of its consumption due to the regularity of offer occurred since then and also due to the entrance of FABOR unit - Fábrica de Borracha Sintética - (Unit of Petroquisa which is located in Duque de Caxias - RJ).

Polybutadiene occupies the second position in terms of consumption of synthetic elastomers of which introduction

in Brazilian market with expressive amount has occurred in 1963, time in which imports have totalized 1,365 tons. But in 1964, this elastomer has displaced butylic rubber, till then occupying the second position in the consumption. Quantities of polybutadiene internally consumed have increased in a fast form due to the entrance of COPERBO - Cia. Pernambucana de Borracha Sintética, which is located in Cabo - PE. In the same way of SBR, polybutadiene may be used as direct substitute of natural rubber and for this reason it will increase substantially its participation in the market.

In relation to butylic rubber due to the characteristics of elasticity and impermeability its use is concentrated in the manufacture of inner tubes. Thus, the future of this elastomer is depended on the success of "tyres without inner tube" which are judged by the answer of the consumers up to the present period and which will not be consumed in a large scale as it occurrs in the United States.

Other synthetic elastomers show a parcel relatively low and stable in the group due to their limited uses.

The consumption of elastomers already studied is supplied by imports, except SBR and polybutadiene which are internally produced. SBR production is accomplished by FABOR (Work of Synthetic Rubber), unit of Petroquisa which is located in Duque de Caxias - RJ, and it has a nominal capacity of production of 110,000 t/per year. Polybutadiene production is accomplished by COPERBO, which is also controled by

PETROQUISA and it has a capapcity of production of 28,000 t/per year.

The following board shows the production, which includes several kinds of SBR and polybutadiene, of both companies to 1962/1972 period.

(in tons)

YEAR	FABOR (SBR)	COPERBO (POLY-BUTADIENE)	TOTAL	PARTICIPATION OF THE PRODUCTION IN THE CONSUMPTION OF SYNTHETIC ELASTOMERS. (%)
1962	15,991	-	15,991	54.73
1963	29,959	-	29,959	87.18
1964	32,496	-	32,496	79.44
1965	35,606	3,085	38,691	102.20
1966	47,664	6,352	54,216	105.46
1967	44,043	7,497	51,540	90.38
1968	50,050	8,806	58,856	83.43
1969	51,507	10,164	61,671	86.71
1970	64,137	11,322	75,459	89.11
1971	65,202	12,747	77,949	80.15
1972	78,517	16,064	94,581	82.94

SOURCE OF PRIMARY DATA: IPLA/MINIPLAN.

We may observe that internal production has being placed in levels which are near to the total supply of the consumption. This position was allowed due to the following reasons:

- successive developments of FABOR's production, according to the necessities of the market. Such developments, which up to now have only required marginal investments (to decrease some strangulation points), were managed through systematic betterments of productivity by the unit of Petroquisa.

- betterments of COPERBO's performance was also managed through the adequate administration of the unit and the presence of PETROQUISA in the company stock; recently PETROQUISA position was emphasized when it has assumed the total control of the company.

Thus, only some kinds of synthetic elastomers are not yet produced in Brazil (the market up to now did not justify the set up of units with economical capacity). In relation to SBR, the production has being increased according to the necessities of the consumption, allowing the accomplishments of exports in some years mainly to Latin-American (Argentine, Uruguay, Mexico, etc.). This justifies the participation above 100% of the one registered in the previous board to the years of 1965 and 1966.

3,2,2 PROJECTIONS OF THE CONSUMPTION

Projections of elastomers consumption will take into consideration three kinds of rubber, i.e., natural rubbers, synthetic rubbers and reproduced rubbers in its group in order to suppose the most possible structure to its future participation.

For such purpose, different hypotheses of projections were tested:

- international cross-section
- adjustment of historical tendency

- correlation between consumption per capita and income per capita.
- automobilistic production and elastomers consumption.

IPEA model has also accomplished several stages of tests to effects of determination of mathematical model which expressed better the development of elastomers consumption and it was encluded by the choice of the correlation between total elastomers consumption and Industrial Product.

Thus, the model determined by IPEA was used and the most adequate adjustment to express the elastomers consumption in relation to Industrial Product was as follows:

$C = a + b \cdot PI$, where

C = total consumption of elastomers in tons;

PI = Index of Industrial Product

$\underline{a}$ and $\underline{b}$ = Constants.

The equation of adjustment is of

$C = -12094 + 726.38\ PI$,

and for which the correlation of 98.8% was found.

It has 1969 as basis year (equal 100).

Supposing as possible that Industrial Product may increase to a yearly rate of 12.2%, we will have the following elastomers consumption:

YEAR	PROJECTED CONSUMPTION (in t)
1975	266,000
1980	483,000
1985	868,000
1990	1,559,000
1995	2,782,000
2000	4,956,000
2005	8,821,000

As the total consumption was already projected, we will distribute it according to several kinds in view of that quantitatives registered in the previous board must participate the natural rubbers, synthetic rubbers and reproduced rubbers.

If we examine the historical series of the consumption of elastomers according to what was already referred, we will observe that reproduced rubbers have been participating with the minumum of 13% and the maximum of 16% of supply. Middle percentage of 14% was adopted to the projections, thus the model of the participation of rubbers in the future will be composed of:

	%
New Rubbers	86
Reproduced Rubbers	14
Total	100

Based on percentages already mentioned, it is necessary to accomplish a hypothesis of distribution of new rubbers between natural and synthetic rubbers..

According to what was already shown in the present analysis - and as the international data confirm the phenomenon which has occurred in Brazil -, we may observe a clear tendency of decrease of natural rubber participation in the total consumption of elastomers. This phenomenon has been occurring due to the systematic technological betterments which have being managed in the production of synthetic rubber as well as the appearance of a new substitute of natural rubber.

We may observe that Brazil is placed in the list of countries which show large participation of synthetic rubber in the total consumption of rubbers and even above the world average and it is only surpassed by the United States.

For this reason we may suppose the following distribution of future consumption of new rubbers:

SPECIFICATION	DISTRIBUTION PER PERCENTAGE		
	1975	1980	1985 and the following years
Natural Rubbers	26	23	20
Synthetic Rubbers	74	77	80
TOTAL	100	100	100

Now, we must distribute the consumption of elastomers according to their several kinds and what is benefited by data already referred. Some stability in the structural distribution among them seems that it was already reached in the present stage of synthetic elastomers consumption in Brazil. New changes in this distribution certaintly will occur, according to

experts of the sector, through the displacement of natural rubber by synthetic rubbers, up to the limits technically possible and by the lost of the parcel of the market which is presently occupied by SBR in favor of synthetic elastomers of more sophisticated characteristics. With this supposition, polybutadiene and poly-isoprene will be able to improve their position in the group. The production of nitrile and neoprene rubber in Brazil, which were planed to a short period, may stimulate their consumption among us; however, the increase of butylic rubber will not be shown in an expressive form in view of limited sectors of their uses.

With such definitions of expectation, IPEA and other institutions foresee the following distribution of synthetic elastomers consumption according to their kinds:

(in %)

Rubbers 1975/1976		1980 and the following years
S B R	64.0	58.0
Polybutadiene and Poly-isoprene	17.0	21.0
Butylic	7.0	7.0
Neoprene	5.5	6.5
Nitrile	2.5	3.0
Others (1)	4.0	4.5
SYNTHETICS TOTAL	100.0	100.0

(1) Including synthetic latexes.

Finally, we may project the structure of Brazilian consumption of elastomers in its three kinds:

YEAR	PROJECTED CONSUMPTION (t)			
	NATURAL RUBBERS	SYNTHETIC RUBBERS	REPRODUCED RUBBERS	TOTAL
1975	59,477	169,283	37,240	266,000
1980	95,537	319,843	67,620	483,000
1985	149,296	597,184	121,520	868,000
1990	268,148	1,072,592	218,260	1,559,000
1995	478,504	1,914,016	389,480	2,782,000
2000	852,432	3,409,728	693,840	4,956,000
2005	1,517,212	6,068,848	1,234,940	8,821,000

If the previous board is used to the distribution of synthetic rubber consumption already referred, we will have the following projection per kind:

(in tons)

YEAR	SBR	POLYBUTADIENE AND POLY-ISOPRENE	BUTYLIC	NEOPRENE	NITRILE	OTHERS[1]	TOTAL
1975	106,343	28,778	11,859	9,311	4,237	6,771	169,283
1980	185,509	67,167	22,389	20,790	9,595	14,393	319,843
1985	346,367	125,409	41,803	38,817	17,915	26,873	597,184
1990	622,103	225,244	75,081	69,719	32,178	48,267	1,072,592
1995	1,110,129	401,943	133,981	124,411	57,421	86,131	1,914,016
2000	1,977,642	716,043	238,681	221,632	102,292	153,438	3,409,728
2005	3,519,932	1,274,458	424,819	394,475	182,065	273,099	6,068,848

1 Including latex and resins.

3.2.3 PROJECTIONS OF OFFER

The development of present elastomers and synthetic latexes offer will occur, as it will be explained further, through the increase of the capacity of existing works and the set up of new units which will be controled by PETROQUISA and COPENE which are component companies of "Petrobras Complex" and specialized in the sector of petrochemical industry.

The aggregation of the elements already shown allows us to point out the following panorama in relation to internal offer of elastomers and synthetic latexes in Brazil:

(in tons/yearly)

SPECIFICATION	1975	1980	1985 and the following years
S B R	165,000	165,000	165,000
Polybutadiene and Poly-isoprene	28,000	58,000	58,000
Butylic	(1)	(1)	(1)
Neoprene	(1)	(1)	(1)
Nitrile	10,000	10,000	10,000
Others	10,000	20,000	20,000

(1) In the course of viability study; capacity not defined yet.

3.2.4 PROJECTED BALANCE OF CONSUMPTION AND OFFER

Balancing the projected consumption and offer, we may summarize the following Brazilian board in the following years and in relation to synthetic elastomers.

(in tons)

PRODUCTS	1975			1980		
	CONSUMPTION (A)	OFFER (B)	BALANCE (A - B)	CONSUMPTION (A)	OFFER (B)	BALANCE (A - B)
S B R	108,341	165,000	55,659	185,509	165,000	- 20,509
Polybutadiene and Poly-isoprene	28,778	28,000	- 778	67,167	58,000	- 9,167
Butylic	11,850	(1)	...	22,389	(1)	...
Neoprene	9,331	(1)	...	20,799	(1)	...
Nitrile	4,232	10,000	5,768	9,595	10,000	405
Others	6,771	10,000	3,229	14,393	20,000	5,607

(1) Under study of viability; capacity not defined yet.

A Board of satisfactory offer in a short period and with some tranquility in a middle period is verified.

Expectations of Deficit show the possibility of an easy

equation since then Petroquisa accomplishes investments of marginal capacity, using gathering economies already existent in its units and accomplishes projects of which studies of viability are being concluded.

On the other hand, deficits in perspective which could occur in a middle period (around 1980) in SBR and poly-butadiene and poly-isoprene do not justify the set up of new units of economic capacity, therefore, it is preferable to admit the development of COPERBO.

3.3 EQUATION OF THE POTENTIAL DEFICIT.

The knowledge of the form as eventual deficits of synthetic elastomers in Brazil will be equated results from the exposition of the model of the set up of petrochemical industries in Brazil and from the characterization of the poles already existent and planned and as well as future investments which will help to equate questions which are placed in the ambit of production of synthetic rubbers.

Now, we will try to describe this panorama from the most distant stages to its present dimension and also show the decisions to increase the Brazilian productive capacity in relation to petrochemical industries.

3.3.1 PLANNING OF BRAZILIAN PETROCHEMICAL SECTOR

Brazilian Petrochemical industry only recently has gained stimulus which was required by the dimension of economy as a whole; it has not shown elements of dynamism for a long period. In view of the absence of definitions in relation to the sector and entrepreneur shyness, Brazil was totally supplied in its necessities of petrochemichal products through imports.

The beginning of Brazilian petrochemical production has occurred in São Paulo, in a low scale, near to the sets up of Petrobras creating FABER unit - Fábrica de Fertilizantes - in Cubatão, a center which has been

increasing up to now when the capacity of production of nitric acid and fertilizers has also being increased.

This enterprise was followed by the set up of a synthetic rubber work (SBR) in Duque de Caxias - RJ, also accomplished by PETROBRAS, and which is operated by FABOR - Fábrica de Borracha Sintética, unit transfered to PETROQUISA in the period of establishing of this auxiliar unit which is a detainer of State monopoly of petroleum.

The board of petrochemical production in Brazil was shown in an indefined way and its development has passed to occur almost totally in São Paulo in view of the isolated actions of particular entrepreneurs.

However, in 1965, clear rules to the sector were defined through a specific decree which gave to the particular entrepreneurs the responsibility to promote the investments, i.e., it was decided that petrochemical industry is not subdued to rules of state monopoly, therefore, they are trying to stimulate particular sector in this activity field. By this way, products proceeding naturally from petroleum should have their internal production stimulated; up to now these products were obtained by other routes (COPERBO - rubber production from the alcohol; steel and iron production - production of ammonium sulphate and other products from residual coke gases).

The Despatching of the decree which defines the lines of the policy in benefit of the sector was added to [illegible]

institution - "Grupo Executivo da Indústria Química", unit which is conected to Ministry of Industry and Commerce and it is composed of representants of the principal units of the Government and private sector.

GEIQUIM has become a planning center of the sector and it takes charge of:

- to diagnose chemical industry
- to establish sectorial rules
- to promote projects of investment etc.
- to recommend the concession of incentives to chemical industry

The action of GEIQUIM was followed and supported by attitudes of the Government, mainly by Ministry of Planning, since then CDI - Council of Industrial Development - has dispatched the 2/70 Resolution in which the set up of the Petrochemical Pole of Bahia was defined as firm attitude.

Such resolution has deflagrated the following rules which have composed all the institutional board which is aimed to the centralized planning of Brazilian petrochemical industry:

- in 1971, the President has established the program of petrochemical investments in Brazil.

- the accepted program has determined the consolidation of São Paulo Pole and the equation of Bahia Pole covering the 1971/1980 period.

- in the same decision, the Presidente has allowed the creation of COPENE - Petroquimica do Nordeste LTDA -, which is an auxiliar company of PETROQUISA and was promoted by MIC which will take charge of the set up of the Petrochemical Pole of Bahia.

Therefore, in the institutional board, petrochemical industry reckons with the programmatic action of PETROQUISA and COPENE and it is improbable that decisions which are not in agreement with governesses which were fixed a long time and followed by all kind of entrepreneurs will occur in this sector.

3.3.2 PRESENT PETROCHEMICAL POLES AND TRENDS

Now we will show the characteristics of petrochemical poles of Brazil and we will stand out the units and projects which are conected to the sector of synthetic elastomers.

São Paulo Pole (SP).

Petrochemical industry of São Paulo has being set up through the appearance of isolated projects without planning characteristics. Only recently with the set up of Petroquimica União S.A. - PQU - projects of 2.nd and 3.rd production are being cared in a more complete form.

The principal units which compose this pole, including planned units, may be shown as follows:

COMPANIES	PRODUCTS	CAPACITY OF PRODUCTION (t/year)
Petroquimica União	Ethylene	310,000
Petroquimica União	Propene	168,000
Petroquimica União	Butadiene	50,000
Petroquimica União	Benzene	110,000
Petroquimica União	Toluene	14,000
Petroquimica União	Xylene	73,000
Polidefinas	Polyethylene LD	80,000
Union Carbide	Polyethylene LD	100,000
Eletrofeno	Polyethylene HD	50,000
Cia. Brasileira de Estireno	Styrene	60,000
Copamo	MVC	100,000
Rhodia	MVA	12,000
Oxiteno	Ethylene oxid	35,000
Polibrasil	Polypropylene	40,000
Rhodia	Phenol	50,000
Brasileira de Tetrâmetro	Propene tetramer	30,000
Ucebel	Maleic Anhydride	7,000
Emca	Dodecylbenzene	27,000
Vulcan	Phthalic anhydride	18,000
Elecciroz	Phthalic anhydride	5,000
Plasbatê	Phthalic anhydride	1,000
Rhodia	Terephthalic acid	60,000

Bahia Pole

Petrochemical Pole of Bahia is the most important world programming experience of petrochemical industry and it reflects a perfectly coordenated and balanced matrix of investments. Its set up has being coordenated by COPENE, Office of Minas and Energy of Bahia, PETROQUISA and MIC. Besides the existent units, there are several projects being set up

or planned. The following board will show the principal units which compose this pole and their products:

COMPANIES	PRODUCTS	CAPACITY OF PRODUCTION (t/year)
Copene	Ethylene	380,000
Copene	Propene	205,000
Copene	Butadiene	55,000
Copene	Benzene	139,000
Copene	Toluene	17,000
Copene	Xylene	120,000
Petroquisa (1)	Polyethylene LD	100,000
Petroquisa (1)	Polyethylene HD	40,000
Petroquisa (1)	Styrene	100,000
Petroquisa (1)	PVC	150,000
Petroquisa (1)	EVA	75,000
Petroquisa (1)	Ethylene oxid	35,000
Petroquisa (1)	Polypropylene	80,000
Fibiba	Acrylonitrile	24,000
Propenasa	Propene oxid	45,000
Ciquine	Octanol	40,000
Nitrocarbono	Caprolactame	35,000
Ciquine	Maleic anhydride	6,000
Debasa	LAB	12,000
Deten	LAB	15,000
Isocianatos	TDI	23,000
Ciquine	Phthalic anhydride	25,000
Pronor	DMT	60,000

(1) Association with national and foreign entrepreneurs.

Duque de Caxias Pole (RJ)

It is the first petrochemical pole set up in Brazil and it is specialized in the production of synthetic elastomers, latexes and their raw-materials. It may be characterized, according to existing and planned units as follows:

COMPANIES	PRODUCTS	PRODUCTION CAPACITY (t/year)
Petroquisa/TABOR	S B R Rubber	160,000
Petroquisa/TABOR	Butadiene	110,000
Petroquisa/TABOR	Styrene	50,000
Nitriflex	A B S Resins	6,000
Nitriflex	Special latexes	10,000
Nitriflex	Nitrile Rubber	10,000

3.3.3 PROJECTS OF ELASTOMERS SECTOR

The previous board allow us to conclude by the existence of a center able to give some tranquility in relation to the internal production of synthetic elastomers and their raw-material according to decisions already taken by Petroquisa and Copene. This center is perfectly defined in the general program of petrochemical investments in Brazil. The general control of the sector (accomplished by Petrobras and its auxiliar units) is not only determined by the propriety which maintains several productive units and by the participation through shares in several other companies. This control was recently intensified by the acquirement of the control (through shares) of Petroquimica União and COPEBRO. By this way, we do not find any productive unit of elastomers, set up in Brazil, without the participation of the group Petrobras/Petroquisa/Copene.

Finally, the general board of offer of elastomers products including the principal raw-materials may be classified as follows.

PRODUCTS	CAPACITY (t/year)	ENTREPRENEURIAL CONTROL
Ethylene	718,000	Petroquisa/Petrobrás/Copene
Propylene	440,000	Petroquisa/Petrobrás/Copene
Butadiene	235,000	Petroquisa/Petrobrás/Copene
Acrylonitrile	24,000	Petroquisa
Styrene	210,000	Petroquisa/Copene
Isoprene	30,000	Petroquisa
Poly-isoprene	30,000	Petroquisa
S B R	165,000	Petroquisa
Polybutadiene	20,000	Petroquisa
Butylic Rubber	(1)	Petroquisa
Nitrile Rubber	10,000	Petroquisa
Neoprene	(1)	Petroquisa

(1) Under study of viability; final capacity is not defined yet.

3.4 CONCLUSIONS

Based on the informations of the present study, we may conclude that:

- Brazilian Petrochemical industry is centrally planned and it has Petrobras, Petroquisa and Copene as activating instruments of the investments.

- The present or planned projects are sufficient to give relative covering to the consumption which is expected in a middle period.

- The sector of elastomers is satisfactorly covered by the present investments and it will be totally equated with the projects which are being studied by PETROQUISA and COPENE.

- There is a strong tendency to set up projects of synthetic elastomers near to Centrais Petroquimicas in view of the advantage of existing economies and it will avoid the transport of raw-material which are of hard manipulation in several cases.

- FABOR, in Duque de Caxias - RJ, will intensify its specialization as producer center of synthetic elastomers and it will use the available paste.

- The opportunity to set up new producer units of synthetic elastomers in the Region of Suape is not foreseen.

The development of the capacity of synthetic elastomers production in Pernambuco will be managed through the increase of COPERBO capacity, according to the necessities of the market.

4.0 TENDENCIES OF SALT MOVING

4.0 TENDENCY OF SALT MOVING

Salt is an industrial raw-material of large meaning and Northeast is a large national producer. For this reason, we have to study it.

In the same study, we have examined the location of the new unit which is destined to the manufacture of soda ash, eventually, it aims export in view of the international market is favorable to the absorption of other suppliers besides the traditional suppliers.

Posteriorly, the location of the industrial plant in the neighbourhood of deposits was considered more favorable since then exports possibilities to international market were not enphasized. However, there is a similar possibility and it will be taken into consideration by the official units which have larger interference in the sector and Suape will be presented as a privileged choice.

Thus, the subject may be retaken in a schematic form; circumstance in which it would be necessary to consider other aspects included in the question and which are shown in the following topics.

4.1 SHORT INDICATIONS ABOUT THE PRESENT SITUATION

Local market is presented with the following characteristics:

a - Salt consumption in Pernambuco is supplied by imports which are derived from neighbour States; such situation occurs because it does not show favourable conditions to salt production of solar crystallization, i.e., high saltiness in the sea and strong and constant winds during all year, dry weather, low pluvious period and high middle temperature. As it is not a producer, all salt necessities in Pernambuco are supplied by Rio Grande do Norte (the largest Brazilian producer) and Ceará, according to the following board:

BUSINESS MATRIX - 1972

Receiver State	Supplier States		Total
	Ceará	Rio Grande do Norte	
Pernambuco	2,594	14,100	16,694

SOURCE: Brazilian Institution of Salt.

The board 4/1 shows the situation according to salt business in Brazil.

b - Salt transport in Brazil is basically accomplished by maritime and highway network but in relation to Pernambuco, trucks and railroad are very much used

because it is near to the producer areas. We may observe this fact in the boards 4/2 and 4/3. In view of the substantial betterment of Regional highway network which is reducing the distances, this system has been assuming the lead while maritime transport of salt shows costs relatively high and which corresponds more than 66% of CIF-Rio price of the product and it is almost four (4) times more of saline post cost. (1)

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(1) According to what was indicated in "Terminais Salineiros de Macau e Areia Branca" - Office of Salt Terminals, Ministry of Transport.

4.2 CONSUMPTION PROJECTIONS

In the development stage in which Brazil is placed, salt has yet its larger use in the human and animal feeding; in more developed economies the industrial consumption of salt is substantially higher.

In the present study only human consumption of salt will be considered to the measurement effects in view of the following statments:

a - it is not expected, at least in a medium period, that State of Pernambuco may have a caw cattle of large dimensions and able to create a strong potential consumption of the product.

b - the entrepreneurs of the sector have not taken the decision to set up in the State large consumer industries of the product. As effect, industrial consumption of salt is almost totally accomplished by the sector of sodic alkalis (production of caustic soda and soda ash). However, these industries have their locational orientation aiming the neighbourhood of the salines in order to avoid the product transport of low specific value. In relation to Brazilian position, these industries are being established near to the large deposits of rock-salt or to large salines. The cases of 250.000 rock-salt are: (250.000 t/per year of caustic soda,

from the rock-salt of Alagoas), Dow of Northeast (150.000 t/per year of caustic soda, from the rock-salt of Itaparica-Bahia) and Cia. Nacional de Alcalis (400.000 t/per year of Soda ash but 200.000 t/per year is from rock-salt of Sergipe and 200.000 t/per year is from sea-salt of Rio Grande do Norte.[2]

For this reason, it is more correct to study only human consumption of the State. As Pernambuco is not a Salt producer the hypothesis to use Suape harbour to supply other consumption regions can not be taken into consideration and mainly by the reason of the conclusion of the new port sets up in Rio Grande do Norte (TERMISA Terminais Salineiros S.A.) to improve cost conditions in shipment operations of the product.

As salt is a prodect relatively inelastic to income changes its consumption per capita does not have large oscillations and it is around 34.6 kg per year in Brazil. However, we may observe that this consumption per capita changes according to the age of the population since then inhabitants below 4 years old and over 60 years old use lower amount of salt in their alimentary diet.

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(2) In this last case, we should suggest Cia.Nacional de Alcalis which included Suape among the locational choices to be considered. However, in the present positions we could not take into consideration this hypothesis.

Several dietetic lists are known and they define the necessary amount of salt in human organism. Some of them, which were divulged by sanitary units, suggest 5.5 kg to a normal person in a maximum age of productivity (from 30 up to 40 years old). Finally, Army assesses yearly consumption, which is recommended per person, in 7.2 kg and the minimum limit was assessed in 1.2 kg per year and per person.

In the State of Pernambuco, medium consumption per capita is of 3.3 kg/per year and it is lower than the ideal consumption which is 4.4 kg/per year and which would result to the State if we have used the following formula which includes the methodology already mentioned:

$$C_o = \frac{[C \text{ pop.} > 60 + \text{pop} < 4)]\ 2\ kg + [C\ 4 < \text{pop.} < 60) \times 5kg]}{\text{Total population}}$$

The use of this formula shows the ideal consumption of 4.4 kg/per year and per inhabitant according to the age of the population and data od Demographic Census of 1970.

If we use the projections of the population which were shown in chapter 2, in the part IV and if we suppose a betterment of the consumption per capita along the years of final accomplishment we will have the following estimate of salt consumption in Pernambuco in the 1975/ /2005 period:

Years	Total Consumption (t)	Consumption Per Capita (kg/inhab./year)
1975	20,877	3.6
1980	23,575	3.7
1985	27,167	3.9
1995	34,127	4.1
2005	41,881	4.4

Based on the Betterment of the consumption per capita assumed in this board in a form that the ideal consumption might be reached, we may suppose an increase of alimentary patterns of the population.

4.3 CONCLUSIONS

The principal conclusion is that state consumption of salt will not create fluxes to Suape harbour since then the necessary amount of salt (of small dimension and of which supply is accomplished in an homogeneous form during all the year) certainly will be transported by trucks from Rio Grande do Norte and/or Ceará.

BOARDS

BOARD 4.1

SALT MOVING - BUSINESS MATRIX - 1972

Receiver States	Producer States - MA	PI	CE	RN	SE	BA	RIO DE JANEIRO Refined	RIO DE JANEIRO Gross	Total
AMAZONAS	-	-	3.573,0	-	-	-	-	-	8.573,0
ACRE	-	-	30,0	-	-	-	-	-	30,0
AMAPÁ	60,0	-	-	-	-	-	-	-	60,0
PARÁ	7.505,0	3.600,0	20,9	-	-	-	-	-	11.125,9
MARANHÃO	1.676,9	20,0	1.690,3	-	-	-	-	-	3.397,2
PIAUÍ	-	12.530,5	750,1	100,0	29,7	-	-	-	13.410,4
CEARÁ	-	11.826,8	51.016,3	25.315,3	3,0	-	-	-	78.161,2
R. G. DO NORTE	-	-	5.206,0	216.026,0	-	-	-	-	221.222,3
PARAÍBA	-	-	277,3	192,0	-	-	-	-	469,3
PERNAMBUCO	-	-	2.935,4	9.932,2	-	-	-	-	12.867,6
ALAGOAS	-	-	152,9	9,0	10,8	-	-	-	172,7
SERGIPE	-	-	374,9	114,6	5.113,4	-	-	-	5.602,9
BAHIA	-	-	7.594,9	8.056,3	1.340,4	916,2	-	-	17.907,8
MINAS GERAIS	-	-	3.520,7	2.900,1	3.417,9	-	13.856,4	440,0	24.232,1
DISTRITO FEDERAL	-	-	-	-	-	-	-	-	-
GOIÁS	24,0	-	534,0	12,0	8,4	-	1.246,2	-	1.845,2
MATO GROSSO	-	-	53,7	50,0	146,4	-	-	125,1	415,2
ESPÍRITO SANTO	-	-	2.237,3	8.387,9	25,5	-	208,2	6,6	10.515,5
RIO DE JANEIRO	-	-	15.343,7	164.538,3	-	-	8.653,3	94.926,9	282.973,2
GUANABARA	-	-	5.535,4	153.684,3	-	-	6.370,5	2.478,9	168.067,1
SÃO PAULO	53.828,3	-	17.897,3	401.308,1	94,5	-	86.232,6	13.216,4	578.473,2
PARANÁ	-	-	471,7	25.212,2	43,5	-	11.524,3	1.046,6	38.298,2
SANTA CATARINA	-	-	1.970,9	41.641,0	-	-	1.969,0	-	45.581,5
R. G. DO SUL	-	-	12.341,6	103.895,6	-	-	3.333,4	-	119.570,6
TOTAL	69.096,2	27.977,2	128.170,3	1.151.363,4	10.233,5	916,2	133.414,1	112.241,5	1.643.412,4

SOURCE: Basic Data of Executive Committee of Salt.

BOARD 4.2

SALT MOVING ACCORDING TO THE KINDS OF TRANSPORT

1970

(in tons)

Producer State	Maritime	Highway	Railroad	River Lines	In animals	Total
Maranhão	78.756	108	-	339	-	79.203
Piauí	25.074	6.539	-	19	-	31.632
Ceará	90.431	88.993	426	-	-	187.850
Rio Grande do Norte	641.326	199.950	54.855	-	-	896.131
Pernambuco	-	-	-	-	-	-
Alagoas	-	-	-	6	6	12
Sergipe	463	5.505	-	79	524	7.731
Bahia	-	142	-	60	-	202
Rio de Janeiro	180	233.728	-	-	-	233.908
Total	844.230	536.125	55.281	503	530	1.436.669

SOURCE: Executive Committee of Salt.

BOARD 4.3

MODAL DISTRIBUTION OF SALT TRANSPORT IN BRAZIL (1)

(in tons)

State	Highway	Railroad	Maritime	Maritime and River Lines	River Lines	Total
AM	1.622,5				816,0	2.438,5
RO	59,2				3,0	62,2
PA	10.178,8		209,1	2.164,3		12.552,2
MA	46,2	24,0	278,1			348,3
PI	69,8	1.915,0	1.692,1			2.776,9
CE	2.446,3		1.779,9	11,4		4.237,6
RN	69.284,7	65.360,5	211,9	8,1		134.665,2
PB	288,9					788,9
PE	2.026,1	42,0				2.068,1
AL	201,2					701,2
SE	2.305,7			9,0		2.314,7
BA	1.872,6					1.872,6
MG	8.834,2	77,2				8.911,4
DF	455,8					455,8
GO	3.448,5					3.448,5
MT	3.231,9	159,0				3.390,9
MS	4.944,5	1.060,7				5.333,2
RJ	26.793,0	0,6				26.793,6
GB	83.747,2					83.747,2
SP	351.190,2	8.830,1				360.020,3
PR	14.146,9	2.872,7				17.019,6
SC	20.704,2	5,0				20.709,2
RS	77.934,3					77.934,3
Total	585.145,7	79.474,8	4.171,1	2.192,8	819,0	591.803,4

SOURCE: Executive Committee of Salt.

(1) - January up to June.

BOARD 4,4

DEVELOPMENT OF BRAZILIAN SALT CONSUMPTION 1971/1973

(in tons)

User Sectors	Real Consumption		Estimated Consumption (1973)
	1971	1972	
Human Feeding	338.089	340.903	340.000(1)
Industry	670.533	739.006	845.600
Farming and Correlates	706.764	732.473	791.100
Total	1.723.386	1.812.462	1.976.700
Yearly Increase Rate (%)	-	5,2	9,1

SOURCE: Executive Committee of salt

(1) - Data relating to the first estimate but subdued to be confirmed

5.0 PNEUMATICS

5.0 PNEUMATICS

5.1 PRELIMINARY ATTENTIONS

In this section indicative elements which allow us to make a deep study and verify the final viability to set up a pneumatic work and similar products in Suape Region will be shown.

As we knew the peculiar characteristics of this activity mainly in relation to its offer, a different methodology was necessary to be used instead of that methodology which was already used in the sectorial studies which were connected to Suape Project.

The principal difficulty which obstructs the formation of conviction elements to take to the last consequences of appraisal of an eventual enterprise in the pneumatics sector - in order to estimate probable profitability of the sector -, results from the present offer structure in this kind of activity.

In effect, technological excellence of the principal world producers of pneumatics and similar products allows to keep in secret the basic informations relative to the sector. These world producers such as Firestone, Good-Year, Goodrich, Pirelli keep a significative parcel of the market, respectively 30%, 30%, 6% and 30%. They also accomplish systematic and expressive expenditures in searches and in their development.

As consequence, factual data relative to the market, technology, structure of investments and production costs, profitability, etc. are not available, at least in a safe form nationally or even in the world.

Thus, indications about the opportunity of new enterprises in the sector will be considered, to the purposes of the present study, in view of the macroeconomic discernment and considerations of qualitative nature.

5.2 DEMAND COMPOSITION

Pneumatics market is composed of two different parcels:

Primary Market

It is the one which corresponds the pneumatics which follow the vehicles when they leave fitter works.

Secundary Market

It is the one which corresponds the pneumatics which are destined to replacement, i.e., the substitution of worn units alongside of all useful life of the vehicle.

If countries which are large vehicles exporters are excluded and where the market shows other characteristics, in general the replacement market will be larger than the primary market due to its cumulative character.

Furthermore, always that market dimensions justify it is convenient to avoid the pneumatics transport to large distances (for example, from São Paulo to Northeast). In this sense, pneumatics production includes the strength of local definition which is the same to several other products -, fertilizers in their final formulations, cement, etc. - for which productive units must be equated according to the regionalized consumption and even to microregionalized consumption.

In the particular case of pneumatics, offer equation in

regional levels of consumption is more justified because its transport includes large useless spaces without the possibility of occupation (the central part of pneumatic is totally empty); it would be the same to transport empty bottles or cans; from this, one way packagings have appeared.

These considerations have proved an atittude to place apart, in the present study, Northeast from the rest of Brazil as homogenous region of pneumatics consumption. For the same reasons, the hypothesis of Northeast supplies other regions of pneumatic consumption was not admited, be it of primary use or be it to replacement purposes.

Considering that the set up of a fitter work (vehicles) in Northeast is not foreseen at least in a middle period, the replacement market of Northeast results methodologically as the most correct to be considered since then the present manufacturers are increasing to Middle-South and new works as Fiat, Mercedes-Benz, Toyota, Peugeaut, Citroen etc, are defining their location in Guanabara-Rio Grande do Sul axis.

5.3 NORTHEAST MARKET

5.3.1 CONSUMPTION PROJECTIONS

As pneumatics are component of vehicles its demand results from the vehicles demand. Therefore, it is preliminarily necessary to accomplish the projections of northeast fleet of vehicles and based on it to formulate consumption hypothesis of the product which is being studied.

For such purpose, we have based on the projetions of northeast fleet of motor vehicles of which calculus and methodology are detailed in the chapter relative to petroleum products. Projections which are found in the referred chapter are resultant from the correlation between vehicles number per inhabitant and income per capita as the international model (cross-section), they suggest the following future fleet of vehicles to Northeast.

(number of vehicles)

Year	Moved by Gasoline	Moved by Diesel	Total
1975	446,808	41,803	488,611
1980	746,808	74,590	821,398
1985	1,246,809	133,333	1,380,142
1995	3,618,823	369,483	3,988,306
2005	7,587,647	843,077	8,430,724

SOURCE: TRANSCON

Considering that each kind of vehicle shows a differrent tires consumption per time unit, it is

necessary to estimate the composition of this fleet. More recent data in relation to this subject are from 1971 and which are shown in the following board:

Kind of Vehicles	Number of Vehicles (1)	Distribution in Percentage
Cars	238,939	73.0
Buses	6,253	1.9
Light Trucks	30,029	9.2
Middle And Heavy Trucks	47,218	14.4
Carts	320	0.0
Other (2)	4,772	1.5
Total	327,531	100.0

SOURCES: IBGE - Statistical Year Book of Brazil and
GT - Statistical Year Book of Transports

(1) - Only licensed vehicles

(2) - Small motorcycles and large motorcycles

With the absence of elements which justify the substantial changes in this board, it was supposed that future fleet will show the same structural composition. As carts participate in an inexpressive form, they were eliminated as isolated category but they may be understood in the general item which includes heavy trucks. This qualification permits the following projections of the fleet per kind of vehicles.

(number of vehicles)

Kind of Vehicles	1975	1980	1985	1995	2005
Cars	356,686	599,620	1,007,504	2,911,463	6,154,428
Buses	9,284	15,607	26,223	75,778	160,184
Light Trucks	44,952	75,569	126,973	366,924	775,627
Middle and Heavy Trucks	70,360	118,281	198,740	574,316	1,214,024
Others	7,329	12,321	20,702	59,825	126,461
Total	488,611	821,398	1,380,142	3,988,306	8,430,724

SOURCE: TRANSCON

If we adopt the model which was accomplished by Transcon and which is always improved, - it results from field searches about the useful life of motor vehicles and their operational cost -, technical coefficients of pneumatics consumption will be used and their projections to Northeast region will be accomplished.

The referred model includes the determination of the useful life of each kind of vehicle and the distances per year in kilometers which were traveled by each one of them. Taking into consideration such parameters and considering mainly the load vehicle, characteristic of one more axis, middle number of tires which are used per kind of vehicle and its possible life may be composed.

Kind of Vehicles	Number of Tires being used per unit	Medium life of the tire (years)
Cars	4	2.0
Buses	6	0.5
Light Trucks	6	0.5
Middle and Heavy Trucks	8	0.5

SOURCE: TRANSCON

Considering the reasons already mentioned, carts were excluded and in the same way that other vehicles were not taken into consideration since then it includes mainly small motorcycles and large motorcycles.

In order to introduce better systematic in the projections, it was supposed that theoretically cars replace half of the pneumatics of which useful life of the group was estimated in 2 years. Thus, instead of 4 pneumantics in each two (2) years, a coefficient of 2 pneuamtics/vehicle each year was used.

If such coefficients are used to projected fleet, we may conclude the following potential market of pneumatics of all kinds to Northeast region in the 1975/2005 period:

(Thousand Pneuamtics)

Kind of Vehicles	1975	1980	1985	1995	2005
Cars	713,4	1,199.2	2,015.0	5,822.9	12,308.9
Buses	222,8	374.6	629.4	1,818.7	3,844.4
Light Trucks	1,078.8	1,813.7	3,047.4	8,806.2	18,615.0
Middle and Heavy Trucks	2,251.5	3,785.0	6,359.7	18,378.1	38,848.8
Total	4,266.5	7,172.5	12,051.5	34,825.9	73,617.1

SOURCE: TRANSCON

As it was shown, only the replacement market was included. The market relative to pneumatics of airplanes, tractors, small motorcycles and bicycles was not included.

Finally, we may see that pneumatics may be divided in light and heavy tires according to the kind of the vehicle in which they will be used. In general, light tires are destined to cars (including in this category utilitarians and similars), while heavy tires are destined to buses, trucks, tractors, etc. Based on this definition it is possible to classify again the projected consumption of pneumatics, included in the previous board, according to its light or heavy characteristic.

(Thousand Units)

Year	Light Tires	Heavy tires	Total
1975	713.4	3,553.2	4,266.6
1980	1,199.2	5,973.2	7,172.4
1985	2,015.0	10,036.4	12,051.4
1995	5,822.9	31,003.0	36,825.9
2005	12,308.9	61,308.2	73,617.1

SOURCE: TRANSCON

5.3.2 OFFER PROJECTIONS

Northeast does not have a pneumatics work. However, the construction of Cia. de Pneus Tropical in Feira de Santana (BA) is foreseen to operate in 1975 and it will change this board in a short period, creating a regional offer.

The unit which is being set up by Cia. de Pneus Tropical counts with Goodrich know-how and the following production program is foreseen:

(Thousand units/year)

Production Line	1975	1977	1980
Light Tires	412.0	618.0	906.4
Heavy Tires	188.0	282.0	413.6
Inner Tube	400.0	600.0	880.0

SOURCE: TRANSCON

5.3.3 PROJECTED BALANCE OF CONSUMPTION AND OFFER

Based on the previous informations, regional balance of pneumatics consumption and offer may be projected according to its kinds as follows.

(Thousand units)

Kind of Tires and Years	Projected Consumption (A)	Planned Offer (B)	Deficit (A-B)
Light Tires			
1975	713.4	412.0	301.4
1980	1,199.2	906.4	292.8
Heavy Tires			
1975	3,553.2	282.0	3,271.2
1980	5,973.2	413.6	5,559.6
Total			
1975	4,266.5	694.0	3,572.5
1980	7,172.5	1,320.0	5,852.5

SOURCE: TRANSCON

Based on the previous board we may observe that in some way the existence of expressive potential market is self-explanatory but it is not covered by the planned offer. Briefly, if equations which were used to project the consumption behave in a form as it was established, even with the development attributed to Cia. de Pneus Tropical, expressive deficits which are able to justify new enterprises in sector will occur.

Those deficits (of almost 1,000 tires/per day of light category) may assume high proportions in the category of heavy tires and what will justify the set up of a work with large capacity seeing that Northeast market which is not supplied by Cia. de Pneus Tropical would be able to develop productive sets up of economic capacity. This hypothesis was based on the informations about the capacity of some works of Good-Year in Brazil (in São Paulo-SP and Americana-SP).

Finally, we may observe that in the present study we have not cared to dimension the market of other rubber products of which production is normally associated to pneumatics such as inner tubes, rubber hose, repair material, pneumatics and inner tubes to bicycles, small and large motorcycles, airplane production and etc. In the same time that the complete line of production is imagined higher scale economies and better economic-financial results will be reached.

5.4 AVAILABILITY OF RAW-MATERIALS

Presently, Northeast has several raw-materials which are used in the production of pneumatics, inner tubes and other products which are normally placed in the same manufacture line such as "camelback", repair material, transporter belts, rubber hoses, etc. Local availability of these raw-materials will be emphasized with the development of present or planned capacity (increase of existing works and set up of new works) to short and middle period and notably as result of the consolidation of petrochemical pole of Bahia.

Now, Registers about the principal raw-materials are accomplished and the detailment of planned offer is shown in other component studies of Suape Project (Synthetic Elastomers, Petroleum Products and Iron Industry).

Natural Rubber

The traditional internal source is located in Amazônia and there are plantings mainly in Bahia. However, we may admit that Brazil is yet a large importer.

S B R

The development of FABOR Capacity (in Duque de Caxias-RJ) will guarantee an adequate offer of the product.

Polybutadiene

COPERBO, the only Brazilian work is located in Pernambuco,

in Cabo region and there is no difficulties of supply.

Lampblack

There is a regional offer which proceeds from Cia. de Carbonos Coloidais - CCC - which is located in Candeias BA and which is doubling its production capacity. After this duplication, CCC will start a new development. There is no difficulties of supply because there is one more work of COPEBRÁS in São Paulo (in the course of development) and other work being set up which belongs to UNIPAR group and which is also in São Paulo.

Poly-Isoprene

The set up of a productive unit in orbit of petrochemical Pole of Bahia is under study. It is an enterprise which is led by Petroquisa.

Nylon Threads

Northeast will be a large producer of nylon in a short period due to the set up of COBAFI project in Camaçari BA. In the production line of this company nylon threads are presented to supply the consumption of pneumatics works.

Polyester Threads

Besides POLYNOR (in Paraíba) and SAFRON (in Bahia) works, which are duplicating their capacity, there is also the COBAFI project which forerees a production line of

polyester fibers and threads.

Sulfur

Brazil is a large importer of sulfur seeing that there are not natural sources to supply this raw-material. However, if Petroleum Refinery is set up in Suape, certainly this one will count with the recuperation unit of sulfur contained in residual gases, what will represent local offer.

Fuel Oil

It will be locally available if Petroleum Refinery is set up in Suape. On the contrary there is availability in Mataripe-BA.

Steel Wire

Local companies which work with steel products will not find difficulties if they want to increase their production capacity.

Others

Other raw-materials as resins will be supplied from Bahia or São Paulo.

Therefore, a favourable board to the regional supply of principal raw-materials which are used in the production of pneumatics and other products of similar line is foreseen and what justifies to make a deeper study to final viability test.

5.5 CONCLUSIONS AND COMPLIMENTS

The analysis accomplished along the present chapter shows the possibility to occur large regional deficits of pneumatics and products of similar line in despite of the development of the capacity which was planned by Cia. de Pneus Tropical.

In view of:

- market dimension to pneumatics production must be regionalized in order to obtain transport economies; and

- Northeast has the principal raw-materials to the production of pneumatics and products of similar line mainly synthetic rubbers (presently in Pernambuco and in the future in Bahia).

The support required to eventual entrepreneurial groups which want to promote pneumatics manufacture in Pernambuco must be appeased.

TOME III

PART 4

ZONING OF THE INFLUENCE AREA AND BASIC INDEXES OF THE REGIONS

1.0 TRAFFIC AREAS

1.0 TRAFFIC AREAS

In transport studies in which a limited parcel of the country is adopted as reference and which is called of Influence Area, it is indispensable the accomplishment of an analysis of economic links which are established in its interior because this parameter is the most consistent to be compared to load moving of the present unit under study. As a last resort, we must appraise the importance of load fluxes and for this reason Influence Area is divided in sub-regions called Traffic Areas.

In relation to studies related to Suape Complex, the determination of decreased number of areas in each State was adopted and as it is shown further. Furthermore, in relation to each one only the informations which are considered indispensable were selected. Thus, only the subsequent detailment will suggest eventual conclusions.

In view of the simplification of future work these informations are grouped in an autonomous form. They are in relation to the behavior of demographic development and agricultural activities in the past and as well as the projections accomplished in consonance with the parameters established in a document of Basic Studies of Economy.

Port set up of Suape will have direct influence in Northeastern Northeast (Alagoas, Pernambuco, Paraíba and Rio Grande do Norte) and indirect influence in Northeast

as a whole. Thus, to effect of the present study, only the influence area of the 1st stage (Northeastern Northeast) was considered in the majority of the cases.

However, delimitation of the Traffic Areas in the Region was adopted since then it was the area considered to some products (petroleum products, fertilizers, etc.).

Delimitation of the Traffic Areas in the Influence Area of Suape Complex has followed the discernment of increase poles.

It was admited that economic increase is a phenemenon not homogenous in the sense that it is manifested in increase poles with variable intensities.

Such poles have capacity to irradiate influences of several ways and with variable terminal effects in relation to the group of economy and/or other terminal pole.

Based on this hypothesis we may give to economy, in the Influence Area of Suape Complex, a special examination as it was a group of increase poles with their several diffusion and agglomaration effects.

- agglomaration effects are relative to peripherical localities seeing that economical activity is centered in the pole and complementary industries, general services (mainly trading) and transport network are set up.

- diffusion effects result from the capacity of one pole

to communicate with other poles; such potentiality increases in a cumulative form offers and demands and also increasing the field of local products.

By this way, microregions are included to increase poles. Therefore, they form the Traffic Areas which were distributed as follows.

INFLUENCE AREA	Nº OF AREAS
NORTHEASTERN NORTHEAST	21
Alagoas	5
Pernambuco	8
Paraíba	3
Rio Grande do Norte	5
NORTHWESTERN NORTHEAST	15
Ceará	5
Piauí	5
Maranhão	5
SOUTHERN NORTHEAST	10
Bahia	7
Sergipe	3
TOTAL	46

Figure 1/1 shows the configuration of these areas. The relation of microregions which compose the areas are shown in Boards 1/1, 1/2 and 1/3.

BOARDS

BOARD 1.1

INTEGRANT MICROREGIONS OF TRAFFIC AREAS

NORTHEASTERN NORTHEAST

TRAFFIC AREAS ACCORDING TO STATES (NUMBER AND DENOMINATION)	INTEGRANT MICROREGIONS NUMBER AND DENOMINATION
Alagoas	
1 Maceió	120 Maceió
2 União dos Palmares	116 Mata Alagoana
	117 Litoral Norte Alagoano
3 Penedo	119 Tabuleiros de São Miguel dos Campos
	121 Penedo
4 Arapiraca	118 Arapiraca
	115 Palmeira dos Índios
5 Santana do Ipanema	113 Sertão Alagoano
	114 Batalha
Pernambuco	
1 Recife	111 Recife
2 Tiriaçuba	110 Mata Seca Pernambucana
3 Palmares	112 Mata Úmida Pernambucana
4 Caruaru	108 Vale do Ipojuca
	107 Agreste Setentrional Pernambucano
5 Garanhuns	109 Agreste Meridional Pernambucano
6 Arcoverde	106 Arcoverde
	105 Sertão do Pajeú
	104 Alto Pajeú
7 Salgueiro	102 Salgueiro
	101 Araripina
8 Petrolina	103 Sertão Pernambucano do S. Francisco
Paraíba	
1 João Pessoa	93 Litoral Paraibano
2 Campina Grande	90 Seridó Paraibano
	91 Curimataú
	92 Piemonte da Borborema
	96 Cariris Velhos
	97 Agreste da Borborema
	98 Brejo Paraibano
	99 Agropastoril do Baixo Paraíba
3 Patos	89 Catolé do Rocha
	94 Sertão de Cajazeiras
	95 Depressão do Alto Piranhas
	100 Serra do Teixeira
Rio Grande do Norte	
1 Natal	84 Natal
2 Mossoró	79 Salineira Norte-Riograndense
	81 Açu e Apodi
	85 Serrana Norte-Riograndense
3 Angicos	80 Litoral de São Pento do Norte
	82 Sertão de Angicos
	83 Serra Verde
4 Caicó	86 Seridó
5 Santa Cruz	87 Borborema Potiguar
	88 Agreste Potiguar

BOARD 1.2

INTEGRANT MICROREGIONS OF TRAFFIC AREAS

NORTHWESTERN NORTHEAST

TRAFFIC AREAS ACCORDING TO STATES (NUMBER AND DENOMINATION)	INTEGRANT MICROREGIONS NUMBER AND DENOMINATION
Ceará	
1 Fortaleza	59 Fortaleza
2 Sobral	56 Litoral de Camocim e Acaraú
	57 Baixo Médio Acaraú
	58 Uruburetama
	62 Ibiapaba
	63 Sobral
	64 Sertões de Canindé
	66 Ibiapaba Meridional
3 Russas	60 Litoral de Pacajus
	61 Baixo Jaguaribe
	65 Serra de Baturité
	70 Médio Jaguaribe
	71 Serra do Pereiro
4 Iguatu	67 Sertões de Crateús
	68 Sertões de Quixeramobim
	69 Sertões de Senador Pompeu
	72 Sertão dos Inhamuns
	73 Iguatu
5 Crato - Juazeiro	74 Sertão do Salgado
	75 Serrana de Caririacu
	76 Sertão do Cariri
	77 Chapada do Araripe
	78 Cariri
Piauí	
1 Teresina	47 Teresina
2 Parnaíba	45 Baixo Parnaíba Piauiense
	46 Campo Maior
3 Floriano	48 Médio Parnaíba Piauiense
	50 Floriano
4 Picos	49 Valença do Piauí
	51 Baixões Agrícolas Piauienses
	54 Altos Piauí e Canindé
5 Bom Jesus	52 Alto Parnaíba Piauiense
	53 Médio Gurguéia
	55 Chapadas do Extremo Sul Piauiense
Maranhão	
1 São Luis	31 São Luis
2 Bacabal	29 Gurupi
	30 Baixada Ocidental Maranhense
	34 Pindaré
	35 Mearim
3 Caixas - Codó	32 Baixada Oriental Maranhense
	33 Baixo Parnaíba Maranhense
	36 Itapecuru
	37 Alto Mearim
4 Presidente Dutra	40 Médio Mearim
	41 Alto Itapecuru
	43 Baixo Balsas
	44 Pastos Bons
5 Imperatriz	38 Imperatriz
	39 Altos Mearim e Grajaú
	42 Chapadas

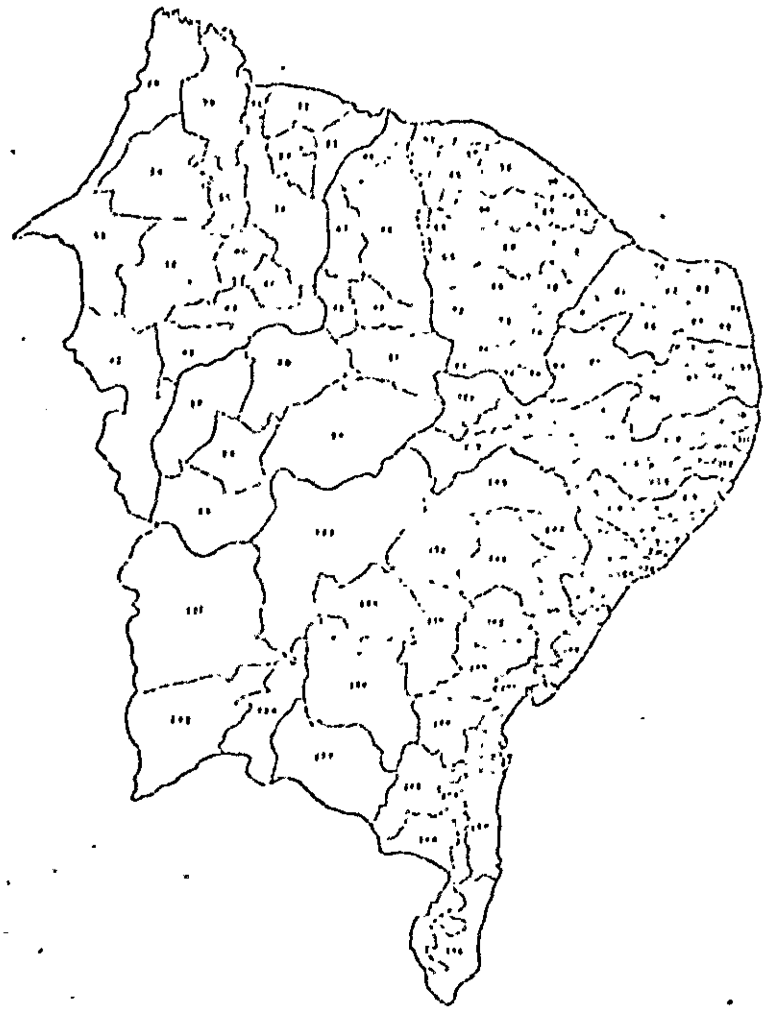
BOARD 1.3

INTEGRANT MICROREGIONS OF TRAFFIC AREAS

SOUTHERN NORTHEAST

TRAFFIC AREAS ACCORDING TO STATES NUMBER AND DENOMINATION	INTEGRANT MICROREGIONS NUMBER AND DENOMINATION
Bahia	
1 Salvador	150 Salvador
2 Feira de Santana	139 Piemonte da Diamantina
	142 Serrinha
	143 Feira de Santana
	147 Sertão de Paulo Afonso
	148 Agreste de Alagoinhas
	149 Litoral Norte Baiano
	151 Recôncavo Baiano
3 Itabuna e Ilhéus	152 Tabuleiros de Valença
	153 Encosta do Planalto de Conquista
	154 Cacaueira
	155 Interiorana do Extremo Sul da Bahia
	156 Litorânea do Extremo Sul da Bahia
4 Jequié	136 Chapada Diamantina Meridional
	144 Jequié
5 Vitória da Conquista	134 Médio São Francisco
	137 Serra Geral da Bahia
	145 Planalto de Conquista
	146 Pastoril de Itapetinga
6 Juazeiro	133 Baixo - Médio São Francisco
	135 Chapada Diamantina Setentrional
	138 Senhor do Bonfim
	140 Corredeiras do São Francisco
	141 Sertão de Canudos
7 Barreiras	131 Chapadões do Alto Rio Grande
	132 Chapadões do Rio Corrente
Sergipe	
1 Aracaju	129 Litoral Sul Sergipano
2 Propriá	123 Sertão Sergipano do S. Francisco
	124 Propriá
	125 Nossa Senhora das Dores
	126 Cotinguiba
3 Lagarto	127 Agreste de Itabaiana
	128 Agreste de Lagarto
	130 Sertão do Rio Real

AL-1	120
AL-2	116-117
AL-3	118-121
AL-4	110-115
AL-5	113-114
PE-1	111
PE-2	110
PE-3	112
PE-4	106-107
PE-5	102
PE-6	106-103-104
PE-7	107-101
PE-8	103
PB-1	93
PB-2	90-91-92-96-97-00-99
PB-3	[illegible]
RN-1	84
RN-2	79-81-85
RN-3	[illegible]
RN-4	86
RN-5	87-89
CE-1	55
CE-2	[illegible]
CE-3	[illegible]
CE-4	[illegible]
CE-5	[illegible]
PI-1	59
PI-2	[illegible]
PI-3	48-50
PI-4	[illegible]
PI-5	52-53-55
MA-1	31
MA-2	[illegible]
MA-3	[illegible]
MA-4	40-41 43 44
MA-5	[illegible]
BA-1	150
BA-2	[illegible]
BA-3	[illegible]
BA-4	150-144
BA-5	[illegible]
BA-6	[illegible]
BA-7	131-132
SE-1	129
SE-2	[illegible]
SE-3	[illegible]



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COMPLEXO INDUSTRIAL DE SUAPE

REGIÃO NORDESTE

MICRORREGIÕES INTEGRANTES DAS ZONAS DE TRÁFEGO

NORTHEAST REGION

INTEGRANT MICROREGIONS OF TRAFFIC AREAS

2.0 DEMOGRAPHY

2.0 DEMOGRAPHY

2.1 RECENT DEMOGRAPHIC DEVELOPMENT

2.1.1 DEMOGRAPHIC DENSITY IN 1970

The historical process of population distribution in the Northeast region has realized a coastal occupation because large disparities in its group are observed.

Based on Coast Areas, since Southern Northeast, we may observe the following densities:

TRAFFIC AREAS	HAB./KM^2
BA.1 - Salvador	351
SE.1 - Aracaju	94
AL.2 - União dos Palmares	61
AL.1 - Maceió	252
PE.3 - Palmares	93
PE.2 - Timbaúba	121
PE.1 - Recife	1,049
PB.1 - João Pessoa	114
RN.1 - Natal	118
RN.2 - Mossoró	23
CE.1 - Fortaleza	298
PI.2 - Parnaíba	12
MA.1 - São Luís	199

As we may see, with small intervals, it is a continuous occupation intermingled of large densifications (metropolitan areas). However, in the interior of Brazilian regions densities decrease to 10 inhabitant/km^2 and to lower indexes as it is possible to observe in boards 2/1, 2/2 and 2/3.

2.1.2 INCREASE BETWEEN TWO CENSUS PERIOD

Athough Northeast region, in its group, has shown rates of demographic increase lower than Brazil's rates in the 1960/1970 period, some Traffic Areas show an important expansion.

AREAS	YEARLY DEVELOPMENT (%)
CE.1 - Fortaleza	5.1
MA.1 - São Luís	5.1
MA.5 - Imperatriz	5.1
PE.8 - Petrolina	5.1
BA.1 - Salvador	4.7
PI.1 - Teresina	4.6
AL.1 - Maceió	4.1

Among the areas which have registered rates near to 4%, Recife (3.9%), Natal (3.8%) and Mossoró (3.9%) may be stood out. Other areas have registered rates below these levels and which are shown in Boards 2/4, 2/5 and 2/6.

2.1.3 URBAN AND RURAL POPULATION

In Northeast, only Pernambuco registered large contingent of urban population in 1970. In other States, rural population was superior.

Considering the question of Traffic Areas, we may observe that the majority of population lives in cities and areas which enclose metropolitan areas and State capitals. The following board shows this position.

TRAFFIC AREAS	URBAN POPULATION (% UNDER THE TOTAL POPULATION)
PE.1 - Recife	93.4
BA.1 - Salvador	92.2
AL.1 - Maceió	85.8
CE.1 - Fortaleza	84.6
SE.1 - Aracaju	80.0
MA.1 - São Luís	70.5
PB.1 - João Pessoa	70.1
RN.1 - Natal	69.3
PI.1 - Teresina	58.4

In all other Traffic Areas rural population represents the majority.

Commented data are shown in Boards 2/7, 2/8 and 2/9.

2.2 PROJECTIONS

According to what was shown in Part I - Basic Economic Studies - it was considered that based on the general policy of economic increase of Northeast better populational distribution will occur in the Region as a whole and parallel to the tendency to decrease development rates.

According to similar promise, the following rates were adopted:

PERIOD	YEARLY DEMOGRAPHIC DEVELOPMENT (%)			
	NORTHEAST	NORTHEASTERN NORTHEAST	NORTHWESTERN NORTHEAST	SOUTHERN NORTHEAST
1970/1975	2.3(1)	2.0(1)	2.8(1)	2.6(1)
1975/1980	2.2	1.9	2.5	2.4
1980/1985	2.1	1.8	2.3	2.2
1985/1995	1.8	1.8	1.8	1.8
1995/2005	1.4	1.4	1.4	1.4

(1) Verified in the 1950/1970 period.

In order to project the population according to Traffic Areas, hypothesis mentioned above and which was added from the urbanization phenomenon and polarizered functions of capitals and other dynamic centers was taking into consideration and expansion rates which were registered in the past were also taken as base.

To Traffic Areas of Northeastern Northeast the projections were accomplished based on the following rates:

Yearly Development

(in percentage)

TRAFFIC AREAS (according to States)	1970 / 1975	1975 / 1980	1980 / 1985	1985 / 1995	1995 / 2005
ALAGOAS	2.00	1.90	1.80	1.80	1.35
AL.1-Maceió	3.35	3.20	3.00	2.95	2.40
AL.2-União dos Palmares	0.95	0.80	0.60	0.80	0.75
AL.3-Penedo	1.90	1.75	1.60	1.55	0.90
AL.4-Arapiraca	2.05	1.90	1.75	1.65	1.05
AL.5-Santana do Ipanema	1.85	1.70	1.55	1.50	0.85
PERNAMBUCO	2.00	1.90	1.80	1.80	1.35
PE.1-Recife	3.35	3.15	2.95	2.80	2.20
PE.2-Timbaúba	0.80	0.60	0.40	0.25	-0.35
PE.3-Palmares	0.70	0.50	0.30	0.15	-0.45
PE.4-Carpina	0.90	0.70	0.55	0.40	-0.20
PE.5-Garanhuns	-0.10	-0.30	-0.50	-0.80	-1.20
PE.6-Arcoverde	2.10	1.90	1.70	1.60	1.00
PE.7-Salgueiro	3.05	2.85	2.65	2.50	1.90
PE.8-Petrolina	4.55	4.35	4.15	4.00	3.40
PARAÍBA	2.00	1.90	1.80	1.80	1.25
PB.1-João Pessoa	2.90	2.80	2.65	2.80	2.00
PB.2-Campina Grande	1.20	1.10	0.95	0.90	0.45
PB.3-Patos	2.60	2.50	2.35	2.30	1.85
RIO GRANDE DO NORTE	2.00	1.90	1.80	1.80	1.35
RN.1-Mossoró	2.15	2.00	1.90	1.90	1.45
RN.2-Natal	2.05	1.90	1.80	1.80	1.35
RN.3-Angicos	1.95	1.85	1.65	1.65	1.60
RN.4-Caicó	1.70	1.70	1.60	1.60	1.15
RN.5-Santa Cruz	1.90	1.90	1.80	1.80	1.35
Northeastern Northeast	2.00	1.90	1.80	1.80	1.35

High development rates which were adopted to Maceio, Recife and Petrolina consider the increase which has been presenting in the last ten years in these centers and the expectation of economic increase of the areas which are polarized by them.

In relation to Northwestern Northeast, the following board shows the rates which were used in the projections:

Yearly Development

(in percentage)

TRAFFIC AREAS (according to States)	1970/1975	1975/1980	1980/1985	1985/1995	1995/2005
CEARÁ	2.80	2.50	2.30	1.80	1.35
CE.1-Fortaleza	4.55	4.15	3.70	3.15	2.60
CE.2-Sobral	1.95	2.00	1.55	1.00	0.45
CE.3-Russas	1.85	1.90	1.45	0.90	0.35
CE.4-Iguatu	3.20	2.85	2.40	1.85	1.30
CE.5-Crato-Juazeiro	1.85	1.90	1.45	0.90	0.35
PIAUÍ	2.80	2.50	2.30	1.80	1.35
PI.1-Teresina	4.00	3.65	3.45	2.90	2.40
PI.2-Parnaíba	2.15	1.80	1.60	1.05	0.55
PI.3-Floriano	2.65	2.30	2.10	1.55	1.05
PI.4-Picos	2.90	2.55	2.35	1.80	1.30
PI.5-Bom Jesus	1.80	1.45	1.25	0.70	0.20
MARANHÃO	2.80	2.50	2.30	1.80	1.35
MA.1-São Luís	5.70	5.30	4.95	4.20	3.40
MA.2-Bacabal	1.90	1.50	1.15	0.40	-0.40
MA.3-Caxias-Codó	1.95	1.55	1.20	0.45	-0.35
MA.4-Presidente Dutra	1.65	1.25	0.90	0.15	-0.65
MA.5-Imperatriz	5.75	5.35	5.00	4.25	3.45
Northwestern Northeast	2.80	2.50	2.30	1.80	1.35

Dynamic centers of this sub-region have been registering increase rates higher than Recife and Maceio rates. They reach almost 6% per year and the same happens with São Luis and Imperatriz in Maranhão.

Finally, the following board shows rates which were used in the projections of populational development of the Traffic Areas located in Southern Northeast.

YEARLY DEVELOPMENT

(in percentage)

TRAFFIC AREAS (according to States)	1970 / 1975	1975 / 1980	1980 / 1985	1985 / 1995	1995 / 2005
BAHIA	2.60	2.40	2.20	1.80	1.35
BA.1-Salvador	5.05	4.75	4.40	3.90	3.25
BA.2-Feira de Santana	1.95	1.55	1.70	0.70	0.05
BA.3-Ilhéus-Itabuna	1.80	1.55	1.25	0.75	0.15
BA.4-Jequié	1.05	1.05	1.05	0.55	-0.05
BA.5-Vitória da Conq.	2.30	2.05	1.75	1.25	0.60
BA.6-Juazeiro	3.35	3.05	2.75	2.25	1.60
BA.7-Barreiras	2.90	2.65	2.35	1.85	1.20
SERGIPE	2.60	2.40	2.20	1.75	1.35
SE.1-Aracaju	3.90	3.65	3.40	2.90	2.40
SE.2-Propriá	2.15	1.90	1.70	1.20	0.70
SE.3-Lagarto	1.80	1.55	1.30	0.80	0.30
Southern Northeast	2.60	2.40	2.20	1.80	1.35

Also in Southern Northeast, the Capitals register larger expansion than other areas.

The application of these rates to populational contingents registered by Traffic Areas in 1960 allows the results which are shown in boards 2/10, 2/11 and 2/12.

BOARDS

BOARD 2.1

TERRITORIAL AREA AND DEMOGRAPHIC DENSITY OF TRAFFIC AREAS - 1970

NORTHEASTERN NORTHEAST

TRAFFIC AREAS	Area (km^2)	Density ($inhab/km^2$)
Alagoas	27,652	57.5
AL.1 - Maceió	1,366	252.1
AL.2 - União dos Palmares	6,961	61.2
AL.3 - Penedo	4,182	38.3
AL.4 - Arapiraca	5,283	64.2
AL.5 - Santana do Ipanema	9,860	28.9
Pernambuco	98,281	52.6
PE.1 - Recife	1,649	1,049.4
PE.2 - Timbaúba	3,706	121.6
PE.3 - Palmares	5,409	93.1
PE.4 - Caruaru	11,558	79.8
PE.5 - Garanhuns	7,574	73.4
PE.6 - Arcoverde	24,019	21.3
PE.7 - Salgueiro	20,892	13.9
PE.8 - Petrolina	23,274	7.7
Paraíba	56,372	42.3
PB.1 - João Pessoa	4,316	113.5
PB.2 - Campina Grande	28,078	42.3
PB.3 - Patos	23,978	29.5
Rio Grande do Norte	53,015	29.3
RN.1 - Natal	3,996	117.7
RN.2 - Mossoró	21,283	22.6
RN.3 - Angicos	10,751	14.0
RN.4 - Caicó	9,372	20.2
RN.5 - Santa Cruz	7,613	34.4
Total	235,320	45.4

SOURCE: Demographic Census

BOARD 2.2

TERRITORIAL AREA AND DEMOGRAPHIC DENSITY OF TRAFFIC AREAS - 1970

(NORTHWESTERN NORTHEAST)

TRAFFIC AREAS	Area (km^2)	Density ($inhab/km^2$)
Ceará	146,817	29.7
CE.1 - Fortaleza	3,483	298.0
CE.2 - Sobral	46,824	25.7
CE.3 - Russas	25,532	23.9
CE.4 - Iguatu	49,647	10.6
CE.5 - Crato-Juazeiro	21,331	32.6
Piauí	250,934	6.7
PI.1 - Teresina	10,779	33.8
PI.2 - Parnaíba	44,281	11.9
PI.3 - Floriano	37,446	9.4
PI.4 - Picos	87,763	5.5
PI.5 - Bom Jesus	70,665	2.2
Maranhão	324,616	9.2
MA.1 - São Luis	1,637	198.6
MA.2 - Bacabal	95,558	11.9
MA.3 - Caxias-Codó	64,976	13.2
MA.4 - Presidente Dutra	51,605	6.7
MA.5 - Imperatriz	110,840	3.0
Total	722,367	12.5

SOURCE: Demographic Census

BOARD 2.3

TERRITORIAL AREA AND DEMOGRAPHIC DENSITY OF TRAFFIC AREAS - 1970

SOUTHERN NORTHEAST

TRAFFIC AREAS	Area (km^2)	Density ($inhab/km^2$)
Bahia	559,951	13.4
BA.1 - Salvador	3,407	351.0
BA.2 - Feira de Santana	83,737	25.1
BA.3 - Itabuna e Ilhéus	58,161	22.5
BA.4 - Jequié	61,448	11.9
BA.5 - Vitória da Conquista	80,619	12.0
BA.6 - Juazeiro	159,596	5.8
BA.7 - Barreiras	112,983	2.5
Sergipe	21,994	41.0
SE.1 - Aracaju	2,984	94.1
SE.2 - Propriá	12,499	27.1
SE.3 - Lagarto	6,511	43.4
Total	581,945	14.5

SOURCE: Demographic Census

BOARD 2.4

DEMOGRAPHIC DEVELOPMENT BETWEEN TWO CENSUS PERIOD ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST

(in 1,000 inhab)

TRAFFIC AREAS	1960	1970	Yearly Development (%)
Alagoas	1,271.1	1,606.2	2.4
1 - Maceió	235.7	351.0	4.1
2 - União dos Palmares	391.3	429.0	0.9
3 - Penedo	127.8	161.3	2.4
4 - Arapiraca	309.0	405.5	2.8
5 - Santana do Ipanema	207.3	259.4	2.3
Pernambuco	4,136.9	5,252.4	2.4
1 - Recife	1,197.0	1,760.7	3.9
2 - Timbaúba	399.1	456.0	1.3
3 - Palmares	465.1	528.7	1.3
4 - Caruaru	809.7	930.9	1.4
5 - Garanhuns	540.7	564.3	0.4
6 - Arcoverde	405.6	529.7	2.7
7 - Salgueiro	203.6	298 7	3.6
8 - Petrolina	111.1	183.4	5.1
Paraíba	2,018.0	2,445.7	1.9
1 - João Pessoa	374.5	499.4	2.9
2 - Campina Grande	1,065.4	1,200.5	1.2
3 - Patos	578.1	745.8	2.6
Rio Grande do Norte	1,157.3	1,611.6	3.4
1 - Natal	328.9	478.9	3.8
2 - Mossoró	344.8	505.3	3.9
3 - Angicos	113.3	157.5	3.3
4 - Caicó	146.3	198.5	3.1
5 - Santa Cruz	224.0	270.4	1.9
Total	8,583.3	10,915.9	2.4

SOURCE: Demographic Census

BOARD 2.5

DEMOGRAPHIC DEVELOPMENT BETWEEN TWO CENSUS PERIOD ACCORDING TO TRAFFIC AREAS

NORTH/WESTERN NORTHEAST

(in 1,000 inhab)

Traffic Areas	1960	1970	Yearly Development (%)
Ceará	3,337.8	4,491.6	3.1
1 – Fortaleza	654.6	1.053.3	5.1
2 – Sobral	981.3	1.225.9	2.1
3 – Russas	505.8	626.1	2.1
4 – Iguatu	618.2	872.9	3.6
5 – Crato-Juazeiro	577.9	713.4	2.1
Piauí	1,263.5	1,734.9	3.1
1 – Teresina	243.7	376.6	4.6
2 – Parnaíba	418.3	539.5	2.6
3 – Floriano	152.2	207.0	3.1
4 – Picos	357.9	497.3	3.1
5 – Bom Jesus	91.4	114.5	2.1
Maranhão	2,492.2	3,037.2	2.1
1 – São Luís	200.5	330.4	5.1
2 – Pacabal	1,009.3	1,149.2	1.1
3 – Caxias-Codó	760.0	867.1	1.1
4 – Presidente Dutra	315.6	350.1	1.1
5 – Imperatriz	206.6	340.4	5.1
Total	7,093.5	9,263.7	2.7

SOURCE: Demographic Census.

BOARD 2.6

DEMOGRAPHIC DEVELOPMENT BETWEEN TWO CENSUS PERIOD ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST

(in 1,000 inhab)

Traffic Areas	1960	1970	Yearly Development (%)
Bahia	5,990.6	7,583.1	2.4
1 - Salvador	765.9	1,217.5	4.7
2 - Feira de Santana	1,777.4	2,120.4	1.8
3 - Itabuna e Ilhéus	1,114.9	1,324.9	1.7
4 - Jequié	667.4	735.6	1.0
5 - Vitória da Conquista	780.0	974.2	2.2
6 - Juazeiro	672.1	928.2	3.3
7 - Barreiras	212.9	282.3	2,9
Sergipe	760.3	911.2	1.9
1 - Aracaju	207.5	284,3	3.2
2 - Propriá	297.5	342,7	1.4
3 - Lagarto	255.3	284,2	1.1
Total	6,750.9	8,494.3	2.3

SOURCE: Demographic Census

BOARD 2.7

URBAN AND RURAL POPULATION ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST

Traffic Areas	URBAN		RURAL	
	Thousand Inhab.	%[1]	Thousand Inhab.	%[1]
Alagoas	**642.3**	**40.0**	**964.0**	**60.0**
AL.1 – Maceió	301.0	85.8	50.0	14.2
AL.2 – União dos Palmares	106.2	24.8	322.8	75.2
AL.3 – Penedo	58.2	36.1	103.2	63.9
AL.4 – Arapiraca	115.2	28.4	290.3	71.6
AL.5 – Santana do Ipanema	61.7	23.8	197.7	76.2
Pernambuco	**2,861.2**	**54.5**	**2,391.4**	**45.5**
PE.1 – Recife	1,645.0	93.4	115.6	6.6
PE.2 – Timbaúba	200.4	43.9	255.7	56.1
PE.3 – Palmares	223.6	42.3	305.1	57.7
PE.4 – Caruaru	336.0	36.1	595.0	63.9
PE.5 – Garanhuns	152.6	27.1	411.6	72.9
PE.6 – Arcoverde	157.9	29.8	371.9	70.2
PE.7 – Salgueiro	75.2	25.2	223.6	74.8
PE.8 – Petrolina-Juazeiro	70.5	38.4	112.9	61.6
Paraíba	**1,018.5**	**41.7**	**1,426.1**	**58.3**
PB.1 – João Pessoa	350.2	70.1	149.2	29.9
PB.2 – Campina Grande	440.8	36.7	759.7	63.3
PB.3 – Patos	226.5	30.6	517.2	69.4
Rio Grande do Norte	**751.0**	**46.6**	**860.5**	**53.4**
RN.1 – Natal	332.1	69.3	146.9	30.7
RN.2 – Mossoró	213.0	42.1	293.2	57.9
RN.3 – Angicos	48.7	30.9	108.8	69.1
RN.4 – Caicó	84.0	42.3	114.5	57.7
RN.5 – Santa Cruz	73.2	27.1	197.1	72.9
TOTAL	**5,274.0**	**48.3**	**5,642.0**	**51.7**

SOURCE: Demographic Census
(1) - % under the total

BOARD 2.8

URBAN AND RURAL POPULATION ACCORDING TO TRAFFIC AREAS

NORTHWESTERN NORTHEAST

Traffic Areas	Urban		Rural	
	Thousand inhab.	%(1)	Thousand inhab.	%(1)
Ceará	1,811.4	40.3	2,680.4	59.7
CE.1 - Fortaleza	891.0	84.6	162.4	15.4
CE.2 - Sobral	322.7	26.3	903.7	73.7
CE.3 - Russas	145.1	23.2	481.0	76.8
CE.4 - Iguatu	194.9	22.3	670.0	77.7
CE.5 - Crato-Juazeiro	758.2	36.2	455.3	63.8
Piauí	561.2	32.3	1,173.8	67.7
PI.1 - Teresina	220.0	58.4	156.6	41.6
PI.2 - Parnaíba	152.5	28.3	387.1	71.7
PI.3 - Floriano	74.1	35.8	132.9	64.2
PI.4 - Picos	93.2	18.7	404.1	81.3
PI.5 - Bom Jesus	21.4	18.7	93.1	81.3
Maranhão	771.7	25.4	2,266.3	74.6
MA.1 - São Luís	237.9	70.5	97.5	29.5
MA.2 - Bacabal	216.8	18.9	932.1	81.1
MA.3 - Caxias-Coroatá	167.3	19.3	699.7	80.7
MA.4 - Presidente Dutra	69.9	20.0	283.1	80.0
MA.5 - Imperatriz	84.8	24.9	255.7	75.1
Total	3,144.3	33.9	6,119.3	66.1

SOURCE: Demographic Census
(1) % under the total

BOARD 2.9

URBAN AND RURAL POPULATION ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST

Traffic Areas	Urban		Rural	
	Thousand inhab.	%(1)	Thousand inhab.	%(1)
Bahia	3,140.4	41.4	4,442.7	58.6
BA.1 – Salvador	1,122.7	92.2	94.8	7.8
BA.2 – Feira de Santana	778.3	34.3	1,392.1	65.7
BA.3 – Itabuna e Ilhéus	513.2	38.7	811.7	61.3
BA.4 – Jequié	197.6	26.9	533.0	73.1
BA.5 – Vitória da Conquista	289.8	29.8	684.3	70.2
BA.6 – Juazeiro e Petrolina	234.6	25.3	693.6	74.7
BA.7 – Barreiras	54.2	19.2	228.2	80.8
Sergipe	421.4	46.2	490.9	53.9
SE.1 – Aracaju	227.5	80.0	56.9	20.0
SE.2 – Propriá	121.5	35.5	221.1	64.5
SE.3 – Lagarto	72.3	25.4	213.9	74.6
Total	3,561.8	41.9	4,933.6	58.1

SOURCE: Demographic Census
(1) % under the total

BOARD 2.10

POPULATION PROJECTIONS ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST

(in 1,000 inhab.)

Traffic Areas according to States	1975	1980	1985	1995	2005
Alagoas	1,773.4	1,948.4	2,130.2	2,543.8	2,907.0
AL.1 – Maceió	413.4	464.0	561.6	750.8	948.8
AL.2 – União dos Palmares	449.8	468.3	487.3	527.7	568.6
AL.3 – Penedo	177.2	193.4	209.6	244.3	287.2
AL.4 – Arapiraca	448.9	493.4	537.3	633.0	702.7
AL.5 – Santana do Ipanema	284.1	309.3	334.4	388.0	421.7
Pernambuco	5,799.3	6,371.6	6,966.9	8,323.7	9,518.4
PE.1 – Recife	2,077.0	2,426.8	2,809.4	3,712.5	4,614.0
PE.2 – Timbaúba	474.0	488.8	499.2	513.3	496.3
PE.3 – Palmares	548.0	562.4	571.6	582.0	557.1
PE.4 – Caruaru	974.6	1,010.1	1,038.9	1,082.3	1,062.1
PE.5 – Garanhuns	560.9	553.0	540.1	507.7	450.9
PE.6 – Arcoverde	588.3	648.9	704.6	824.0	910.5
PE.7 – Salgueiro	347.3	399.9	436.2	582.5	705.7
PE.8 – Petrolina-Juazeiro	229.2	283.7	343.0	516.4	720.9
Paraíba	2,699.9	2,966.3	3,243.9	3,876.3	4,432.7
PB.1 – João Pessoa	576.5	691.4	793.9	974.8	1.183.9
PB.2 – Campina Grande	1,275.0	1,345.3	1,411.5	1,546.0	1.617.6
PB.3 – Patos	848.4	929.6	1,038.5	1,354.5	1.627.1
Rio Grande do Norte	1,729.3	1,934.2	2,137.3	2,561.1	2,928.7
RN.1 – Natal	529.5	581.0	634.8	759.7	867.6
RN.2 – Mossoró	563.2	621.4	682.3	824.6	950.9
RN.3 – Angicos	173.5	191.1	209.3	251.7	289.8
RN.4 – Caicó	216.1	235.1	254.4	298.6	334.4
RN.5 – Santa Cruz	297.0	326.3	356.5	426.5	487.0
Northeastern Northeast	12,001.9	13,241.2	14,478.5	17,304.9	19,788.8

BOARD 2.11

POPULATION PROJECTION ACCORDING TO TRAFFIC AREAS

NORTHWESTERN NORTHEAST

(in 1,000 inhab.)

Traffic Areas according to States	1975	1980	1985	1995	2005
Ceará	5,156.6	5,834.2	6,536.7	7,816.6	8,938.6
CE.1 - Fortaleza	1,315.6	1,615.2	1,935.9	2,633.1	3,396.6
CE.2 - Sobral	1,358.4	1,461.6	1,570.2	1,740.8	1,819.1
CE.3 - Tauás	686.4	739.3	794.4	867.9	897.8
CE.4 - Iguatu	1,021.8	1,175.4	1,322.8	1,585.9	1,802.0
CE.5 - Crato-Juazeiro	782.4	842.7	905.4	988.9	1,023.1
Piauí	1,991.8	2,253.5	2,524.9	3,013.8	3,446.4
PI.1 - Teresina	457.7	547.8	648.5	861.1	1,099.0
PI.2 - Parnaíba	599.6	656.0	709.7	786.7	839.7
PI.3 - Floriano	236.0	264.6	293.4	341.6	379.0
PI.4 - Picos	573.3	650.5	730.1	871.1	990.4
PI.5 - Bom Jesus	125.2	134.6	143.2	153.3	156.3
Maranhão	3,486.8	3,945.0	4,429.0	5,299.3	6,045.1
MA.1 - São Luís	436.7	504.7	718.3	1,082.5	1,510.0
MA.2 - Bacabal	1,763.9	1,990.8	1,440.3	1,591.1	1,444.2
MA.3 - Caxias-Codó	955.9	1,031.7	1,094.7	1,146.5	1,108.6
MA.4 - Presidente Dutra	380.2	404.4	422.8	429.8	403.4
MA.5 - Imperatriz	450.1	583.4	743.9	1,126.4	1,579.9
Northwestern Northeast	10,635.2	12,032.7	13,481.6	16,116.7	18,430.1

BOARD 2.17

POPULATION PROJECTIONS ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST

(In 1,000 inhab.)

Traffic Areas according to States	1975	1980	1985	1995	2005
Bahia	8,621.5	9,706.9	10,822.3	12,937.6	14,794.8
BA.1 - Salvador	1,553.2	1,962.5	2,434.3	3,562.1	4,906.5
BA.2 - Feira de Santana	2,325.3	2,510.1	2,666.8	2,858.4	2,879.6
BA.6 - Juazeiro-Petrolina	1,095.1	1,274.4	1,460.3	1,822.1	2,138.6
BA.4 - Jequié	775.5	817.1	860.9	909.2	902.4
BA.3 - Itabuna-Ilhéus	1,449.4	1,564.0	1,665.5	1,794.0	1,816.3
BA.5 - Vitória da Conquista	1,022.1	1,207.7	1,318.0	1,491.4	1,585.6
BA.7 - Barreiras	325.9	371.1	417.0	500.4	564.8
Sergipe	1,036.1	1,166.5	1,309.6	1,550.2	1,772.7
SE.1 - Aracaju	344.4	412.0	487.3	668.7	821.9
SE.2 - Propriá	381.1	418.9	455.0	513.1	550.4
SE.3 - Lagarto	310.6	335.6	358.3	388.4	400.4
Southern Northeast	9,657.6	10,873.4	12,123.4	14,487.8	16,567.5

3.0 INCOME

3.0 INCOME

3.1 DEVELOPMENT OF THE INCOME DURING THE SIXIES

3.1.1 METHODOLOGY OF EXAMINATION

Estimates of Internal Income of Brazil are assessed by Instituto Brasileiro de Economia (IBRE), through Centro das Contas Nacionais da Fundação Getulio Vargas (CCN-FGV), which tries to follow the recommendations which were proved by Union Nation in relation to the uniformity of the system. Estimates are assessed each year in current prices and they are shown in a state level. As the estimates were requested in a level of Traffic Area, we have tried to use, always it was possible, the same methodology which was adopted by Centro das Contas Nacionais.

At first, the estimates were accomplished to homogenous microregions and after the results were grouped according to Traffic Areas. The years of 1960, 1968 and 1969 were included. The first one, as it was census year, is propitious to the obtainment of more complete informations mainly in relation to Tertiary Sector and the others are the last years of the series which was recently published by Fundação Getulio Vargas.

Several municipal dismemberment have occurred along the period, therefore, adjustments were necessary in order to compare the results of 1960 with the results obtained in 1968 and 1969.

Calculus methodology of the internal income to the three economic sectors in a level of Traffic Area is shown further with more details.

AGRICULTURE

The estimate of agricultural product is divided in three subsectors which are separately assessed.

- Farming
- Production of Animal and its Products
- Vegetal extraction

"Centro das Contas Nacionais" estimates in a national level the intermediary consumption of agriculture (farming, animal and its products) and it is accomplished through purchases to the proper agriculture and other Economic Sectors.

In this item we may include:

- Fertilizers
- Seeds
- Sanitary Defence
- Equipment costs(maintenance, fuel and depreciation)

The calculus of the intermediary consumption in Agriculture is impossible in a level to Traffic Area.

FARMING

The total of the farming[1] was obtained by the addition of avlues colected in a municipal level to temporary and permanent cultures and it is published yearly by the technical group of Farming and Caw Cattle Statistic (ex-service of Production Statistic) of Ministry of Agriculture.

PRODUCTION OF ANIMAL AND ITS PRODUCTS

In this item killing of caw cattle and hog cattle and animal products (milk, egg, wool bolls, wax and bee honey) were included. In almost all Traffic Areas, the parcel relative to milk and eggs corresponded around 90% of the total animal products.

In relation to the killing of caw cattle and hog cattle the value of this elopment was estimated in the same way that vegetative increase of the cattles was, considering that official statistics only register what is accomplished in the units under inspection and control - it includes all rural area:

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(1) including horticulture and fruit growing.

Industry

Values created in Extracting Industry of Mineral Products, Secondary Industry, Civil Construction and Industrial Services of Public Utility are computed as Income of Industrial Sector.

Although it changes very much we may say, in a state level, that around 90% of the Income of the Industrial sector proceeds from Extracting Industry of Mineral Products and Secondary Industry. Furthermore, existing statistics do not allow the distribution in level of Traffic Area to the total of the industry of Civil Construction and Industrial Services of Public Utility.

The value of Secondary Industry defines the Income of Industrial Sector, i.e., when it is included to a product which is being transformed. Thus, the work has consisted in distributing through Traffic Zones the total value of the income created by Industries and which was estimated by "Centro das Contas Nacionais" - IBRE, FGV, in a State level.

To 1960, the value of Secondary Industry was taken as base to the distribution, in a municipal level in the Industrial Census.

There are not similar informations in a lower level than State to 1968 and 1969 (2). For this reason the estimate has supported itself in the productivity and what was relative to the industrial transformation to employed people. Based on this coefficient and on the number of employed people per Traffic Area in 1968 and 1969 (3), the relation mentioned above was used. The result in level of Traffic Area was adjusted in order that the total was similar to the one published, in a state level, by Fundação Getulio Vargas.

Services

The income created by Tertiary Sector comprehends salaries, interests and rents of these subsectors:

- Trade
- Intermediary Financier
- Transports and Communications
- Government
- Rents
- Other Services

Each Sector was separately estimated in several ways in view of the lack of basic statistics to the years when census was not accomplished.

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(2) The publication of Fundação IBGE called "Industrial Production" to 1968 and 1969 does not give the value of industrial transformation in a municipal level, therefore, this kind of calculus is necessary.

(3) Employed people was obtained to these two years by the geometric interpolation of 1960 and 1970 data, the latter relative to the Demographic Census of 1970 and relative to the Population Economically Employed of the Industrial Sector.

Trade

To 1960, income and expense of wholesale and retail trade per municipal region and values published by Trade Census were taken as basis because it was supposed that the difference would be equivalent to aggregated value. Based on this element, values according to Traffic Areas were adjusted by the total.

The distribution to 1968 and 1969 was based on the number of employed people during these years and it was assessed by the relation between income and employed people; but after it was compared with the coefficients which were obtained in 1960. The values which were found to each Traffic Area have served as indexes of the total distribution of each State and they were given by Centro das Contas Nacionais.

In this item salaries (with additional remuneration), Interests and Profits of Trade Banks, Credit Companies, Financing, Investment, Insurance Companies, Trust Company and Official Banks are included.

The estimate was based on the position occupied by the areas and in relation to loan and deposits in cash and in a short period (surplus in 31.st December per municipal region). "Movimento Bancário segundo as Praças", publication of Fundação IBGE was used as source. As there are not such informations to 1969, the same percentage of 1968 was taken into consideration.

Transports and Communications

The income created by Services of Transports and Communications is measured according to salaries payed to registered and autonomous employees which work in this sector, including also the following activities.

- Air Service and telecomunication services
- Urban carts
- Railroad transports
- Maritime transports
- Highway transports and trimming
- Post and telegraph office
- Telephonic services

The distribution in level of Traffic Area was done according to the employed people in 1960, 1968 and 1969.

Government

Centro de Estudos Fiscais (CEF) is an organ which takes care to estimate the parcel of the internal income created by Public sector. Salaries and other remunarations (in clothing and feeding form) payed to the employed people in federal, state and municipal sphere have taken part as basic elements to income determination of Government sector. Public companies, economy companies and autharchies which perform an entrepreneurial function were excluded. The distribution of the total has followed the same methodology which was adopted to transports and it was published by Centro das Contas Nacionais per Traffic Area.

Rents

The estimates of FGV are based on Imposto Predial Territorial (House Land Tax) which is payed by the employed people. Whith the absence of this element the number of existing dwellings (in municipal level) in 1960, 1968 and 1969 was taken into consideration to distribution.

Other Services

Trade Census and services of 1960 were used as basic data and from where informations in relation to incomes and total expenses were colected, in municipal level, thus, liquid income was obtained. To 1968 and 1969, the index resulting from the relation between liquid income and employed people was taken into consideration.

3.1.2 INTERNAL INCOME ACCORDING TO THE AREAS IN 1960, 1968 AND 1969.

The application of methodological procedures already mentioned allows the obtainment of estimates which are shown in Boards 3/1 to 3/9.

3.2 PROJECTIONS

As we already knew, Northeast has been showing important increase rates during a large period. In 1971 and 1973 it has established higher results than the results of Brazil when it reached respectively 10.2% and 13%.

In relation to the execution of the project, increase rate of 9% per year was taken into consideration but it is lower than the one which BNH foresaw to the present decade. However, the development which results from there would be larger than the one which is expected to Brazil as a whole (7.4%).

The application of this premise to Traffic Areas has taken into consideration the hypothesis that the increase would occur in an harmonious form in all areas, and from which would result a better distribution of the internal Income between the States. In the present, around 44% of the total is centralized in Northeastern Northeast. From the second half of present decade, it was supposed that the following participation would occur:

	%
Northeastern Northeast	38
Northwestern Northeast	29
Southern Northeast	33
Total	100

The distribution of the expected development of internal Income between Traffic Areas has considered the irrefutable dynamism of some of them. For this reason, different rates were taken as basis.

In relation to Norhteastern Northeast, Development rates of internal Income adopted in the projections are as follows:

YEARLY DEVELOPMENT

(in percentage)

TRAFFIC AREAS	1975/1980	1980/1985	1985/1995	1995/2005
Alagoas	9.20	9.05	9.00	9.00
AL.1 - Maceió	8.10	8.05	8.00	7.90
AL.2 - União dos Palmares	9.20	9.15	9.10	9.00
AL.3 - Penedo	10.25	10.80	10.70	10.60
AL.4 - Arapiraca	8.50	8.45	8.40	8.30
AL.5 - Santana do Ipanema	8.40	8.35	8.30	8.20
Pernambuco	7.30	9.00	7.45	9.00
PE.1 - Recife	7.30	9.10	7.45	8.90
PE.2 - Timbaúba	8.50	10.40	8.70	10.20
PE.3 - Palmares	5.35	7.10	5.35	6.30
PE.4 - Caruaru	6.70	8.50	6.75	8.20
PE.5 - Garanhuns	7.30	9.10	7.45	8.90
PE.6 - Arcoverde	6.50	8.40	8.40	8.90
PE.7 - Salgueiro	6.60	8.60	6.95	8.40
PE.8 - Petrolina	9.10	10.90	9.15	10.60
Paraíba	5.70	9.00	10,70	9.00
PB.1 - João Pessoa	8.55	11.80	13.05	10.85
PB.2 - Campina Grande	4.55	7.60	9.00	6.80
PB.3 - Patos	3.05	6.00	7.35	5.25
Rio Grande do Norte	5.70	9.00	9.00	9.00
RN.1 - Natal	7.50	10.60	10.20	9.85
RN.2 - Mossoró	1.70	4.65	4.30	3.90
RN.3 - Angicos	4.15	7.20	6.80	6.40
RN.4 - Caicó	7.40	10.50	10.10	9.75
RN.5 - Santa Cruz	2.05	5.90	5.55	5.15
Northeastern Northeast	6.90	9.00	8.45	9.00

YEARLY DEVELOPMENT.

(in percentage)

TRAFFIC AREAS	1975/ 1980	1980/ 1985	1985/ 1995	1995/ 2005
Ceará	10.90	9.90	10.70	9.00
CE.1 Fortaleza	12.60	10.50	12.00	10.00
CE.2 Sobral	10.00	8.60	10.10	8.10
CE.3 Russas	8.00	6.70	8.05	6.10
CE.4 Iguatu	8.20	6.20	7.50	5.60
CE.5 Crato - Juazeiro	7.20	5.15	6.50	4.55
Piauí	14.00	9.00	9.00	9.00
PI.1 Teresina	15.00	9.90	9.70	9.40
PI.2 Parnaíba	11.70	6.70	6.50	6.20
PI.3 Floriano	11.40	6.40	6.20	5.95
PI.4 Picos	15.60	10.50	10.40	10.10
PI.5 Bom Jesus	9.50	4.50	4.40	4.20
Maranhão	9.00	9.00	9.00	9.00
MA.1 São Luís	7.40	7.00	6.50	5.90
MA.2 Bacabal	7.40	7.20	6.80	6.30
MA.3 Caxias - Codó	9.60	9.50	9.00	8.30
MA.4 Presidente Dutra	7.40	7.40	7.00	6.40
MA.5 Imperatriz	14.20	13.70	13.20	12.60
Northwestern Northeast	10.70	9.00	9.80	9.00

Finally, in Southern Northeast, Development of internal Income would be placed according to the following rates

YEARLY DEVELOPMENT

(in percentage)

TRAFFIC AREAS	1975/ 1980	1980/ 1985	1985/ 1995	1995/ 2005
Bahia	10,5	9,0	9,0	9,0
BA.1 Salvador	10,5	8,9	8,8	8,7
BA.2 Feira de Santana	9,4	7,9	7,8	7,7
BA.3 Ilhéus - Itabuna	10,5	8,9	8,8	8,7
BA.4 Jequié	11,7	10,2	10,1	10,0
BA.5 Vitória da Conquista	9,2	7,7	7,6	7,5
BA.6 Juazeiro	13,5	11,9	11,8	11,7
BA.7 Barreiras	11,2	9,6	9,5	9,4
Sergipe	9,0	9,0	9,0	9,0
SE.1 Aracaju	9,7	9,6	9,6	9,5
SE.2 Propriá	7,7	7,7	7,7	7,6
SE.3 Lagarto	9,4	9,3	9,3	9,5
Shouthern.	10,4	9,0	9,0	9,0

The estimate of internal Income, to 1975, 1980, 1985, 1995 and 2005 is shown, according to Traffic Areas, in Boards 3/10, 3/11 and 3/12, and which also register the results per capita. The expansion of the latter would b equivalent to the obtainment of development rates which are shown in Boards 3/13, 3/14 and 3/15.

Board 3.1

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST - 1960

(Cr$ 1,000 current)

TRAFFIC AREAS	Primary Sector	Secondary Sector	Tertiary Sector	Total
Alagoas	9,147.9	2,543.4	6,726.4	18,417.7
AL1 – Maceió	947.4	1,074.3	4,105.9	6,127.6
AL2 – União dos Palmares	3,043.7	822.7	800.6	4,666.5
AL3 – Penedo	1,461.2	250.1	412.2	2,123.5
AL4 – Arapiraca	1,719.9	227.3	930.6	2,877.8
AL5 – Santana do Ipanema	1,976.2	169.0	477.1	2,622.3
Pernambuco	23,990.7	12,527.1	42,920.1	79,432.9
PE1 – Recife	3,429.4	8,327.9	30,310.1	42,067.4
PE2 – Timbaúba	2,339.2	917.3	1,596.5	4,853.0
PE3 – Palmares	3,370.2	1,941.9	2,141.8	7,453.9
PE4 – Caruaru	4,427.4	785.5	3,991.8	9,204.7
PE5 – Garanhuns	3,313.0	245 5	1,333.0	4,891.5
PE6 – Arcoverde	4,002.6	172.9	2,098.0	6,773.5
PE7 – Salgueiro	2,068.9	87.5	838.8	2,995.2
PE8 – Petrolina	1,040.0	43.6	610.1	1,693.7
Paraíba	18,414.3	2,917.2	11,117.6	32,444.6
PB1 – João Pessoa	1,670.5	1,642.0	3,578.0	6,890.5
PB2 – Campina Grande	8,611.3	755.6	5,649.7	15,016.6
PB3 – Patos	8,132.5	520.1	1,884.9	10,537.5
Rio Grande do Norte	9,533.7	2,039.1	8,783 4	20,356.2
RN1 – Natal	1,431.3	567.0	4,660.0	6,658.3
RN2 – Mossoró	2,667.1	801.5	2,491.1	5,959.7
RN3 – Angicos	1,182.2	82.3	253.0	1,517.5
RN4 – Caicó	1,309.0	352.7	837.4	2,499.1
RN5 – Santa Cruz	2,944.1	235.6	461.9	3,641.6
Total	61,086.6	20,022.3	69,462.5	150,571.4

Board 3.2

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST - 1960

(Cr$ 1,000 currents)

TRAFFIC AREAS	Primary Sector	Secondary Sector	Tertiary Sector	Total
Ceará	18,350.9	3,369.4	22,929.7	44,649.0
CE1 - Fortaleza	3,525.3	1,612.8	11,978.2	17,116.9
CE2 - Sobral	3,769.8	435.2	3,028.3	7,234.3
CE3 - Russas	3,007.2	260.1	1,690.5	4,957.8
CE4 - Iguatu	4,175.7	312.4	2,761.1	7,279.2
CE5 - Crato-Juazeiro	3,872.9	916.9	3,471.0	9,260.8
Piauí	4,406.3	531.1	4,425.6	9,363.0
PI1 - Teresina	1,055.4	164.4	1,783.3	3,003.1
PI2 - Parnaíba	1,078.2	156.9	1,456.5	2,683.6
PI3 - Floriano	727.2	125.1	519.2	1,371.5
PI4 - Picos	1,278.4	49.5	498.6	1,826.5
PI5 - Bom Jesus	317.1	33.2	126.0	476.3
Maranhão	12,609.6	2,510.8	10,033.5	25,203.1
MA1 - São Luís	823.1	1,135.6	4,926.3	6,885.0
MA2 - Pacabal	5,303.3	807.1	2,328.4	8,493.8
MA3 - Caxias-Codó	3,635.8	303.7	1,732.1	5,731.6
MA4 - Presidente Dutra	1,423.2	175.4	579.5	2,182.1
MA5 - Imperatriz	1,099.4	84.0	518.2	1,696.6
Total	35,367.0	6,010.3	37,443.8	79,421.1

Board 3.3

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST - 1960

(Cr$ 1,000 currents)

TRAFFIC AREAS	Primary Sector	Secondary Sector	Tertiary Sector	Total
Bahia	38,527.1	11,741.2	46,531.9	96,850.2
BA1 - Salvador	2,370.0	6,764.9	23,878.7	32,993.6
BA2 - Feira de Santana	10,918.5	2,251.9	8,075.0	21,245.4
BA3 - Itabuna-Ilhéus	11,573.1	1,548.0	6,721.5	19,842.6
BA4 - Jequié	4,031.7	320.9	2,225.0	6,577.6
BA5 - Vitória da Conquista	4,970.9	636.3	3,077.5	8,684.7
BA6 - Juazeiro	3,543.0	171.7	2,266.7	5,981.4
BA7 - Barreiras	1,119.9	47.5	387.5	1,554.9
Sergipe	4,777.8	1,209.1	5,199.8	11,177.7
SE1 - Aracaju	666.8	534.5	3,121.6	4,322.9
SE2 - Propriá	2,125.2	469.7	1,116.5	3,711.4
SE3 - Lagarto	1,985.8	204.9	952.7	3,143.4
Total	43,304.9	12,950.3	51,777.7	108,027.9

Board 3.4

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST - 1963

(Cr$ 1,000 currents)

TRAFFIC AREAS	Primary Sector	Secondary Sector	Tertiary Sector	Total
Alagoas	270,296.5	61,625.7	218,139.9	570,062.1
AL1 – Maceió	24,661.7	32,650.3	138,564.5	195,876.5
AL2 – União dos Palmares	114,246.3	28,079.2	24,429.4	166,754.9
AL3 – Penedo	34,520.7	7,101.5	11,671.1	53,291.3
AL4 – Arapiraca	47,951.3	8,570.7	28,809.7	85,331.7
AL5 – Santana do Ipanema	48,908.5	5,224.0	14,665.2	68,797.7
Pernambuco	691,521.9	459,264.2	1,527,126.7	2,677,912.8
PE1 – Recife	68,785.0	302,655.1	1,170,032.4	1,490,565.5
PE2 – Timbaúba	92,669.3	34,204.1	57,218.0	134,788.4
PE3 – Palmares	115,879.5	45,926.4	64,231.3	226,037.2
PE4 – Caruaru	127,640.5	43,170.9	128,452.6	299,264.0
PE5 – Garanhuns	97,471.9	15,615.0	49,748.0	162,834.9
PE6 – Arcoverde	117,691.2	10,303.0	56,036.5	184,290.7
PE7 – Salgueiro	40,655.9	3,674.1	23,996.1	67,726.1
PE8 – Petrolina	31,828.6	2,755.6	27,421.5	62,006.0
Paraíba	402,334.6	75,850.0	333,181.9	810,615.5
PB1 – João Pessoa	42,500.1	30,995.2	143,125.9	216,721.2
PB2 – Campina Grande	196,651.9	23,265.1	137,930.2	358,937.2
PB3 – Patos	161,142.6	20,788.7	53,076.8	234,957.1
Rio Grande do Norte	293,508.3	60,453.2	388,757.7	742,802.2
RN1 – Natal	56,830.9	19,977.1	183,340.7	260,660.7
RN2 – Mossoró	70,837.6	18,801.0	76,299.8	165,925.4
RN3 – Angicos	37,413.3	3,204.0	9,445.1	50,070.4
RN4 – Caicó	29,422.1	11,549.5	97,901.2	138,869.8
RN5 – Santa Cruz	99,050.4	7,012.6	15,767.9	121,830.9
Total	1,657,801.3	676,392.1	2,467,206.2	4,801,399.6

Board 3.5

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHWESTERN NORTHEAST - 1968

(Cr$ 1,000 currents)

TRAFFIC AREAS	Primary Sector	Secondary Sector	Tertiary Sector	Total
Ceará	680,248.2	140,407.5	869,339.6	1,689,994.3
CE1 - Fortaleza	135,979.2	62,762.2	536,467.7	735,209.1
CE2 - Sobral	166,478.5	31,210.9	94,056.4	291,845.8
CE3 - Iguatu	111,788.0	10,951.8	48,057.7	170,797.5
CE4 - Iguatu	157,433.2	8,845.7	79,943.4	245,219.3
CE5 - Crato-Juazeiro	108,572.3	26,536.9	111,813.4	246,922.6
Piauí	168,807.7	20,633.6	200,629.6	390,075.9
PI1 - Teresina	25,745.2	7,760.1	97,800.0	131,305.3
PI2 - Parnaíba	47,141.1	4,416.7	53,749.0	99,806.5
PI3 - Floriano	21,743.0	4,934.5	22,184.9	48,922.4
PI4 - Picos	66,936.3	2,972.0	22,402.7	92,311.0
PI5 - Bom Jesus	12,242.1	495.3	4,993.0	17,730.4
Maranhão	415,870.4	64,763.4	356,516.2	837,150.0
MA1 - São Luís	15,194.6	27,135.9	184,501.0	226,831.5
MA2 - Pacabal	162,814.5	10,392.9	71,034.6	292,242.0
MA3 - Caxias-Codó	135,237.5	8,872.6	63,560.0	207,670.1
MA4 - Presidente Dutra	44,201.4	4,339.1	17,004.7	65,545.2
MA5 - Imperatriz	58,422.4	6,022.9	20,355.9	84,801.2
Total	1,264,926.3	225,809.5	1,426,484.4	2,917,220.2

Board 3.6

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST - 1968

(Cr$ 1,000 currents)

TRAFFIC AREAS	Primary Sector	Secondary Sector	Tertiary Sector	Total
Bahia	1,175,043.3	303,059.0	1,811,201.4	3,297,309.7
BA1 - Salvador	45,003.6	171,951.7	1,006,915.0	1,223,870.3
BA2 - Feira de Santana	304,746.7	44,440.3	282,549.5	631,736.5
BA3 - Itabuna e Ilhéus	353,592.5	42,116.6	244,185.9	639,895.0
BA4 - Jequié	148,847.2	9,004.2	77,845.9	235,697.3
BA5 - Vitória da Conquista	144,100.0	15,975.2	111,513.3	271,588.5
BA6 - Juazeiro	83,664.6	15,628.3	73,770.6	173,083.5
BA7 - Barreiras	95,138.7	1,742.7	14,627.2	111,508.6
Sergipe	126,572.7	28,045.5	200,073.7	355,691.9
SE1 - Aracaju	3,782.1	15,312.8	143,858.1	162,953.0
SE2 - Propriá	59,099.4	7,572.3	29,074.5	95,746.2
SE3 - Lagarto	63,691.7	5,160.4	28,041.1	96,892.7
Total	1,301,616.0	328,904.5	2,011,331.1	3,642,201.6

BOARD 3.7

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHEAST(1) NORTHEAST - 1969

(Cr$ 1,000 current)

Traffic Areas	Primary Sector	Secondary Sector	Tertiary Sector	Total
Alagoas	703,860.4	101,583.3	292,901.0	1,103,344.7
AL1 - Maceió	73,794.5	40,430.1	186,725.9	300,950.5
AL2 - União dos Palmares	189,429.1	34,843.1	32,387.5	256,659.7
AL3 - Penedo	173,343.0	8,735.2	15,475.1	197,554.3
AL4 - Arapiraca	122,518.8	11,072.6	38,353.0	171,944.4
AL5 - Santana do Ipanema	149,770.0	6,501.3	19,964.5	176,235.8
Pernambuco	875,618.6	599,952.2	2,025,653.5	3,501,224.3
PE1 - Recife	89,611.5	392,965.7	1,492,188.3	1,974,765.5
PE2 - Timbaúba	109,859.4	46,196.3	74,718.7	230,774.4
PE3 - Palmares	131,935.3	56,395.5	83,853.7	272,184.5
PE4 - Caruaru	169,496.1	59,995.2	167,499.2	396,992.5
PE5 - Garanhuns	129,635.4	21,588.3	63,753.7	214,957.4
PE6 - Arcoverde	157,483.2	14,393.9	73,116.9	245,193.0
PE7 - Salgueiro	43,357.8	4,799.6	32,575.6	80,733.0
PE8 - Petrolina	44,249.9	3,568.7	57,153.4	55,071.8
Paraíba	448,699.0	87,513.6	425,109.6	961,322.2
PB1 - João Pessoa	48,234.7	34,217.6	188,232.4	270,684.9
PB2 - Campina Grande	231,626.2	27,566.8	168,332.7	427,525.7
PB3 - Patos	168,774.1	25,729.0	68,544.5	263,047.6
Rio Grande do Norte	309,751.4	89,197.6	406,271.3	736,220.3
RN1 - Natal	67,692.7	77,026.6	241,877.4	336,596.7
RN2 - Mossoró	73,734.9	24,259.8	95,824.7	193,859.4
RN3 - Angicos	48,635.2	4,090.2	12,338.3	65,064.7
RN4 - Caicó	34,093.5	15,478.1	35,974.9	85,546.5
RN5 - Santa Cruz	85,592.1	9,302.9	20,256.0	115,151.0
Total	2,342,665.4	799,246.7	3,149,535.4	6,292,047.5

BOARD 3.8

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHWESTERN NORTHEAST-1969

(Cr$ 1,000 currents)

Traffic Areas	Primary Sector	Secondary Sector	Tertiary Sector	Total
Ceará	**778,102.3**	**201,655.3**	**1,094,640.8**	**2,074,004.4**
CE1 - Fortaleza	102,277.9	89,535.0	670,842.8	951,655.7
CE2 - Sobral	173,745.7	47,389.1	117,539.2	338,674.0
CE3 - Russas	131,208.7	11,729.1	60,025.5	207,023.3
CE4 - Iguatu	163,770.9	12,301.0	100,033.8	276,555.7
CE5 - Crato-Juazeiro	127,045.1	30,701.1	137,399.5	301,745.7
Piauí	**179,569.7**	**25,131.9**	**251,200.7**	**455,902.3**
PI1 - Teresina	28,239.9	9,600.4	123,862.1	159,702.4
PI2 - Parnaíba	49,748.1	5,152.0	64,007.6	118,907.7
PI3 - Floriano	24,226.9	6,056.7	28,018.6	58,302.2
PI4 - Picos	69,381.0	3,744.7	28,800.8	101,926.5
PI5 - Bom Jesus	9,973.8	578.1	6,451.6	17,003.5
Maranhão	**478,667.3**	**87,918.5**	**447,535.0**	**1,014,120.8**
MA1 - São Luís	29,421.4	36,749.9	172,042.9	238,214.2
MA2 - Bacabal	189,605.5	24,705.2	114,088.5	327,799.2
MA3 - Caxias-Codó	140,668.2	12,302.5	104,198.9	257,167.6
MA4 - Presidente Dutra	51,314.6	5,978.5	26,769.8	84,062.9
MA5 - Imperatriz	68,457.6	8,176.4	30,502.9	107,136.9
Total	**1,436,515.3**	**314,705.7**	**1,794,036.5**	**3,545,257.5**

BOARD 3.9

INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST -1969

(Cr$ 1,000 Currents)

Traffic Areas	Primary Sector	Secondary Sector	Tertiary Sector	Total
Bahia	1,533,002.4	424,395.4	2,079,117.1	4,036,514.9
BA1 – Salvador	44,019.4	251,242.1	1,023,104.6	1,323,366.1
BA2 – Feira de Santana	339,163.6	63,234.8	369,178.0	768,576.6
BA3 – Itabuna e Ilhéus	513,975.0	63,235.0	317,202.7	909,362.7
BA4 – Jequié	212,668.4	13,156.2	101,480.5	327,305.1
BA5 – Vitória da Conquista	84,207.8	23,765.1	147,009.8	254,982.7
BA6 – Juazeiro	135,753.3	7,214.8	96,736.1	239,704.2
BA7 – Barreiras	100,262.7	2,546.4	19,405.4	122,214.5
Sergipe	357,739.5	40,730.8	248,947.1	647,416.4
SE1 – Aracaju	46,037.6	22,605.6	174,645.5	243,488.7
SE2 – Propriá	162,664.4	10,502.5	37,675.6	210,788.5
SE3 – Lagarto	149,056.5	7,616.7	36,426.0	193,139.2
Total	1,890,740.9	465,126.2	2,328,064.2	4,683,931.3

TABLE 3.14

PROJECTIONS OF INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHEASTERN NORTHEAST

Traffic Areas	1975		1980		1985		1995		2005	
	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"
Alagoas	3,549	1,777	4,937	2,321	7,532	3,537	17,293	7,013	42,333	16,555
AL1 - Maceió	379	2,126	1,295	2,575	1,957	2,299	4,116	5,473	2,283	9,255
AL2 - União dos Palmares	740	1,639	1,159	2,475	1,797	3,538	4,019	8,128	10,117	17,823
AL3 - Penedo	532	3,443	1,023	5,273	1,735	8,133	4,713	19,232	12,902	42,225
AL4 - Arapiraca	473	1,063	718	1,435	1,073	2,005	2,533	3,212	3,344	7,605
AL5 - Santana do Ipanema	473	1,672	712	2,302	1,053	3,779	2,326	6,972	5,173	12,260
Pernambuco	22,153	2,732	22,357	3,557	35,755	4,037	71,321	8,370	152,326	17,792
PE1 - Recife	7,933	4,375	12,961	5,323	19,937	7,114	40,759	11,041	95,166	20,552
PE2 - Timbaúba	1,132	2,269	1,713	3,303	2,303	3,523	6,436	12,636	17,145	34,529
PE3 - Palmares	1,118	2,342	1,449	2,276	2,039	3,317	3,439	5,737	5,633	11,725
PE4 - Caruaru	1,727	1,765	2,321	2,337	3,577	3,450	5,373	6,352	15,113	15,235
PE5 - Garanhuns	929	1,733	1,403	2,343	2,175	4,027	4,462	3,709	10,459	22,213
PE6 - Arcoverde	1,039	1,774	1,456	2,297	2,222	3,134	4,996	5,603	12,859	14,112
PE7 - Salgueiro	235	933	336	1,340	259	1,773	1,535	2,705	3,330	5,622
PE8 - Petrolina	433	1,533	672	2,359	1,125	3,226	2,595	5,225	7,397	10,262
Paraíba	4,653	1,655	5,290	1,924	9,075	2,791	25,035	6,553	59,265	13,367
PB1 - João Pessoa	1,512	2,623	2,279	3,445	3,974	5,271	13,249	11,835	37,220	31,919
PB2 - Campina Grande	1,208	1,175	2,392	1,376	3,453	2,453	8,167	5,233	15,951	9,753
PB3 - Patos	1,063	1,233	1,219	1,271	1,634	1,516	3,319	2,450	5,543	3,435
Rio Grande do Norte	4,455	2,509	3,820	3,070	9,755	4,233	21,453	5,383	50,855	17,347
RN1 - Natal	2,179	4,333	3,135	3,430	5,272	8,220	13,335	18,372	35,297	40,663
RN2 - Mossoró	855	1,523	932	1,500	1,572	5,215	1,713	2,152	2,621	2,756
RN3 - Pau dos Ferros	303	1,746	371	1,951	525	2,353	1,014	4,922	1,232	6,551
RN4 - Caicó	565	2,522	773	3,329	1,251	5,033	3,339	11,247	8,511	25,452
RN5 - Santa Cruz	565	1,502	536	2,554	811	2,443	1,596	3,505	2,439	5,070
Northeastern Northeast	27,675	2,332	33,274	2,965	60,423	4,171	135,995	7,855	321,725	16,240

BOARD 3.11

PROJECTIONS OF INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

NORTHWESTERN NORTHEAST

Traffic Areas	1975 Cr$ Million	1975 Cr$ "Per Capita"	1980 Cr$ Million	1980 Cr$ "Per Capita"	1985 Cr$ Million	1985 Cr$ "Per Capita"	1995 Cr$ Million	1995 Cr$ "Per Capita"	2005 Cr$ Million	2005 Cr$ "Per Capita"
Ceará	7,071	1,350	11,779	2,021	18,175	2,775	50,974	6,502	119,532	13,262
CE.1 Fortaleza	3,630	2,753	6,371	4,052	10,538	5,528	33,615	12,767	87,033	25,525
CE.2 Sobral	1,175	834	1,820	1,285	2,846	1,903	7,426	4,266	16,159	8,868
CE.3 Russas	614	825	934	1,763	1,223	1,623	2,735	3,223	5,054	5,623
CE.4 Iguatu	807	700	1,199	1,073	1,535	1,222	3,345	2,109	5,771	3,205
CE.5 Crato - Juazeiro	844	1,073	1,195	1,413	1,537	2,533	2,552	2,924	4,501	4,373
Piauí	2,552	1,279	4,037	2,175	7,552	2,971	17,835	5,033	42,333	12,786
PI.1 Teresina	1,021	2,730	2,053	2,747	3,226	5,267	8,263	9,532	20,332	18,653
PI.2 Parnaíba	573	951	920	1,503	1,267	1,326	2,551	3,255	4,592	5,843
PI.3 Floriano	222	1,285	480	1,825	554	2,223	2,271	3,467	2,122	5,536
PI.4 Picos	628	1,077	1,235	1,975	2,121	2,305	5,627	6,523	14,300	15,044
PI.5 Bom Jesus	63	503	93	735	124	865	191	1,246	288	1,343
Maranhão	6,334	1,024	9,820	2,491	15,110	3,419	35,794	6,757	64,656	14,024
MA.1 São Luís	1,322	2,791	1,864	3,330	2,509	3,632	4,911	4,537	8,702	5,763
MA.2 Bacabal	2,235	1,530	2,763	2,030	3,917	2,723	7,537	5,054	13,951	9,550
MA.3 Caxias - Codó	1,327	1,833	2,352	2,754	4,488	4,100	10,534	9,275	23,676	21,375
MA.4 Presidente Dutra	514	1,351	735	1,919	1,052	2,438	2,077	4,332	3,854	5,554
MA.5 Imperatriz	923	1,335	1,605	2,751	3,044	4,032	10,555	9,371	34,463	21,327
Northwestern Northeast	15,957	1,530	26,506	2,203	40,788	3,025	103,713	6,435	245,531	13,322

TABLE 3.12

PROJECTIONS OF INTERNAL INCOME ACCORDING TO TRAFFIC AREAS

SOUTHERN NORTHEAST

Traffic Areas	1975		1980		1985		1995		2005	
	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"	Cr$ Million	Cr$ "Per Capita"
Bahia	12,551	2,022	22,454	3,014	45,174	4,130	102,272	8,294	252,979	17,159
BA.1 Salvador	5,534	3,782	9,695	4,940	14,944	6,090	24,531	9,694	73,453	16,131
BA.2 Feira de Santana	1,253	1,403	5,124	2,011	7,493	2,610	15,597	5,562	32,351	11,565
BA.3 Itabuna - Ilhéus	4,043	2,793	6,657	4,257	10,136	6,222	23,717	13,220	54,572	30,045
BA.4 Jequié	1,525	1,966	2,046	3,239	4,293	4,992	11,254	12,378	23,137	32,305
BA.5 Vitória da Conquista	1,449	1,326	2,254	1,552	3,266	2,478	6,802	4,561	14,012	8,831
BA.6 Juazeiro	1,173	1,030	2,129	1,676	3,732	2,556	11,383	6,247	34,335	15,654
BA.7 Barreiras	557	1,709	946	2,549	1,495	3,585	3,707	7,408	9,033	16,100
Sergipe	1,316	1,543	2,949	2,521	4,530	3,426	10,722	6,322	25,400	14,325
SE.1 Aracaju	725	2,105	1,151	2,733	1,822	3,733	4,557	7,025	11,339	13,735
SE.2 Propriá	597	1,566	867	2,032	1,257	2,753	2,640	5,145	5,513	10,015
SE.3 Lagarto	534	1,312	930	2,771	1,451	4,050	3,531	9,031	8,548	21,349
Southern Northeast	13,782	2,045	32,402	2,273	49,559	4,110	110,019	8,345	273,379	15,955

BOARD 3.13

INCREASE RATES OF THE INCOME PER CAPITA

ACCORDING TO TRAFFIC AREAS

Northeastern Northeast

(Yearly Development, in Percentage)

Traffic Areas	1975/ 1980	1980/ 1985	1985/ 1995	1995/ 2005
Alagoas	7.00	7.10	7.10	7.55
AL.1 Maceió	4.70	4.90	4.90	5.40
AL.2 União dos Palmares	8.35	8.30	8.25	8.20
AL.3 Penedo	8.90	9.00	9.05	9.60
AL.4 Arapiraca	6.45	6.65	6.65	7.15
AL.5 Santana do Ipanema	6.60	6.70	6.70	7.30
Pernambuco	5.70	7.10	5.60	7.55
PE.1 Recife	4.05	5.95	4.50	6.55
PE.2 Timbaúba	8.15	9.95	8.40	10.60
PE.3 Palmares	4.75	6.75	5.15	7.25
PE.4 Caruaru	5.95	7.90	6.30	8.40
PE.5 Garanhuns	7.65	9.60	8.10	10.20
PE.6 Arcoverde	4.60	6.55	6.75	8.80
PE.7 Salgueiro	6.80	5.75	4.30	6.40
PE.8 Petrolina	9.10	6.45	4.90	7.00
Paraíba	3.75	7.10	8.70	7.55
PR.1 João Pessoa	5.60	8.90	10.20	8.65
PR.2 Campina Grande	3.50	6.55	8.00	6.30
PR.3 Patos	0.60	3.60	4.90	3.35
Rio Grande do Norte	3.70	7.10	7.05	7.55
RN.1 Natal	5.50	8.65	8.30	8.40
RN.2 Mossoró	-0.25	2.75	2.35	2.45
RN.3 Angicos	2.15	5.25	4.85	5.00
RN.4 Caicó	5.60	8.80	8.40	8.50
RN.5 Santa Cruz	1.05	4.05	3.70	3.80
Northeastern Northeast	4.95	7.05	6.55	7.55

BOARD 3.14

INCREASE RATES OF THE INCOME PER CAPITA

ACCORDING TO TRAFFIC AREAS

Northwestern Northeast

(Yearly Development, in Percentage)

Traffic Areas	1975/ 1980	1980/ 1985	1985/ 1995	1995/ 2005
Ceará	8.20	6.55	8.70	7.55
CE.1 Fortaleza	8.10	6.60	8.60	7.55
CE.2 Sobral	9.10	7.00	9.00	7.60
CE.3 Russas	7.10	5.15	7.10	5.75
CE.4 Iguatu	5.25	3.70	5.00	4.25
CE.5 Crato - Juazeiro	5.60	3.65	5.55	4.20
Piauí	11.20	6.55	7.10	7.55
PI.1 Teresina	10.95	6.20	6.60	6.90
PI.2 Parnaíba	9.70	5.00	5.40	5.65
PI.3 Floriano	8.90	4.20	4.60	4.85
PI.4 Picos	12.90	8.00	8.40	8.70
PI.5 Bom Jesus	7.90	3.35	3.70	4.00
Maranhão	6.35	6.55	7.05	7.55
MA.1 São Luís	2.05	1.95	2.25	2.45
MA.2 Bacabal	5.80	6.00	6.40	6.70
MA.3 Caxias - Codó	7.90	8.20	8.50	8.70
MA.4 Presidente Dutra	6.10	6.45	6.85	7.05
MA.5 Imperatriz	8.45	8.30	8.65	8.80
Northwestern Northeast	8.00	6,55	7.85	7.55

BOARD 3.15

INCREASE RATES OF THE INCOME PER CAPITA

ACCORDING TO TRAFFIC AREAS

Southern Northeast

(Yearly Development, in Percentage)

Traffic Areas	1975/ 1980	1980/ 1985	1985/ 1995	1995/ 2005
Bahia	7.90	6.70	7.10	7.55
BA.1 Salvador	5.50	4.30	4.75	5.25
BA.2 Feira de Santana	7.80	6.60	7.05	7.60
BA.3 Ilhéus - Itabuna	8.80	7.50	8.00	8.55
BA.4 Jequié	10.50	9.05	9.50	10.05
BA.5 Vitória da Conquista	7.10	5.85	6.30	6.80
BA.6 Juazeiro	10.15	8.90	9.35	9.90
BA.7 Barreiras	8.30	7.05	7.50	8.10
Sergipe	6.45	6.60	7.10	7.55
SE.1 Aracaju	5.80	6.00	6.50	7.00
SE.2 Propriá	5.75	5.95	6.40	6.90
SE.3 Lagarto	7.70	7.90	8.40	8.90
Southern Northeast	7.80	6.70	7.10	7.55

4.0 AGRICULTURE

4,0 AGRICULTURE

In Basic Studies of Economy, the hypothesis of development of the cultivated area in Northwestern Northeast from the present 4.3 million ha. up to 5.5 million ha. is included. According to this estimate, the area used by the principal farmings would have the following development.

(in thousand ha.)

Specification	1973	1980	1985	2005
INDUSTRIAL CULTURES	2,320	3,100	3,500	3,500
Sugar-Cane (1)	350	700	700	700
Cotton	1,520	1,800	2,000	2,000
Castorbean	86	100	150	150
Sisal	200	250	300	300
Tobacco	21	50	70	70
Irrigated Citrus	-	50	100	100
Others (2)	143	150	180	180
SUBSISTENCE FARMINGS	1,930	1,970	2,000	2,000
Bean	700	700	700	700
Rice	50	50	50	50
Corn	778	778	778	778
Manioc	293	293	293	293
Others (3)	109	149(4)	179(4)	179(4)
TOTAL	4,250	5,070	5,500	5,500

1 - only the one which is destined to the processing by Plants
2 - coffee, coconut, sugar-cane from other places, etc.
3 - including fruit growing and horticulture
4 - including modern planting of tomato and cashew-nut

We may observe that significative changes are not foreseen in the sphere of subsistence farming. Among the industrial cultures, planting of sugar-cane and cotton would have more significative development. Both have in Northeast adequate areas and which were taken into

consideration when present developments were distributed between Traffic Areas.

Briefly, it was based on present situation (1973) as it is shown in Boards 4/1 and 4/2.

Taking into consideration that principal cultures specificated in boards mentioned above supply a fundamental parcel of the universe and the distribution between areas has accomplished in relation to the following items: sugar-cane, cotton, sisal, castorbean and tobacco, among industrial cultures, and rice, bean, manioc and corn among subsistence farmings. This distribution is shown in boards 4/3 to 4/6.

Production estimates are based on the increase of outputs, in form already justified in the present study and they are summarized as follows:

Sugar Ton Per Hectare

STATES	1975	1980	1985	1995	2005
Alagoas	6.53	7.27	10.00	11.82	12.04
Pernambuco	6.50	7.50	10.00	12.00	12.00
Paraiba	4.00	5.00	6.94	10.56	11.11
Rio Grande do Norte	3.50	5.00	5.50	8.00	9.50

Cotton (kg/ha) in the year of final accomplishment: 650

Castorbean (kg/ha) in the year of final accomplishment: 1,50

Sisal (kg/ha) in the year of final accomplishment: 2,000

Tobacco (kg/ha) in the year of final accomplishment: 1,600

Kg/ha

SUBSISTENCE FARMINGS	1980	2005
Bean	800	970
Rice	1,600	2,000
Corn	1,000	2,000
Manioc	15,000	21,000

Based on such parameters, the projections of production mentioned in boards 4/7 to 4/10 were accomplished.

BOARDS

BOARD 4.1

CULTIVATED AREAS OF NORTHEASTERN NORTHEAST
ACCORDING TO TRAFFIC AREAS
1972

(in 1,000 ha)

Traffic Areas	Sugar Cane	Cotton	Sisal	Castorbean	Tobacco	Rice	Bean	Manioc	Corn
Alagoas	173	83	-	1	16	12	102	45	109
AL.1 - Maceió	20	-	-	-	-	1	1	1	1
AL.2 - União dos Palmares	68	9	-	-	1	1	2	17	8
AL.3 - Penedo	35	2	-	-	1	8	2	5	3
AL.4 - Arapiraca	1	33	-	-	14	1	17	13	29
AL.5 - Santana do Ipanema	2	44	-	1	-	1	80	6	68
Pernambuco	240	405	20	91	3	5	260	141	292
PE.1 - Recife	23	-	-	-	-	-	-	3	1
PE.2 - Timbaúba	75	12	-	-	-	-	2	21	3
PE.3 - Palmares	126	1	-	-	-	-	1	10	2
PE.4 - Caruaru	4	147	14	-	-	-	34	25	52
PE.5 - Garanhuns	7	120	6	15	-	-	70	35	68
PE.6 - Arcoverde	3	122	-	24	3	1	103	14	103
PE.7 - Salgueiro	1	-	-	10	-	2	23	15	45
PE.8 - Petrolina - Juazeiro	1	4	-	25	-	2	21	4	11
Paraíba	20	520	65	2	2	25	183	53	244
PB.1 - João Pessoa	13	12	1	-	-	1	2	6	1
PB.2 - Campina Grande	1	455	61	1	2	2	102	44	97
PB.3 - Patos	-	53	3	1	-	22	84	3	145
Rio Grande do Norte	10	510	95	2	-	8	153	54	133
RN.1 - Natal	3	59	5	-	-	-	14	14	6
RN.2 - Mossoró	-	49	1	1	-	6	80	4	69
RN.3 - Angicos	2	37	69	1	-	-	6	4	4
RN.4 - Caicó	-	-	2	-	-	2	17	-	13
RN.5 - Santa Cruz	-	365	18	-	-	-	53	32	41
Total	333	1,523	280	86	21	50	702	293	778

FORM 4.2

AGRICULTURAL PRODUCTION OF NORTHEASTERN NORTHEAST
ACCORDING TO TRAFFIC AREAS
1973

(in 1.000 t)

Traffic Areas	Sugar Cane	Cotton	Sisal	Castorbean	Tobacco	Rice	Bean	Manioc	Corn
Alagoas	6534	25	-	1	18	23	60	495	65
AL.1 - Maceió	106	-	-	-	-	2	1	11	1
AL.2 - União dos Palmares	403	3	-	-	1	2	1	154	5
AL.3 - Penedo	80	-	-	-	1	12	1	55	2
AL.4 - Arapiraca	5	9	-	-	15	1	10	200	17
AL.5 - Santana de Ipanema	5	13	-	1	-	1	47	56	40
Pernambuco	1,093	110	13	52	2	5	160	1,805	263
PE.1 - Recife	104	-	-	-	-	-	-	33	1
PE.2 - Timbaúba	341	3	-	-	-	-	1	269	3
PE.3 - Palmares	574	-	-	-	-	-	1	123	2
PE.4 - Caruaru	13	40	13	-	-	-	21	461	47
PE.5 - Garanhuns	32	33	5	10	-	-	43	465	61
PE.6 - Arcoverde	14	33	-	15	2	2	67	173	98
PE.7 - Salgueiro	5	-	-	10	-	3	24	192	41
PE.8 - Petrolina - Juazeiro	5	1	-	16	-	3	13	52	10
Paraíba	80	195	102	2	2	32	125	593	207
PB.1 - João Pessoa	53	4	1	-	-	1	1	65	1
PB.2 - Campina Grande	20	137	97	1	2	2	93	464	92
PB.3 - Patos	-	15	4	1	-	27	55	33	174
Rio Grande do Norte	31	115	95	2	-	3	85	355	80
RN.1 - Natal	23	14	5	-	-	-	8	93	4
RN.2 - Mossoró	-	11	1	1	-	5	34	25	41
RN.3 - Angicos	3	3	60	1	-	-	3	25	2
RN.4 - Caicó	-	-	2	-	-	2	10	-	3
RN.5 - Santa Cruz	-	82	13	-	-	-	30	211	25
Total	1,052	405	215	57	22	63	430	3,213	615

BOARD 4.3

ALAGOAS - PROJECTIONS OF CULTIVATED AREA PER TRAFFIC AREAS
1975 - 1980 - 1985 - 1995 - 2005

(In thousand hectares)

Traffic Areas according to years	Sugar cane	Cotton	Castorbean	Tobacco	Rice	Bean	Manioc	Corn
1975								
Total of the State	170	93	1	55	12	102	45	109
AL.1 Maceió	33	-	-	-	-	1	1	1
AL.2 União dos Palmares	119	9	-	2	1	2	14	8
AL.3 Penedo	21	3	-	1	10	2	5	3
AL.4 Arapiraca	1	32	-	50	1	17	19	29
AL.5 Santana de Ipanema	2	47	1	-	1	80	6	58
1980								
Total of the State	190	130	3	32	12	102	45	109
AL.1 Maceió	31	-	-	-	-	1	1	1
AL.2 União dos Palmares	137	13	-	3	-	2	14	8
AL.3 Penedo	24	3	-	1	10	2	5	3
AL.4 Arapiraca	1	45	-	33	1	17	19	29
AL.5 Santana de Ipanema	2	69	3	-	1	80	6	58
1985								
Total of the State	220	170	5	55	12	102	45	109
AL.1 Maceió	35	-	-	-	-	1	1	1
AL.2 União dos Palmares	154	17	-	4	-	2	14	8
AL.3 Penedo	28	4	-	2	10	2	5	3
AL.4 Arapiraca	1	60	-	49	1	17	19	29
AL.5 Santana de Ipanema	2	89	5	-	1	80	6	58
1995								
Total of the State	220	170	5	55	12	102	45	109
AL.1 Maceió	35	-	-	-	-	1	1	1
AL.2 União dos Palmares	154	17	-	4	-	2	14	8
AL.3 Penedo	28	4	-	2	10	2	5	3
AL.4 Arapiraca	1	60	-	49	1	17	19	29
AL.5 Santana de Ipanema	2	89	5	-	1	80	6	58
2005								
Total of the State	220	170	5	55	12	102	45	109
AL.1 Maceió	35	-	-	-	-	1	1	1
AL.2 União dos Palmares	154	17	-	4	-	2	14	8
AL.3 Penedo	28	4	-	2	10	2	5	3
AL.4 Arapiraca	1	60	-	49	1	17	19	29
AL.5 Santana de Ipanema	2	89	5	-	1	80	6	58

BOARD 6.4

PERNAMBUCO - PROJECTIONS OF CULTIVATED AREA PER TRAFFIC AREAS

1975 - 1980 - 1985 - 1995 - 2005

(in thousand hectares)

Traffic Areas according to years	Sugar Cane	Cotton	Sisal	Castorbean	Tobacco	Rice	Beans	Manioc	Corn
1975									
Total of the State	203	430	30	31	3	5	252	141	292
PE.1 - Recife	19	-	-	-	-	-	-	3	1
PE.2 - Timbaúba	62	22	-	-	-	-	2	21	3
PE.3 - Palmares	105	1	-	-	-	-	1	10	2
PE.4 - Caruaru	3	157	21	-	-	-	4	35	52
PE.5 - Garanhuns	6	127	9	16	-	-	73	38	68
PE.6 - Arcoverde	2	129	-	24	3	1	102	14	109
PE.7 - Salgueiro	1	-	-	10	-	2	23	15	46
PE.8 - Petrolina - Juazeiro	1	4	-	25	-	2	21	4	11
1980									
Total of the State	200	350	40	84	8	5	250	141	292
PE.1 - Recife	19	-	-	-	-	-	-	3	1
PE.2 - Timbaúba	62	16	-	-	-	-	2	21	3
PE.3 - Palmares	106	1	-	-	-	-	1	10	2
PE.4 - Caruaru	3	201	28	-	-	-	34	35	52
PE.5 - Garanhuns	6	163	22	33	-	-	70	38	68
PE.6 - Arcoverde	2	164	-	24	4	1	109	14	109
PE.7 - Salgueiro	1	-	-	10	-	2	23	15	46
PE.8 - Petrolina - Juazeiro	1	5	-	25	-	2	21	4	11
1985									
Total of the State	200	382	40	135	10	5	250	141	292
PE.1 - Recife	19	-	-	-	-	-	-	3	1
PE.2 - Timbaúba	62	17	-	-	-	-	2	21	3
PE.3 - Palmares	106	1	-	-	-	-	1	10	2
PE.4 - Caruaru	3	212	28	-	-	-	34	35	52
PE.5 - Garanhuns	6	172	22	27	-	-	70	38	68
PE.6 - Arcoverde	2	173	-	40	10	1	109	14	109
PE.7 - Salgueiro	1	-	-	27	-	2	23	15	46
PE.8 - Petrolina - Juazeiro	1	5	-	41	-	2	21	4	11
1995									
Total of the State	200	380	40	135	10	5	250	141	292
PE.1 - Recife	19	-	-	-	-	-	-	3	1
PE.2 - Timbaúba	62	17	-	-	-	-	2	21	3
PE.3 - Palmares	106	1	-	-	-	-	1	10	2
PE.4 - Caruaru	3	212	28	-	-	-	34	35	52
PE.5 - Garanhuns	6	172	22	27	-	-	70	38	68
PE.6 - Arcoverde	2	173	-	40	10	1	109	14	109
PE.7 - Salgueiro	1	-	-	27	-	2	23	15	46
PE.8 - Petrolina - Juazeiro	1	5	-	41	-	2	21	4	11

BOARD 4.5

PARAIBA - PROJECTIONS OF CULTIVATED AREA PER TRAFFIC AREAS
1975 - 1980 - 1985 - 1990 - 2005

(In thousand hectares)

Traffic Areas according to years	Sugar Cane	Cotton	Sisal	Castorbean	Tobacco	Rice	Bean	Manioc	Corn
1975									
Total of the State	30	530	95	2	2	25	128	53	244
PA.1 - João Pessoa	29	13	1	-	-	1	2	5	2
PA.2 - Campina Grande	1	463	91	1	2	2	102	44	97
PA.3 - Patos	-	54	3	1	-	22	84	3	145
1980									
Total of the State	167	580	100	4	5	25	128	53	244
PA.1 - João Pessoa	171	14	1	-	-	1	2	6	2
PA.2 - Campina Grande	9	507	95	1	5	2	102	44	97
PA.3 - Patos	-	59	4	3	-	22	84	3	145
1985									
Total of the State	168	630	120	5	5	25	128	53	244
PA.1 - João Pessoa	171	15	1	-	-	1	2	6	2
PA.2 - Campina Grande	9	553	114	2	5	2	102	44	97
PA.3 - Patos	-	66	5	3	-	22	84	3	145
1990									
Total of the State	169	650	130	5	5	25	128	53	244
PA.1 - João Pessoa	171	16	1	-	-	1	2	6	2
PA.2 - Campina Grande	9	563	124	2	5	2	102	44	97
PA.3 - Patos	-	66	5	3	-	22	84	3	145
2005									
Total of the State	169	650	130	5	5	25	128	53	244
PA.1 - João Pessoa	171	15	1	-	-	1	2	6	2
PA.2 - Campina Grande	9	568	124	2	5	2	102	44	97
PA.3 - Patos	-	66	5	3	-	22	84	3	145

BOARD 4.6

RIO GRANDE DO NORTE - PROJECTIONS OF CULTIVATED AREA PER TRAFFIC AREAS
1975 - 1980 - 1985 - 1995 - 2005

(in thousand hectares)

Traffic Areas according to years	Sugar Cane	Cotton	Sisal	Caterbean	Rice	Bean	Manioc	Corn
1975								
Total of the State	70	515	55	2	6	159	54	133
TM.1 - Natal	15	53	5	-	-	15	14	5
TM.2 - Mossoró	-	50	1	-	6	59	4	69
TM.3 - Angicos	5	38	53	-	1	6	4	4
TM.4 - Caicó	-	-	2	-	1	17	1	13
TM.5 - Santa Cruz	-	364	19	-	-	52	31	41
1980								
Total of the State	100	540	110	5	9	158	54	133
TM.1 - Natal	75	53	6	-	-	15	14	5
TM.2 - Mossoró	-	52	1	2	7	60	4	57
TM.3 - Angicos	25	39	78	2	-	6	4	4
TM.4 - Caicó	-	-	3	-	2	17	1	13
TM.5 - Santa Cruz	-	396	22	-	-	52	31	41
1985								
Total of the State	100	570	120	5	10	153	54	133
TM.1 - Natal	75	58	7	-	-	15	14	5
TM.2 - Mossoró	-	50	1	2	8	60	4	69
TM.3 - Angicos	25	44	93	-	-	6	4	4
TM.4 - Caicó	-	-	3	-	2	17	1	13
TM.5 - Santa Cruz	-	429	26	-	-	52	31	41
1995								
Total of the State	100	600	130	5	10	150	54	133
TM.1 - Natal	75	60	7	-	-	15	14	5
TM.2 - Mossoró	-	58	1	2	8	60	4	69
TM.3 - Angicos	25	44	93	2	-	6	4	4
TM.4 - Caicó	-	-	3	1	2	17	1	13
TM.5 - Santa Cruz	-	423	26	-	-	52	31	41
2005								
Total of the State	100	600	130	5	12	150	54	133
TM.1 - Natal	75	60	7	-	-	15	14	5
TM.2 - Mossoró	-	58	1	2	8	60	4	69
TM.3 - Angicos	25	44	93	2	-	6	4	4
TM.4 - Caicó	-	-	3	1	2	17	1	13
TM.5 - Santa Cruz	-	423	26	-	-	52	31	41

BOARD 4.7

ALAGOAS - PROJECTIONS OF PRODUCTION PER TRAFFIC AREAS (1)

1975 - 1980 - 1985 - 1995 - 2005

Traffic Areas according to years	Sugar Cane	Cotton	Castor-bean	Tobacco	Rice	Bean	Manioc	Corn
1975								
Total of the State	1,110	22	1	15	23	60	545	73
AL.1 - Maceió	176	-	-	-	-	-	22	1
AL.2 - União dos Palmares	777	3	-	1	-	1	167	6
AL.3 - Penedo	137	1	-	1	19	1	66	2
AL.4 - Arapiraca	7	10	-	12	2	10	227	21
AL.5 - Santana do Ipanema	13	14	1	-	2	48	72	43
1980								
Total of the State	1,500	53	3	48	26	67	595	115
AL.1 - Maceió	201	-	-	-	-	1	13	1
AL.2 - União dos Palmares	1,112	5	-	4	-	1	135	8
AL.3 - Penedo	222	1	-	1	22	1	56	3
AL.4 - Arapiraca	8	23	-	43	2	11	251	31
AL.5 - Santana do Ipanema	17	23	2	-	2	53	80	72
1985								
Total of the State	2,000	77	6	77	29	75	681	150
AL.1 - Maceió	352	-	-	-	-	1	15	1
AL.2 - União dos Palmares	1,540	8	-	6	-	1	212	11
AL.3 - Penedo	200	2	-	3	25	1	76	4
AL.4 - Arapiraca	430	27	-	68	2	12	287	40
AL.5 - Santana do Ipanema	20	40	6	-	2	60	91	94
1995								
Total of the State	2,800	95	7	83	30	85	805	193
AL.1 - Maceió	414	-	-	-	-	1	18	2
AL.2 - União dos Palmares	1,970	10	-	6	-	2	283	14
AL.3 - Penedo	330	2	-	3	24	2	85	5
AL.4 - Arapiraca	12	34	-	74	3	14	365	51
AL.5 - Santana do Ipanema	24	49	7	-	3	66	116	113
2005								
Total of the State	2,450	103	8	33	32	95	950	230
AL.1 - Maceió	422	-	-	-	-	1	21	2
AL.2 - União dos Palmares	1,655	10	-	6	-	2	295	17
AL.3 - Penedo	337	3	-	3	26	2	103	6
AL.4 - Arapiraca	12	35	-	79	3	16	403	61
AL.5 - Santana do Ipanema	24	54	8	-	3	74	127	144

1 Only principal cultures are considered

BOARD 4.8

PERNAMBUCO - PROJECTIONS OF PRODUCTION PER TRAFFIC AREAS (1)

1975 - 1980 - 1985 - 1995 - 2005

Traffic Areas according to years	Sugar Cane	Cotton	Sisal	Casterbean	Tobacco	Rice	Bean	Manioc	Corn
1975									
Total of the State	1,300	134	32	65	4	11	154	1,952	293
PE.1 - Recife	172	-	-	-	-	-	-	42	1
PE.2 - Timbaúba	472	4	-	-	-	-	1	231	3
PE.3 - Palmares	599	2	-	-	-	-	1	129	2
PE.4 - Caruaru	33	51	22	-	-	-	21	493	52
PE.5 - Garanhuns	39	41	10	13	-	-	44	527	63
PE.6 - Arcoverde	13	42	-	19	4	3	62	234	122
PE.7 - Salgueiro	7	-	-	13	-	4	33	202	45
PE.8 - Petrolina - Juazeiro	7	1	-	20	-	4	23	55	21
1980									
Total of the State	1,500	221	49	97	10	13	177	2,175	359
PE.1 - Recife	142	-	-	-	-	-	-	46	1
PE.2 - Timbaúba	465	7	-	-	-	-	1	224	4
PE.3 - Palmares	795	3	-	-	-	-	2	154	2
PE.4 - Caruaru	22	64	34	-	-	-	23	555	62
PE.5 - Garanhuns	45	68	15	29	-	-	43	525	82
PE.6 - Arcoverde	15	63	-	29	10	3	74	216	131
PE.7 - Salgueiro	8	-	-	20	-	5	16	231	55
PE.8 - Petrolina - Juazeiro	8	2	-	22	-	5	14	62	13
1985									
Total of the State	2,000	252	61	152	24	13	209	2,405	453
PE.1 - Recife	220	-	-	-	-	-	-	51	2
PE.2 - Timbaúba	520	8	-	-	-	-	2	258	5
PE.3 - Palmares	1,050	6	-	-	-	-	1	271	3
PE.4 - Caruaru	39	93	43	32	-	-	26	524	89
PE.5 - Garanhuns	69	79	18	49	-	-	54	543	125
PE.6 - Arcoverde	29	82	-	32	24	3	83	239	167
PE.7 - Salgueiro	12	-	-	59	-	5	23	255	71
PE.8 - Petrolina - Juazeiro	13	2	-	-	-	5	16	63	17
1995									
Total of the State	2,490	328	62	122	15	14	225	2,935	552
PE.1 - Recife	223	-	-	-	-	-	-	62	2
PE.2 - Timbaúba	249	13	-	-	-	-	2	437	5
PE.3 - Palmares	1,772	9	-	-	-	-	1	221	4
PE.4 - Caruaru	35	123	42	31	-	-	27	753	123
PE.5 - Garanhuns	72	97	20	56	-	-	61	791	239
PE.6 - Arcoverde	24	53	-	38	15	3	94	297	203
PE.7 - Salgueiro	12	-	-	57	-	5	20	312	93
PE.8 - Petrolina - Juazeiro	12	3	-	-	-	6	18	94	21
2005									
Total of the State	2,420	359	77	201	15	14	253	3,224	710
PE.1 - Recife	223	-	-	-	-	-	-	70	2
PE.2 - Timbaúba	239	11	-	-	-	-	2	491	7
PE.3 - Palmares	1,777	1	-	-	-	-	1	234	5
PE.4 - Caruaru	35	111	54	40	-	-	33	842	226
PE.5 - Garanhuns	72	135	23	60	-	-	67	833	165
PE.6 - Arcoverde	24	107	-	40	15	3	105	327	265
PE.7 - Salgueiro	12	-	-	61	-	5	27	355	112
PE.8 - Petrolina - Juazeiro	12	3	-	-	-	6	20	93	27

1 Only principal cultures are considered

BOARD 4.9

PARAIBA - PROJECTIONS OF PRODUCTION PER TRAFFIC AREAS (1)

1975 - 1980 - 1985 - 1995 - 2005

Traffic Areas according to years	Sugar-cane	Cotton	Sisal	Castorbean	Tobacco	Rice	Bean	Manioc	Corn
1975									
Total of the State	120	217	132	2	2	42	128	400	235
PB.1 - João Pessoa	116	5	2	-	-	2	1	45	2
PB.2 - Campina Grande	4	190	126	1	1	3	70	332	94
PB.3 - Patos	-	22	4	1	1	37	57	23	140
1980									
Total of the State	900	290	154	4	7	99	140	525	295
PB.1 - João Pessoa	855	7	2	-	-	2	1	59	2
PB.2 - Campina Grande	45	254	146	1	7	4	76	436	117
PB.3 - Patos	-	29	6	3	-	42	63	30	176
1985									
Total of the State	1,250	362	216	6	7	59	150	621	370
PB.1 - João Pessoa	1,187	9	2	-	-	2	2	70	3
PB.2 - Campina Grande	63	315	205	2	7	5	81	516	147
PB.3 - Patos	-	37	9	4	-	51	67	35	220
1995									
Total of the State	1,900	419	239	7	8	62	170	792	450
PB.1 - João Pessoa	1,805	10	2	-	-	2	2	90	4
PB.2 - Campina Grande	95	366	228	3	8	5	92	657	179
PB.3 - Patos	-	43	9	4	-	55	76	45	267
2005									
Total of the State	2,000	448	265	8	8	68	200	969	580
PB.1 - João Pessoa	1,900	11	2	-	-	3	2	110	5
PB.2 - Campina Grande	100	391	253	3	8	5	109	804	231
PB.3 - Patos	-	46	10	5	-	60	89	55	344

1 Only principal cultures are considered

BOARD 4.10

RIO GRANDE DO NORTE - PROJECTIONS OF PRODUCTION PER TRAFFIC AREAS (1)
1975 - 1980 - 1985 - 1995 - 2005

Traffic Areas according to years	Sugar Cane	Cotton	Sisal	Castorbean	Rice	Bean	Manioc	Corn
1975								
Total of the State	70	179	111	2	14	47	409	33
RN.1 - Natal	53	20	6	-	-	3	105	4
RN.2 - Mossoró	-	17	2	1	10	25	33	18
RN.3 - Angicos	17	13	75	1	2	3	30	3
RN.4 - Caicó	-	-	2	-	2	10	8	3
RN.5 - Santa Cruz	-	126	22	-	-	26	234	25
1980								
Total of the State	300	733	147	6	18	95	535	140
RN.1 - Natal	375	28	9	-	-	20	133	5
RN.2 - Mossoró	-	23	2	2	14	38	40	73
RN.3 - Angicos	125	17	109	3	-	4	40	4
RN.4 - Caicó	-	-	4	1	4	11	10	14
RN.5 - Santa Cruz	-	170	23	-	-	33	307	43
1985								
Total of the State	550	294	203	5	22	105	533	203
RN.1 - Natal	413	34	11	-	-	11	209	3
RN.2 - Mossoró	-	28	2	2	15	42	47	103
RN.3 - Angicos	137	22	145	2	-	4	47	5
RN.4 - Caicó	-	-	4	1	4	12	12	20
RN.5 - Santa Cruz	-	210	41	-	-	36	368	62
1995								
Total of the State	680	358	233	7	26	120	807	240
RN.1 - Natal	600	41	13	-	-	12	203	11
RN.2 - Mossoró	-	25	2	3	21	47	60	125
RN.3 - Angicos	200	25	167	3	-	5	65	7
RN.4 - Caicó	-	-	5	1	5	14	15	23
RN.5 - Santa Cruz	-	255	46	-	-	42	463	74
2005								
Total of the State	850	390	259	8	23	135	997	280
RN.1 - Natal	713	45	14	-	-	14	256	13
RN.2 - Mossoró	-	38	2	3	22	54	73	145
RN.3 - Angicos	237	23	185	3	-	5	73	8
RN.4 - Caicó	-	-	5	2	5	15	18	27
RN.5 - Santa Cruz	-	279	51	-	-	47	567	85

1 Only principal cultures are considered.

4.0 MARITIME TRANSPORT

4.0 MARITIME TRANSPORT

4.1 TECHNICAL-OPERATIONAL CHARACTERISTICS OF THE PORT SYSTEM IN NORTHEAST

4.1.1 RECIFE HARBOR

Support System to Shipping Liner

Availability of Space to Handling and Foundations.

Access Canal

The access canal of Recife Harbor has an width of 580 m, in South of Banco Inglês, of which the ax is 340 meter from the pier of Recife Light.

Secure deepness of the South Canal is of 9.15 m (30 feet).

Basin of Development

The basin of Development can not be used without practice due to its small area. Deepness is around 9.50 meter (31 feet) and the width changes from 160 up to 475 meter.

"The allowance" is the local destined to basin of development.

Dredging

The following board shows data about drainage of Recife Harbor to the 1966/1972 period.

Year	Dregded Volume	Dredged Material	Dredged Part	Obtained or Kept Deepness	Place for Spilling
1966	646,752	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line
1967	1,327,077	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line
1968	1,155,715	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line
1969	944,830	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line
1970	881,956	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line
1971	748,488	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line
1972	517,639	mud and sand	Basin	from 8 up to 10 M	6.5 km from the exit of coast line

Sources: DNPVN

Towing

There are three towboats: one with 1,200 HP which belongs to Administration of Recife Harbor and the two others belong to private harbors.

Port Sets up to supply vessels.

Quay

Total extension of the dockable quay of Recife Harbor is of 3,060 meter. The quay is composed by three parts:

1st Part — New quay with a deepness of 10 m. and an extension of 470 m.

2nd Part — Quay with a deepness of 10 m. and a total extension of 950 m.

3rd Part — Quay with a deepness of 8 m. and a total extension of 1,640 m.

In the 1st part, 340 m. are useful but the remaining part (130 m) composes the pier width of a new quay which does not allow vessels docking due to present conditions.

The 2nd part is divided in two conections of 600 m and 350 m.; and an angle of 150 degrees formed between them.

The 3rd part is divided in three parts: the first one in Santa Rita, which is separated from the others by the principal mouth of Capibaribe River with a quay of 300 m.; the second part has 470 m. and the third part has 870 m. The conection of these two parts form a small deflection near to Rio Branco Square.

Docks

Internal dock: eventually, vessels under dispute or under

repair of larger meaning may be fastened to reefs. But a deepness of 9 m. is required.

External dock: anchorage to vessels of large and small capacity, with a deepness larger than 10 m.

Maximum size of vessel which can moor in the harbor, in high water sea level, is equivalent to a draft of 9.45 m. (31 feet), with a length of 220 m. and maximum mouth of 35 m.

Specialized Terminals

CAGEP (Companhia de Armazéns Gerais de Pernambuco)

In the first part of the quay there is a sugar terminal to storage and shipment of sugar and molasse and which occupies an area of 42,000 m^2 of which 24,000 m^2 is covered. It is in front of 1-A Store which is a specialized terminal to cereal and bulk (mainly wheat), with a sucker system and conveyer belt of CAGEP (Companhia de Armazéns Gerais de Pernambuco) and a terminal to alcohol with a tube-way to shipment.

The Sugar Terminal is destined to sugar and molasse shipment, being both in bulk.

1. Sugar Sets up are composed of:
   - Receiving place - where a weighing group composed of three balance, two grain hopper, one railroad and other highway is set up. The receiving place receives sugar in bulk by railroad or highway.

- Laboratory

- Administrative Office

- Two storehouses of stockpiling with a capacity of 100,000 t each one

- Weighing Tower of sugar in bulk with two balances, allowing a continuous and regular feed of the feeding transporter of vessels loading.

- Loading Quay of sugar in bulk is composed of movable system to vessels shipment.

Specifications of Sugar Terminal

- Nominal capacity of unloading in each grain hopper of 250 t/h, and it is possible to obtain 500 t/h with operational simultaneousness of both grain hopper with wagons and/or trucks.

- Retaking of sugar in stock through a rotative spade: 500 t/h nominal capacity.

- Capacity of vessels loader: 1,000 t/h nominal capacity.

2. Molasse Terminal is composed of:

- Receiving Place - Molasse is unloaded by vehicles through a gravity system in a tank from where it is pumped to two stockpiling reservatories through two pumps with a nominal outflux of 50 m^3/h, each one.

- Reservatory of Storage - it has two tanks with capacity of 5,000 m^3 each one.

- Shipment - loading of vessels is made through three suction pumps. Nominal speed of loading is of 120 m^3/h, and each pump has an outflux of 60 m^3/h. Molasse Terminal may operate during 24 hours.

Port Sets up to the Supply of Railroad and Highway Transports

Highway Access to the Harbor

The largest part of Recife Harbor is located in an island with the same name and which is connected to other places through four bridges which supply the highway access to port sets up; but one of them has also a railroad access.

Vehicles proceeding from BR-101 (all paved) and BR-232 (paved to Salgueiro) pass by Engenheiro Abadias Street, Remédios Road and South Avenue and everything is mixed with the urban traffic.

Vehicles proceeding from South come to the port area through 12 de Setembro Bridge.

Vehicles proceeding from BR-101 (North) come through Limoeiro Bridge.

There is not an express way towards the harbor.

Railroad Access to the Harbor

Recife Harbor is supplied by the railroad system of RFF S.A. The railroad traffic is mixed with the urban traffic,- including trains which go to IAA terminal and which bring sugar from the hinterland and trains which take liquid fuel to the interior.

The entrance of railroad lines to the part of the quay is between the storehouses 9 and 10 (internal yard), storehouse 14 and stotehouse 2, there is also an entrance to South part of the harbor in the storehouse 15.

Internal Railroad Network

In the platform of the second part of the quay has two railroad lines with a gauge of 1 m, and with their centers located in a 3,00 m and 6,25 m from the parameter of the quay. In the third part of the quay there are two railroad lines of metric gauge. In front of the storehouses 14 and 15 there are three railroad lines adding 12,200 m. Seven engines and 73 wagons, being one closed, are available.

Internal Highway Network

The principal Street of Recife Harbor is parallel to the quay. It is Alfredo Lisboa Avenue which has an width of 28.0 m and which is paved with parallelepipeds and it is behind of the storeshouses of the 1st rank.

Militar Avenue is perpendicular to the quay and it connects Limoeiro Bridge to the park of inflammables.

In the internal area there is Dr. Ascânio Peixoto Avenue, which crosses longitudinally the inflammables park and it was recently paved with parallelepipeds.

Availability to Load and Unload of Waggons and Trucks

There are 37 derricks with capacity of 1.5-20 t, 45 internal rolling bridges in the storehouses and 81 stockpiling machines with capacity of 2 up to 7 t; but the smallest machine prevail.

Storehouses - Port Availabilities to Load Moving

In the 1st part of the quay there is only one internal storehouse with an area of 1,790 m^2 to the use of vessels to long distances.

The following boards show the internal and external storehouses which are located in the second part.

QUAY OF 10 m - INTERNAL STOREHOUSES

Storehouse Nº	Length	Width (M)	Area (M^2)	Useful Height (M)	Use
1-A	101.50	19.50	1,980	8.00	Inflammable
2	101.00	19.50	1,970	8.00	Long distance
3	150.60	19.55	2,950	5.60	Long distance
4	24.40	19.55	480	8.00	Luggage (Passenge
5	144.00	19.55	2,820	5.60	Long Distance
6	120.50	19.55	2,360	5.60	Long distance

QUAY OF 8 m - EXTERNAL STOREHOUSES

Storehouse	Length (m)	Width (m)	Area (m^2)	Useful Height (m)	Use
16	150.20	24.30	3,650	8.00	General Storehouse
17	185.20	38.70	7,170	8.00	General Storehouse
18	150.00	40.00	6,000	8.00	COBEC

Courtyards

There are five covered courtyards and each one has an area of 490 m^2; seven discovered courtyards which have a total area of 15,495 m^2 and a courtyard to deposit of heavy materials with an area of 14,430 m^2.

Silos

There are silos of Recife Mill with a static capacity of 28,535 t and with a fixed sucker with nominal receiving capacity of 100 t/h, and silos of Cia. de Armazéns Gerais do Estado de Pernambuco (CAGEP) with a Static capacity of 10,000 and a movable sucker with nominal capacity of 100 t/h.

Tanks

The following board shows the existing tanks in Recife Harbor

Proprietor	Nº of Tanks	Capacity (L)	Products
Texaco	6	15,509,000	Petroleum Products
Shell	17	33,758,619	Petroleum Products
Esso	15	56,851,057	Petroleum Products
Petrobras	11	22,727,000	Petroleum Products
Atlantic	6	8,576,922	Petroleum Products
I.A.A.	3	2,999,764	Alcohol
Sambra	1	-	Castorbean Oil
Brasilgás	24	2,792,000	G.L.P.
Icoasa	3	-	Castorbean Oil
Tiuma Plant	1	1,500,000	Alcohol
Pibigás	24	1,170,000	G.L.P.

4.1.2 OTHER HARBORS OF NORTHEASTERN NORTHEAST

Maceió Harbor

Support System to Shipping Lines - Place to Handling and Foundation.

Maceió Harbor has a basin of Development with the following dimensions:

- Width - 360 m
- Length - 475 m

Anchorage is signalized in DHN's letter nº 901, though Port Authority has already proposed its transference to other place, i.e., to West.

Piloting and Ship Tugging

Maceió Harbor has a piloting service which is performed by two pilots. There is a necessity of tugboat to benefit the handlings.

Access and Dredging Operation

Two dredging operations were accomplished in order to benefit the access canal which, presently, has an width of 80 m near to the flashlight, and it has being increased up to 210 m. near to IAA quay. Dredged cube in the canal is 220,000 m^3. The basin of development has an high of 10 m in all its extension, though with some high areas (-9.0 m), one is standing out in the beginning of IAA quay and other in the end of trade quay where the Hope vessel was tied up.

Port Sets up to Supply Vessels

Quays and Anchorages

Trade quay (DNPVN) has an extension of 500 m. and it is destined to future sugar terminal (IAA) which has an extension of 250 m.

An water-front warehouse with an extension of 120 m. and an width of 9 m. was built to the Hope vessel. But presently, it is not more useful.

Flatboats and Lighters

Maceió Harbor does not have these shipping.

Specialized Terminals

1. Molasse

Owner of Sugar Mill Cooperative of the State of Alagoas has set up two cylindrical and metallic tanks with a capacity of 7,000 t. each one. The transference to shipment in vessels is made through a group of pumps (total capacity of 300 t/hour).

2. Gross Petroleum

Petroleum shipment has a lankage of 20,000 barrels in view of the hourly outflux of 740 barrels proceeding from tanks located in the harbor.

Petrobras is increasing its storage sets up with new tanks which are being built in the filled and levelled ground of the quay. Tubulation diameter is of 6 inches.

3. Refined Petroleum

It belongs to the Administration of Maceió Harbor, which was rented to Atlantic and there are tanks to:

- Gasoline 5,565 t
- Diesel Oil 3,595 t
- Kerosene 1,584 t

The capacity of medium unloading is of 1,500 barrels through a tubulation of 8 m.

4. Wheat

Northeast mill has set up a sucker (Niag kind) to 50 t/per hour. But it has not been working since 1971.

Port Sets up, Supply of Highway and Railroad Transport

Highway Access

Municipal Government of Maceió has underway the study of access to Maceió Harbor through an express way (BR-101, AL-101 and AL-419).

Railroad Access

RFF S/A. has built a railroad deviation which leaves from the railroad branch line which has supplied the old quay of metallic stake (this railroad deviation is not functioning and the motives are not known), in order to connect the internal port system to RFF S/A (3rd region).

There is only railroad traffic to the storehouses of Jaraguá.

Internal Highway and Railroad Network

Highway network is presenting a reasonable traffic condition, except the internal line of access to the quay which shows the lines in a precarious condition of maintenance. There is a purpose to do an avenue parallel to the line mentioned above.

Railroad network is not being rightly used due to the precarious condition of the railroad lines.

Port Availabilities to Load Moving

Port equipment is limited. Board instruments (winch or derrick) are the only ones which are used to load moving of/to trucks. (It is good to remind that there is not railroad traffic).

A.A.P.N. has an Orton derrick in a precarious condition, a stockpiling machine to 8 t. and a truck with an winch. The Derricks (5) proceeding from Germany are waiting the set up of an electric network.

There are large port parts (which are well paved of blokrets near the quay (IAA and trade). The internal lane of access is in a very bad condition.

Existing Projects

a. Under Development

D.N.P.V.N. supports the Master Plan of Maceió Harbor and IAA has already started the arrangements to the construction of a sugar terminal of which dimensions are similar to Recife terminal and with shipment availabilities of sugar in bulk in 1,000 t/h and 240 t/h. in quantity of sacks.

b. Under Execution

Aiming a larger supply of electric power to the harbor

(mainly with the set up of 5 portico derricks), a set up of electric network of high tension (6,900 V) is being set up to the trade quay where it will be decreased down to 380 V in view of the electric power which was taken to derricks and vessels.

Cabedelo Harbor

Support System to Shipping Lines

Signaling

In the Airport: In view of the inexistence of radio broadcasting and radio beam, the signaling is precarious to cloudy days and to storm. There are three lights: Ponta de Seixas, Pedra Seca and Ponta do Molhe.

In the coast line: one light buoy and one red blind buoy.
In the access canal: 3 light buoys and 1 land-mark in its head.
In the Basin of Development: Canalaũ flashlight.

Availability of Space to Handling and Foundation

In the coast line: according to piloting, the width of the natural pass is of 200 m. The material of the deepest part is composed by sand and dense sandstone near to Pedra Nova Bank, forming a natural obstacle to shipping lines, but it is signalized. The deepness of coast line is of 10 m.

In the Access Canal: the Access Canal of Cabedelo Harbor

has an extension of 6.3 km, a maximum width of 300 m and a minimum deepness of 4.90 m (16 feet). This canal presents a large problem in the curves of Alçada buoy (buoy 4) and in the bank which compresses the canal in these parts, leaving it with an width of 70 m. The material of the deepest part in this place is composed by sandstone. In high water sea level, the canal allows a traffic with a deepness of 8 m; but dredging operation is necessary to reach 10 m.

In the Basin of Development: Basin of Development of Cabedelo Harbor has an extension of 100 m, an width of 300 m and a minimum deepness of 4.90 m (16 feet). The material of the deepest part is composed by sand and it has a retaining capaci

Ship Tugging

There are not tugboats and, according to piloting, there is a necessity of its use. The harbor is supplied, in relation to piloting, by the harbor pilots of Harbor Pilot Association of Cabedelo Harbor.

Access and Dredging

The Access Canal is precarious and in its entrance the deepness is of 5.90 m.

Port Set up to Supply Vessels

Quay

Dockable Quay of Cabedelo Harbor has 602 m and a deepness of 7 up to 10 m.

The material has a slight structure with 402 m. in LARSEN metallic stakes, doubly anchored, and 200 m. in concrete stake. The highest point is in a high of + 4.00 m.

There are 14 mooring ropes, including the region of 420 m which is under construction.

Anchorages

There are 4 anchorages:

- Near to Pedra Seca Light (around 1,600 m to NE)
- Near to Ponta de Santo Antônio (around 100 n to S)
- In front of Santa Catarina Fort (700 m to Northwest)
- In front of the South part of the quay with a draft of 16 feet. (350 m to S.)

All anchorages have good retaining capacity, however anchorages of the coast must have some care due to the existing reefs.

Specialized Terminals

There are only intakes to receive petroleum products and which are located in the quay.

Port Sets up to the Supply of Railroad and Highway Transport

Highway Access

Cabedelo City has an access through the following Federal roads:

- BR-230 - paved road in the first part and flexible paving in the second part; there is a platform of 14 m and a traffic lane of 7.20 m; maximum speed of 80 km and there are not precarious bridges, tunnels and traffic problems in the rainy period. It connects Cabedelo to João Pessoa and to Santa Rita City.

- BR-101 - Coast road with flexible paving and it is considered of first rank. It connects Porto Alegre to Natal.

- BR-104 - is being paved. It connects Campina Grande to Pernambuco.

- BR-110 - is not paved

- BR-412 - paved from Farinha to Boa Vista.

- BR-227 - is being paved.

Highway network which supplies the harbor is composed by seven roads. PB-55, PB-79 and PB-105 roads with a flexible paving are the most important because they pass through the centers of cattle raising and farming production of the State (swamp region). PB-107, PB-306 and PB-325 are not paved but they allow a continuous traffic. PB-266 road is the continuation of PB-306 road and it is important because drains off the mineral productions of the State.

Municipal highway network is composed of not paved roads. The access to Cabedelo Harbor is formed by streets which are not paved or paved with parallelepipeds.

Railroad Connection

Cabedelo Harbor is supplied by Rede Ferroviaria S/A (Federal Railroad Network). The railroad yard of RFFSA is 500 m. from the access of the harbor and it is done through two large gates which are located in the yard of the port area.

Railroad Network and Internal Highway Network

The harbor has 4 highway entrances. There is an engine with a capacity of 100 HP, 2,500 m of railroad lanes and 7 open waggons with a capacity of 20 t. each one.

Availability to Load and Unload Waggons and Trucks

There are 4 rolling bridges, 34 stockpiling machines with capacity of 2-4 t and 12 derricks.

PortAvailabilities to Load Moving

Storage

Cabedelo Harbor has 4 internal storehouses of first rank with a dimension of 100 x 20 m. Load capacity of these storehouses is of 3 tons per square meter. A-1,A-3 and A-7 storehouses have a structure of reinforced concrete and A-5 has a metallic structure and has a rolling bridge to 2 tons.

A-2, A-4 and A-6 storehouses are of second rank. They also have the same dimension (100 X 20 m) and a load capacity of 3 t per square meter.

Storehouses structures (of second rank) are of reinforced concrete and its paving is of irregular concrete. There is a platform near to ESSO terminal but there is no ramp to the access of stockpiling machines.

Internal Yards

There are two internal yards: one between A-3 and A-5 storehouses, with dimensions of 30.50 x 20 m, it is paved and is covered with a roofing tile of cement, and the other is between A-7 and A-5 storehouses with dimensions of 31.55 x 20.00 m.

Existing Projects

Under Execution

A set up of a new screen of reinforced concrete stakes is being accomplished. They are enlarging the quay area to more than 5 m. and which will allow future dredging operations to 10 m. There is also a set up of new derricks with an increase of load capacity to 5 t. per square meter.

Future anchorages will be moved 25 m. and will be measured to a traction of 100 t.

There will be small iron hoops to a traction of 20 t. and cylindrical cushions in a total of 1,200 m.

The final project foresees in the area (402 m.) of the new quay, 3 railroad to waggons (gauge of 1 m) and a line to derricks in a gauge of 10 m. Total extension of new lines will be of 1,250 m.

Natal Harbor

Location

Natal Harbor is located near to the capital of the State of Rio Grande do Norte, in the right edge of Potengi River. It has as geographic coordinate 05°46'41" of South altitude an 35°12'04" of West longitude. It is 270 miles of Mucuripe Harbor and 150 miles of Recife Harbor.

Access

The access to Natal Harbor is made through the coast of Poteng River between South reef and Baixinha reef and through a canal which is yielded to variations and strong current; it has an width of 100 m and a draft of 6.0 m. Basin of Developme has an width of 300 m in front of the quay. In 1971, large submarine flagging was moved, therefore, the access through this canal was limited.

Quay

Natal Harbor has a dockable quay of 400 m and the project deepness changes from 5.3 m up to 8.3 m, its structure is supported by tubes and high tide prevention rockfill in the internal part of the quay.

In extreme North of dockable quay, inflammable terminals are set up with heads to moor and allowing to operate vessels with a length of 160 m and a draft of 6 m.

Storehouses and Port Facilities

Natal Harbor has 3 storehouses or a port area with a total area of 4.820 m^2, besides 1 freezer with capacity of 140 t., 1 silo to wheat with capacity of 4.800 t and 7 fuel tanks with 18,283 m^3.

The harbor has 9 derricks, 15 stockpiling machines, 1 engine, 1 portable sucker to unload wheat, which belongs to mill, and 1 small derrick with an elevation capacity of 5 t.

Harbor Moving

It is a harbor with small moving (since 1955 till 1970) and it has been maintaining a stable moving, since then in this period, the year with the smallest moving (124,798 t.) was 1964, while 1960 has moved 170,865 t., what had represented a variation between the extremes (46,067 t.).

On the other hand, based on the moving of 1970, we may observe that it is an importer harbor with 78% of import. Petroleum products take part with 44% and wheat represents 14.5% of total port moving.

General load corresponds to 34.5% but 19.5% is to import. Coast shipping shows the largest importance with 71.4% of the total, against 28.6% of long distance.

The principal goods of its export list are: cotton, sugar, salt, oily seeds, corn and carnauba wax.

Availability of Development

Precarious port sets up, in relation to their location in the region, do not show any product wich requires maritime transport and what takes us to consider that it is an harbor without good trends of development.

Saltworks Terminals of Rio Grande do Norte

Termisa Harbor (Saltworks Terminal of Rio Grande do Norte S.A.)is an artificial island which was built at Brazil's coast, near to the coast of Areia Branca in the State of Rio Grande do Norte and it was inaugurated in February of 1974. It is a terminal to receive salt produced in the region; it may stock up to 100 thousand tons and transfer the product to vessels which transport it to harbors of South of Brazil and to foreign States.

Location

The island is located 14 nautical miles, Northeast of Areia Branca and 28 miles toward West of Macau or, approximately 7.6 miles or 14 km of Brazil's coast, in a straight line, and in water with a deepness of more or less 7 m. It is 450 m from a natural channel with a deepness of 15 m.

Island Characteristics

Among the terminal components, the largest part which is destined to storage of Salt in bulk is really considered as artificial island, adequating river shipping flux (mini-grain carrier ship) and maritime transport.

The direction of the largest dimension of the island is to Northwest and vessels mooring is done in West region due to other regions do not allow a safe mooring, reason why North, South and East region are protected by an adequate breakwater structure of reinforced concrete.

Terminal Functioning

All terminal comprehends an artificial island, service area, quay of vessels mooring, unloader of vessels conveyor belt transporters, loader of vessels, system of vessels mooring, several structures and fleet of self-propelled shippings.

Terminal functioning obeys the following system: mechanized loading of self-propelled shippings in loading

stations of saltworks (300 tons per hour); mechanized unloading of shippings in the artificial island by the use of two pórtico derricks as roller bridge (700 tons per hour); forming of a salt heap in the artificial island by the use of a lance with a conveyor belt as an integral part of the unloader derricks or of the proper clam-sheel with the help of two tractors D-6; recovery of salt heap by the use of a group of two mechanic spade (Caterpillar - 988), movable hopper and conveyor belt or of the proper clam-sheel of unloader derricks and a loader conveyor belt of 42 inches salt transference to vessels board (1,500 tons per hour), by the use of an approach conveyor belt of 36 inches or432 m and a loader of vessels.

Capacity of Operation

The system has a loading capacity of 1,500 tons per hour, what means that a grain carrier ship of 6,800 tons, for example, is loaded in a work period of 9 days, i.e., if we are based on recent methods.

The loader of vessels is rotary and has a capacity to load vessels up to 2.500 t of gross capacity, without moving the vessel. Larger vessels can be loaded changing the position in order to place the holds under the loader of vessels.

Availability of Development

Termisa.(Saltworks Terminals of Rio Grande do Norte) is a company of mixed economy which is associated to Departamento Nacional de Portos e Vias Navegáveis - DNPVN (National Department of Harbors and Navegable Shipping Lines).

Although the terminal purpose is salt transference, in its project the use of it was admited to load vessels with other products in bulk to transport to other harbors in South of Brazil and to foreign States.

There is already a plan to increase the artificial island; its execution is foreseen to the beginning of 1975.

Other Anchorages

In Northeastern Northeast there are other anchorages as Areia Branca and Macau in the State of Rio Grande do Norte and Penedo in the State of Alagoas.

Areia Branca

Areia Branca Harbor is located in the right edge and near to mouth of Mossoró River, in the State of Rio Grande do Norte, and it is near to the frontier of Ceará (04°57'19" S, 37°08'16" W).

It is mainly a salt anchorage. Vessels have transported the product to vessels anchored along side the river, but now they transport to Ternisa Terminal.

The mouth of Mossoró River is obstructed by snad banks and there is only one narrow channel with a deepness of 3 m.

Areia Branca, a large salt producer, is connected by a railroad and highway from Mossoró to Natal.

Macau

Macau Harbor is located in the mouth of Açu River, in the coast of Rio Grande do Norte (05°06'54" S, 36°38'20" W).

Macau is the second salt producer of Northeast and has as principal purpose salt export which is recently transfered by vessels to Termisa Terminal.

The access to the harbor is done through the north border which allows moving of vessels with a draft of 3 m. Vessels may anchor along the coast of the river and near to the wait buoy; loading by flatboats is performerd, 5 miles NNW from Macau Light. Smaller vessels may anchor 3 miles NNW from Macau Light in a deepness of 6 m.

Penedo

It is the principal harbor of the low coast of São Francisco River, in the State of Alagoas (10°17'24" S, 36°35'06"). It receives only vessels of internal shipping. São Francisco Basin, though with an width of 1 mile is surrounded by a sand bank which forms a narrow and low channel which allows only vessels with a draft of 3.5 m and it is lashed by strong south winds which increase the tide. For this reason that is difficult to do its demand through vessels of small capacit

There is a small quay though there is not equipaments to load moving.

4.1.3 HARBORS OF NORTHWESTERN NORTHEAST

The principal harbor of Northwestern Northeast is Mucuripe in the State of Ceará. Itaqui harbor, in the State of Maranhão, is being accomplished and there are also in the region São Luís, Tartoia and Igoronhon harbors, which are all in the State of Maranhão, and Luís Correia and Parnaíba harbors in the State of Piauí; and Chaval, Camocim, Acaraí and Aracati harbors in the State of Ceará.

Mucuripe Harbor

Location

Mucuripe Harbor is located at Mucuripe bay near to Fortaleza city. It has geographic coordenates of 03°41'28" of South latitude and 38°33'24" of west longitude. It is 420 miles from Recife harbor and 270 miles of Natal harbor.

Access

Some times Mucuripe harbor offers some difficulty to moor because it is lashed by NE, SE and E Winds, the latter with great intensity. Considering only the currents and tides, the bay does not show any access problems to the vessels. There are current indexes and protection piers.

Quay

Mucuripe harbor has a quay of 1,116 m, and which is corposed by tubes, concrete flagging and high tide prevention rockfill

in the internal part. The deepness is of 8 m in an extension of 956 m and 10 m in an extension of 160 m, but the basin of development suffers silting up and the real deepness is much smaller.

Storehouses and Port Facilities

There are 4 storehouses with 6,000 m^2 of built area each one and there are several uncovered yards to the stockpiling of wood and other products.

There are 9 yards derricks under tires, 2 conveyor belts, 17 stockpiling machines, 11 trucks, 3 tractors, 11 carts, 1 towboat, 1 motor boat, 1 engine (there are no waggons, RFFSA's waggons are used) and several cars and other facilities.

Although there are not silos to wheat, there are two mills at the port area which have silos: Fortaleza Mill with a static capacity of 12,000 t and Cearense Mill with a static capacity of 8,000 t. There are not also freezer storehouses, but in the neighborhood there are ice works and freezers which are mainly used by lobster fishers.

There are also an inflammable park with tanks which have a stockpiling capacity of 16,850 m^3 of petroleum products.

Harbor Moving

Since 1964, Port moving of Mucuripe has suffered an increase, i.e., it has doubled its moving in relation to

1963, (563,721 t against 280,390 t.); since then it has been increasing, although in 1969 it has su-fered a decrease in relation to the previous year. But in 1970 it has increased again and has reached 949,469 t. of moved load.

The principal exportable products by Mucuripe are: cotton, salt, vegetal oils, oil seeds, leather and castor bean. In the import, the principal products are: wheat, petroleum and its products, sugar and cement.

Expansion

There is a project to build a terminal to liquid bulk.

São Luís Harbor

It is located in the board of Bacanga River, at São Luís Island, in the State of Maranhão (02°31'00" S, 44°18'08" W). It is 390 miles from Mucuripe Harbor and 350 miles of Belém Harbor.

The access canal has a deepness of 5 to 6 m up to the distance of 300 m from the city. The coast is obstructed by Minerva Bank, which always requires dredging operation to assure the access to vessels. Mooring is only possible in high water sea level. Maritime border is uncovered in low water sea level, leaving the vessels moored in the muddy part

Port region has a quay of 180 m.

Vessels of draft above 4.8 m stay along the coast in a

deepness which changes between 7 an 4.3 m in low water sea level. Flatboats and other smaller vessels are used to load transference.

In the area of the harbor there are several storehouses and private water-front warehouses.

Itaqui Harbor

It is under construction by DNPVN, and it is located in the west region of São Luís island, at São Marcos bay (02°35'00" S 44°22'00" W) it is 8 miles from the coast of São Luís Harbor.

The access canal has an width of 900 m and a deepness to 20 m.

It has being used since 1963 by distributor companies of petroleum and its products which, in provisory sets up, has unloaded vessels of 16,000 tdw, and pumping its products. Sinc 1961, wheat has being unloaded to Moinho Maranhão Industrial S.A., and of which silo (with 14 cells) has a capacity of 12,000 m^3, near to the support brick. Unloading is done by lighters and from these ones by pneumatic suckers.

In 1971, DNPVN has accomplished 120 m of dockable quay, which is released while the first stage of a part with 440 m is bei accomplished.

Vale do Rio Doce Company is developing, in Itaqui, a construction of an export terminal of iron ore which proceeds from Carajás Mountain, in the State of Pará.

Tutoia and Igoronhon Harbors

Tutoia and Igoronhon harbors are located in the coast of Maranhão (02°41'00" S, 42°41'00" O) and they do not have storehouses or quays. Their sets up are rudimental and they aim salt activity.

In Tutoia Harbor, the access canal has an width of 100 m and a deepness of 3 m in low water seal level and 7 m in high water sea level. When vessels pass the coast, they moor in three anchorages (Cajueiro, Coroate and Igoronhon) which have a deepness of 7 up to 13 m. Near to Igoronhon Harbor the medium draft is of 5.4 m, allowing the mooring of vessels up to 6,000 TDW.

Luiz Correia Harbor

It is located in the coast line of Piauí, in the mouth of Parnaíba River (02°52'00" S, 41°39'00" W). It is 15 km of Parnaíba city and 212 nautic miles from Fortaleza. There is only one masonry storehouse and an wood water-front warehouse. Its access canal an width of 120 m and a deepness of 1 up to 3.6 m) is very much open. The vessels moor along the coast.

The construction of a rockfill pier to assure conditions of shelter and a construction of one anchorage in its extremity were already started.

Parnaíba Harbor

It is a terminal point of river shipping of Parnaíba River, in the State of Piauí, and it is accessible only to small

vessels (3 up to 5 t). This harbor is located in the right edge of Iguaraçu River, one of the branches of Parnaíba River, around 10 miles from the River's mouth.

Due to the small deepness and the existence of sand banks which obstruct the coast, it does not offer great interest to trade shipping lines.

Chaval Harbor

It is located in the frontier of the State of Piauí with Ceará (03°02' S, 41°16' W), in the east edge of Ubatuba River, and 9 miles from the coast.

Its access is done through the coasts of Ubatuba and Timonha Rivers. It allows the entrance, in a precarious way, of vessels up to 4,000 TDW.

Its moving is limited to salt which is directly loaded from the lighters which collect it in the saltworks of the region.

Camocim Harbor

Camocim anchorage (2°52'31' S, 40° 52' 07" W) has only one part of quay which was constructed by DNPVN, and which has a length of 90 m and two water-front warehouses. Its access is done through the mouth of Coreaú River and through a natural channel which always changes its deepness and direction. It allows, with great difficulty, the entrance of vessels with a draft up to 4.0 m in high water sea level. It exports salt,

leather, cotton, oiticica oil and carnaúba wax. It is 156 miles from Mucuripe harbor and has one storehouse of general load with an area of 1,050 m^2.

Acaraú Harbor

The small Acaraú Harbor is located between Camocim and Mucuripe Harbors and there are only small vessels and generally sailing vessels. The coast has only a deepness of 2.4 m in high water sea level of spring tide. It loads salt, manioc gum, fish, carnaúba wax and cotton.

Aracati Harbor

There is an harbor at Aracti city, in the State of Ceará, whic is 9 miles from de coast and which is located in the mouth of Jaguaribe River (04933'39" S, 37946'12" W). Normally, the access is only to Fortinho, i.e., 3 miles from the river's mouth. In the spring tides, the canal of the coast gives an access to vessels with a draft up to 3 m. But during the flood period we can reach Aracati city. The loads are transported to vessels by the lighters. The harbor has not any substructure work. The moving is represented almost totall by salt export.

4.1.4 HARBORS OF SOUTHERN NORTHEAST

There are in this region, which comprehends the States of Bahia and Sergipe, the harbors of Baía de Todos os Santos, including Salvador, Aratu, São Roque harbors, Usiba Terminal, Magnesita - Temag Terminal, Petrobrás - Temadre Terminal, Ilhéus, Malhado and Campinho harbors, (also in the State of Bahia), and Aracajú harbor in Sergipe.

Baía de Todos os Santos

Baía de Todos os Santos has around 25 miles in its largest dimension. Its coast, between Ponta de Santo Antonio and East coast of Itaparica Island, has approximately an width of 5 miles. The bay protects Salvador harbor and several specialized terminals.

Te Salvador harbor maritime access is the same of other anchorages of Baía de Todos os Santos.

Salvador Harbor

It is located in the east part of Baía de Todos os Santos and it is 3 miles from Ponta de Santo Antonio in the coordenates of 13°00'37" S and 38°35'00" W.

It is protected from agitations of its water plan by a breakwater of 926 m which comes from the continent toward Northwest with a small curve. Parallelly to the mooring quay there is other breakwater with 1,100 m.

The access to the harbor is done from the coast to the point where vessels receive the harbor pilot. From there, vessels may use the entrances which are located near to the north or south part of the second breakwater, which is so called north breakwater. In the north part, a natural deepness of 10 m is found to the new quay of Água dos Meninos region. In the south part there is a canal with a deepness of 10 m and an width of 185 m from the entrance between the two breakwaters to the quay.

There is a dockable quay of 2,210 m, of which a part of 130 m has a depness of only 2 m, and the other part (1,100 m) has a deepness of 8 m and the remaining part (around 1,000 m) has a deepness of 10 m. Port area is very much decreased, having only an width of 36 m. There is not a possibility of increase because it is enclosed by the urban area.

There are 10 storehouses with an usefull area of 20,930 m^2 and a passengers station.

The available equipments are: 52 derricks, 20 rolling bridges, 14 stockpiling machines, 2 wheat unloaders, 2 tugboats, 1 tripod hoist, 2 engines and 9 waggons of metric gauge.

It shows large limitations to the operation of medium vessels, besides the deficiencies which are presented by a port decreased area.

It is really a harbor of general load where this kind of load represents 65% of total moving against 22% of solid bulks and only 13% of liquid bulks. Its meaning will decrease with the set up of a specialized terminals in the Industrial Center of Aratu. Wheat represents 19.4% of import moving and there is not other important product.

Usiba Terminal

Usiba Terminal (Usina Siderúrgica da Bahia S/A) is located in the north direction of Salvador and near to Ponta de Sapoca. It is destined to ores moving to that iron and steel industry which is being set up in the Industrial Centrer of Aratu.

Its access is done through a natural channel with a large draft and width. It has an extension of 13 miles since the coast. The draft near to the harbor is of 11.5 m. It was recently accomplished and it is composed by an anchorage, an access bridge and a stockpiling courtyard of ore.

Aratu Harbor

To supply the Industrial Center of Aratu, an harbor is being constructed in the channel between Mare Island and the Continent, above Usiba Terminal. It is located between Marinho and João Pereira harbor.

Its natural channel allows a shipping of vessels with a draft up to 18 m, except in the part near the coast where, without dredging, a deepness of 10 m is found. To its first stage, the use of vessels up to 25,000 TDW is foreseen. In the future, vessels up to 100,000 TDW and with a draft up to 17 m will be used.

It is composed by a terminal of solid bulks and which is connected to land by an access bridge of concrete where the conveyor belt remains; it has a pier with a deepness of 200 m and an width of 30 m. It allows truck traffic to general load.

Foreseen equipments are: loaders and unloaders which will be set up over the pier, and which will be supplied by the conveyor belts; loader and recuperator stockpiling machines and a car dumper to unload the waggons.

São Roque Harbor

It is located in the west part of the bay, behind Itaparica Island, and in the confluence of Paraguaçu and Baetantã Rivers. The brick of its quay has fallen and there is not any plan of repair because it was destined to load of manganese ore. An allowance to a private company (Magnesita S.A.) was given in order to construct and control a specialized terminal around 500 m from the harbor.

Magnesita Terminal - Temag

The project of Magnesita S.A. foresees an anchorage with 4 mooring buoys, a small pier with a conveyor belt and with a capacity of drain off up to 800,00 t/per year, allowing drafts up to 15 m.

The ore will be received by a underground grain hopper which will transport it to the pier through a several conveyor belts.

Petrobrás Terminal - Temadre

Almirante Alves Câmara Terminal of Petrobrás is located in the middle and north part of Baía de Todos os Santos, on Madre de Deus Island and in the north part of Frade Island.

Its access is done through a natural channel with a deepness above 12 m.

Vessels are tied in two heads which are located 80 m and 140 m from the extremities of the terminal, and which allow a better mooring.

It supplies vessels up to 65,000 TDW or with a draft of 12.80 m.

The terminal has 2 tugboats to help the mooring.

The terminal also moves liquid fuels.

Ilhéus/Malhado Port Group

Ilhéus and Malhado harbors compose a port group in which the latter has as purpose to substitute the first one, which had a precarious technical conditions, without possibilities to improve it, and a low deepness in the maritime access.

Ilhéus/Malhado group is located in the left edge of Cachoeira River, in Malhado Estuary, in the extreme end with the same name, and with the coordenates of 14°47'46' S and 40°57'10" W. It is 127 miles from Salvador, 348 miles from Vitória and 618 miles from Rio de Janeiro.

Maritime access to Ilheus harbor is done by a canal alongside of Cachoeira River, since its mouth, with an width of 75 m and a deepness of 4.5 m. In the entrance of the coast, deepness decreases down to 3.0 m. In front of the harbor, Basin of Development has an width of 150 m in the same high of the canal. In relation to Malhado quay, continuous dredgings of the project assure a deepness of 10 m to access and basin of development.

Ilhéus is an harbor of open sea and it is protected by a pier. It has a quay of 478 m and a deepness which changes 1.0 m to 3.5 m; therefore, without conditions to moor vessels. There are 5 bridges of orthogonal attachment to the quay where cargo boats of middle capacity may moor. Larger vessels are carried alongside the coast in view of the transport in the lighters.

Malhado Harbor has a modern conception, in open sea, without burden of maintenance dredgings. It is protected by a pier of 1,922 m and which forms an "L" of protection. The quay has 420 m of useful extension and a deepness of 10 m. It was built in a tray of reinforced concrete with a reinforcement to derricks lines or railroad. Complementary works of paving the quay area are under construction (pluvial water, potable water, eletric power and lighting).

Ilhéus harbor has 5 storehouses with an area of 7,000 square meters. In Malhado harbor four (4) storehouses with an area of 28,000 square meter will be built.

At the jurisdiction area of the harbor there are four (4) private terminals: Gonçalves Terminal (Tegon) of Petrobrás; Terminal of Pequina S.A.; Terminal of Hevea da Bahia S.A. and Terminal of Frigorífico Nordeste S.A.

The harbor does not have freezer sets up, therefore, it uses the freezers of Frigorífico do Nordeste S.A. The storage of liquid bulk is done in Tegon deposits. In the project of Malhado harbor, sets up to storage of solid bulk are foreseen.

The principal moving is cocoa export (106,000 t in 1971, in a total of 163,000 t).

Aracaju Harbor

It is located in the right edge of Sergipe River, in the north area of Aracaju city (10°56'00" S, 37°07'21" W). It is 171 miles from Maceió and 165 miles from Salvador.

Maritime access is done through Sergipe River, since its mouth, in an extension of 13 km, and it has a deepness of 8.0 m and an width of 400 m. Basin of development is large and has a deepness around 7 m. The entrance of the coast allows only draft of 3.8 up to 4.7 m. There is a sand bank which moves with the winds and sometimes changes the position of the canal and obstructs the entrance or exit of vessels for several days.

The harbor has a quay of 60 m and a deepness of 8.0 m. From a total of 200 m which was built, 140 m has colapsed. There are problems of stability in the remaining part.

There are not storehousers or equipments. There is an Esso Terminal in the neighborhood which has a storage capacity of 3,836 t, but it is more supplied by highway than by Maritime transport. There are two (2) private piers.

Local progress, which was stimulated with petroleum search, induces a cogitation of betterments in the harbor. The construction of a quay with 26 m is underway.

Atalaia Velha Terminal (Tecarmo)

Maritime Terminal of Atalaia Velha of Petrobrás (Tecarmo) is located in the jurisdiction area of Aracaju harbor. It supplies vessels up to 54.000 TDW or with a draft of 16.8 m. Tecarmo exports the petroleum which is drawn out in Carmópolis, and which contributes with 98% of the yearly moving of Aracaju harbor.

4.2 ANALYSIS OF THE LOAD WHICH IS MOVED IN NORTHEAST HARBORS

The harbors located in Northeastern Northeast move approximately one third of the total port load of Northeast. We may observe that petroleum products, moved by Madre de Deus Terminal in the State of Bahia, assume an import proportion in Northeast moving, what gives a larger importance to Northeastern Northeast. That terminal was excluded from the orientation in port context of the region.

In 1969/1973 period, Northeastern Northeast has occupied a good position and which is shown in the following board.

(1,000 t)

YEARS	Northeastern Northeast (A)	Total of Northeast (B)	B/A %
1969	3,361	14,013	24.0
1970	3,887	14,078	27.6
1971	3,633	14,258	25.5
1972	4,388	14,897	29.5
1973	4,906	16,182	30.3

In the group of Northeastern Northeast, Recife Harbor is the most important. We may observe this fact in the following board.

YEARS	NORTHEASTERN NORTHEAST			
	RECIFE	MACEIÓ	OTHERS (1)	TOTAL
1969	2286	654	421	3361
1970	2678	828	381	3887
1971	2429	792	412	3633
1972	2995	1020	373	4388
1973	3323	1047	536	4806

Source: DNPVN
(1) Natal and Cabedelo Harbors.

The following board shows the importance of Madre de Deus Terminal.

(in 1,000 t)

YEARS	SOUTHERN NORTHEAST				
	MADRE DE DEUS	SALVADOR	ARACAJU	ILHÉUS	TOTAL
1969	6975	659	1509	240	9383
1970	6417	552	1584	287	8840
1971	6696	671	1599	351	9317
1972	6477	760	1580	311	9128
1973	6082	1018	1534	308	9742

Source: DNPVN

Finally, the following board will show the moving of Northwestern Northeast.

(in 1,000 t)

YEARS	NORTHWESTERN NORTHEAST			
	SÃO LUIS/ ITAQUI	MUCURIPE	OTHERS (1)	TOTAL
1969	242	926	101	1269
1970	315	949	87	1351
1971	277	953	78	1308
1972	310	954	117	1381
1973	319	1121	94	1534

Source: DNPVN
(1) Tutóia, Luiz Correa, Parnaíba, Camocim and Aracati Harbors.

Petroleum Products and wheat occupy a pole position in the regional port activity. In relation to Southern Northeast they correspond more than 90% of the total load. In other areas, though they do not show the same levels, they also have a good position.

The following board shows the position of Northeastern Northeast.

(in 1,000 t)

YEAR	PETROLEUM PRODUCTS	WHEAT	SUB-TOTAL (A)	TOTAL (B)	A/B (%)
1969	1076	255	1331	3361	39.6
1970	1108	274	1382	3887	35.6
1971	1137	311	1448	3633	39.9
1972	1247	279	1526	4388	34.8
1973	1540	333	1873	4906	38.2

Source: DNPNV

The following board shows also the importance of the same loads in Northwestern Northeast.

(in 1,000 t)

YEAR	PETROLEUM PRODUCTS	WHEAT	SUB-TOTAL (A)	TOTAL (B)	A/B (%)
1969	407	128	535	1269	42.2
1970	590	156	746	1351	55.2
1971	648	185	833	1308	63.7
1972	685	157	842	1381	61.0
1973	874	198	1072	1534	69.9

Source: DNPVR

The presence of Petrobrás Terminal, in Madre de Deus, and which supplies Landulfo Alves Refinary and drains off the raw oil which is drew out in the region, allows the loads to reach the positions mentioned above or as the following board shows.

(in 1,000 t)

YEAR	SOUTHERN NORTHEAST				
	PETROLEUM PRODUCTS	WHEAT	SUB-TOTAL (A)	TOTAL (B)	A/B (%)
1969	8077	105	8182	9383	87.2
1970	8418	123	8541	8840	96.6
1971	8206	168	8374	9317	89.9
1972	8618	159	8777	9128	96.2
1973	8487	168	8655	9742	88.8

Source: DNVPN

According to Board 4.11, the moving of petroleum and its products is mainly done toward import by the majority of the harbors; except Southern Northeast where exports of petroleum products and raw oil prevail.

Besides harbors position in the supply of petroleum products and wheat, they also supply the draining services of regional products to international market. In relation to Salvador, port moving is determined by exports of sisal, tobacco, cocoa and iron alloy. In Mucuripe, cotton, vegetal oils, cakes and grains are drained off. In import, the fertilizers have been occuping an outstanding position.

In relation to Maceió and Recife, sugar is the most important load. In both harbors, in 1971, exports of sugar have increased more than 1,126.6 thousand t. which are equivalent to 25.2% of the total moving of the anchorages of Northeastern Northeast. The other loads are: tobacco (in Maceió), cotton and vegetal oils in Recife. Fertilizers import have surpassed 300 thousand tons in 1973.

4.3 PERFORMANCE OF BRAZILIAN AMATEURS IN COAST SHIPPING

The analysis of operational performance of Brazilian Companies of coast shipping and private fleets (excluding PRONAPE) shows that:

1 - The average of operational days shows a real index of 85 up to 90% of the total of available days/year, what is considered very much reasonable in relation to medium age of the fleet.

2 - Real time of production, i.e., days employed under operation in the sea and in other harbors (mooring, load and unload) is equivalent to 86% of operational days, what is very good.

3 - Wait time and repair time in the journeys are not very large (14% of operational days).

4 - Port productivity is low. Operational time in the harbors is larger than the time in the sea. In an organized harbor a vessel takes 2 or 5 days to move 1,000 thousand tons of general load; daily production of solid bulk changes between 200 up to 1,000 thousand tons.

5 - The index of load capacity use of the vessels is low (19%) if it is compared with the international patterns (40%). It results from the permanence time in the harbors and from the choice of amateurs by light loads in view of the structure of cargo tariff, and as well as from the scarce return load in vessels

wich go to North and Northeast, and from the lack of load in the departure to Argentine and Rio Grande do Sul.

6 - There is a considerable incompatibility between fleet structure and traffic structure. While 79.5% of available tdw/year is destined to general load, only 25.6% of the traffic has corresponded this kind of load. There is an inversion of numbers in relation to solid bulks: available tdw/year to this kind of load is equivalent to 14.2% of the fleet and the traffic is 69.5% of the load. This distortion contributes to decrease the port productivity in moving of solid bulks.

7 - The projection to 1980 show that incompatibility between fleet structure and kind of load will remain, and there will be an important decrease of general load in the total of the traffic.

The conclusions mentioned above have resulted from a measurement study of coast shipping fleet, which was supported by SUNAMAM, containing the following scheme.

Methodology of Analysis

The results of the performance of 30 (thirty) companies during the year of 1970 were considered to operational analysis of coast shipping companies and private fleets. The informations bound together to SUNAMAM have required an hard work of legal processing and data measurement of computer; without which it would not be possible to have colected the elements in an analysis conditions.

Only the companies which have operated in 1971 were considered in this study (excluding Petrobrás and FRONAPE). Among them, 4 (four) are of the State and 26 (twenty-six) are private. They are grouped together in order to visualize the position of the companies which also act in a long distances or have a connection with industry or trade organizations to which they do transport services and which have as purpose the transport in a competitive nature (trade). Such difference is necessary in view of the operational results of these companies maintain a narrow connection with the purpose which they were organized, thus, making contingent on their performance in the sector.

The analysis includes the performance of the companies along the Brazilian coast between national harbors and as well as between national and Argentinean harbors and characterizes the operation in coast shipping traffic. The traffic with Guianas was not stood out since then it did not show important levels and because it is not normalized yet.

The pattern which analysis is accomplished is very much important since then it has included the performance of 87 vessels in 476 round trips, which were started and finished in 1970. They have moved a total of 2,451,668 tons (57% of total of the coast shipping export and large coast shipping in private vessels and national vessels of Brazilian amateurs) in a distance of 3,374 miles per round trip/vessel.

We may add that these 30 companies have taken part, in 1970, with 77,4% of the total ton transported in coast shipping and

large coast shipping. The participation of foreign amateurs was excluded. Therefore, such companies have taken part in almost all traffic, which is done by national amateurs.

Coast Shipping Transport and Large Coast Shipping Exports - 1970

	TONS	%
30 Considered Companies	3,595,781	77,4
Other National Companies (including Petrobrás and FRONAPE)	1,047,855	22,6
T O T A L	4,643,636	100,0

Analysis

Informations about amateurs performance and their fleets which were colected, studied, processed and measured are shown in Board 4.12. They allow the visualization of the performance, in a company levels, and a group of companies with characteristics similar to the nature of the enterprise and the total.

To help the analysis, data of the board were shown in board 4.13 in percentage index (operational days, degree of capacity use of fleet load and factor of medium load of vessels) and medium values (traveled distance, number of days of around trip in the year and by trip, number of days/year in docking and other activities and production in harbors in t/day). In the same board the composition of tons moved by the companies according to load nature was shown in percentages in order to characterize its specialization and adequation level of vessels to the traffic.

Operational Time

Occupation of available days/year

In 476 round trips which have started and finished in 1970, the average of operational days observed to a group of 30 companies with their 87 vessels was of 204 days, i.e., 56% of available days/year total (365); even including trips started in the previous year and finished in 1970, as well as trips which have started in 1970 and finished in 1971, and which were not computed, the relation will only increase up to 66% (from 204 up to 241 days) what would show an excessive productive time. However, some vessels will be also used in long distance, what turns impossible the unproductive time; furthermore, even between vessels which do only coast shipping and large coast shipping, some were chartered to other companies, others were sold and others will start their performances during the year. Thus, the index which was found does not have a large meaning to the effect of operational analysis. If we exclude vessels of companies which also operates in long distance (LLoyd, L.Figueiredo, Frota Oceânica, Aliança and Neptunia), the index of other companies will reach 78% to which factors already mentioned would be added. Thus, we may estimate that real index is around 85 up to 90% which is very reasonable if we consider the medium age of the fleet.

Occupation of Operational Days.

We may observe, in relation to the performance of the companies and operational days (204 days), that 86% of these days (in

an average per round trip) is equivalent to operated times in the harbors (mooring, load and unload) and in the sea, i.e., the real time of production may be considered satisfactory since then wait time and repair time in the trips are not large (14%).

This real time of production (in the sea and in the harbors) reflects the present programming system of trips which was established by SUNAMAM and which must be accomplished by all private or state amateurs, concessionaires of regular lines or trips allowed in an extraordinary nature (tramp). Such observation is reinforced by the averages observed to private or state companies and which are the same to the average of the group (86%). Only some private companies have their real time of production lower than the good average and with a significative wait or repair time. In relation to state companies, only Lloyd has a large average (97%), while the others (Siderurgica Nacional and EMASA) show a real time of production lower than the average which was observed.

Hourly production per harbor to general load changes from 100 up to 200 t/day to elementary harbors and from 200 up to 500 t/day to organized harbors, depending on the kind of the load and the characteristics of each harbor. Only this characteristic shows how low port productivity is because a vessel would take 5 or 10 days to move 1,000 t in an elementary harbor and 2 or 5 days in an organized harbor. Also to solid bulks (wheat and salt) daily productions are low, changing from 200 up to 1,000 t. and depending on the equipment which is used. We may find a production between 1,200 and 1,800 t. only in some harbors, (mainly in Santos harbor).

Therefore, this explain why the average of time operating in the harbors is 44% and the average in the sea is 42% in relation to the total time which was used. Thus, operation time in the harbors is larger than the time in the sea per round trip, though 72% of transported load (average to all companies) is solid bulk. This fact should allow a lower operation time in the harbors. Thus, the restraint to the efficiency of coast shipping and large coast shipping transport, which is caused by the operation time in the harbors, is now a great problem to the performance of the companies and what decreases very much the productivity per vessel.

Factor of Middle Load of the Vessels.

Considering that the factor of middle load of the vessels is given by the relation:

$$F_{CM} = \frac{PTM - U}{PTM - P} \times TM \times 100 \text{ where,}$$

PTM - U = ton of product x used mile

PTM - P = ton of product x produced mile

TM = proportion of days in the sea under the total of operational days.

Calculus of this index was used to the performance of all vessels of considered companies and in the round trips (479) which were accomplished in 1970. The results per company, group of companies and the total are shown in board 4.14.

It is interesting to observe that low levels of index of load capacity use of the vessels were placed in 19% to a group of 30 companies and that the performance of private companies

is yet expressive (with a factor of middle load of 23%) in relation to state companies (with a factor of middle load of 11%).

Private companies which also operate in long distance show lower indexes (average of 18%) while companies with industrial connection and trade companies show a factor of middle load of 20% and 24% (changing a minimum of 12% to maximum of 43%).

Such index, when it is compared with international levels (around 40%) is explained by two factors:

a) Middle distances change from 1,500 up to 1,800 miles and they are lower than traveled distances in the traffic of long distance which results larger participation of stay time in the harbors and which make worse by the low productivity of the same harbors according to what was already shown.

b) Vessels move with 45% of their load capacity, in terms of weight (PTM - U/PTM - P) due to the structure of freight tariff wich obliges the amateurs to make a choice to light loads which are collected per cubic meter and do not fill the capacity of the vessel in tons. Also the scarce return load to vessels wich go to North and Northeast (mainly salt and wood) as well as the lack of load in the departure of vessels to Argentine and Rio Grande do Sul help to the low use of vessel capacity. Only South routes to Santos and Rio and from these both harbors to North, the vessels move normally loaded.

However, we may stand out that, in a study accomplished by GEIPOT in 1965, the factor of middle load of coast shipping fleet was estimated, in that period, around 16%; thus, after 5 years we may observe a slight betterment, which may be resulted from the traffic increase or also from the decrease of vessels number, of larger adequacy of new vessels incorporated to fleet during this period, and betterments in the harbors.

Specialization of Companies and Adequacy of Fleet in Relation to the Traffic.

Specialization of Companies:

Based on data which are shown in Board 4.15, in relation to moved ton by companies according to load nature, we may observe that, in 1970, 74% of the total load transported by 30 companies, corresponded to bulks and 25% of general load. Studying such statment in a company level, we may observe that 7 (seven) have transported, in their vessels, mainly bulk and only one has transported 82% of frozen load. Others have transported bulk and general load in a large proportion that it will not be possible to characterize any of them as specialized company in relation to load because the level of general load has not surpassed 60% in any company. Bulk was the only one which had a strong tendency.

Such position results from traffic structure in which more than 79% of load flux is represented by bulks.

Adequacy of the Fleet.

According to SUNAMAM's specification which excludes vessels of Petrobras/Fronape and taking into consideration the distribution of TDW/year of the vessels under operation, in 1970, in the coast shipping and large coast shipping and comparing it with traffic structure of that year, using the same sepcification, we may observe that it had a reasonable incompatibility between fleet structure and traffic structure as it may be seen in the following board.

TDW/Year - T/year according to ranks of fleet and Traffic

1970 - Indexes

SPECIFICATION	TDW/YEAR	T./YEAR
General Load	79.5	25.6
Solid Bulk	14.2	69.5
Frozen Load	3.9	1.4
Liquid Bulks	2.4	3.5
TOTAL	100.0	100.0

If the composition of available TDW/Year is compared with load distribution according to kind of vessels and traffic in 1970, we will observe that general load in a relation to TDW/Year - T/year is of 79% to 25.6%; to solid bulks is of 14.2% to 69.5%; to frozen load is of 3,9% to 1,4% and to liquid bulks is of 2,4% to 3,5%, from which results an inadequacy very much significative between available TDW/year and T/year in traffic of general load and solid bulks. In relation to frozen load, inadequacy, which is

shown, is only possible because vessels of this traffic also operate in a long distance. In relation to liquid bulks, as data show, there is a deficiency of available TDW/year, though, we must stand out that in the load ton which was considered the parcel of vegetal oils transport in foreign vessels is included.

Such position shows, mainly to general load and solid bulks, a relative inversion in fleet structure and in relation to traffic structure because, while general load prevailed in a total of available TDW, there is a preponderance of solid bulks in total ton. This fact helps to decrease port productivity, in moving of solid bulks, mainly by the occasion of shooting box.

Based on foreseen data relative to coast shipping traffic and large coast shipping and data relative to fleet in 1975 and 1980, we may observe that the position of incompatibility of TDW/year to general load and solid bulks is maintained and that the participation of general load in the total of traffic decreases very much.

However, the correction which must be done in relation to the order of new vessels will have to take into consideration that vessels which transport general load to North, Northeast and South return transporting salt and wheat. Therefore, it is necessary to have mixed vessels, i.e., vessels which may transport general load and solid bulks. Thus, some vessels will keep on transporting solid bulk in their return.

BOARD 4.1

RECIFE HARBOR

COSTS TO INSUME (*)

KIND OF LOAD	COST CR$	MOVED TON	COST/TON
General load with severals	2,666,378.0	76,445.8	34.9
Quantity of sacks with severals	8,435,716.7	519,713.1	16.2
Packages with severals	815,975.9	19,167.6	42.6
Bundles with severals	46,893.8	911.9	51.4
Pallets with severals	27,859.9	1,275.5	21.8
Metal Barrel, Barrels with severals	248,421.2	11,495.0	21.6
Cases, Packing boxes with severals	99,415.2	2,074.1	47.9
Heavy Load with severals	10,917.2	241.3	45.2
General Wood Load	725,336.5	9,274.4	78.2
General Square iron bars load	49,177.6	1,152.5	42.7
General Coils load	53,732.7	1,289.6	41.7
GENERAL LOAD	13,179,824.7	643,040.8	20.5
Solid Bulk-wheat	307,519.8	96,526.8	3.2
Solid Bulk-Fertilizers and Sulphur	1,444,444.8	144,403.0	10.0
Solid Bulk-others	692,157.3	159,054.2	4.4
SOLID BULK	2,444,121.9	399,984.0	6.1
Liquid Bulk - Gas - Liquid Petroleum	80,071.9	25,336.7	3.2
Bulk - Gasoline, Kerosene, Diesel	364,111.9	115,213.9	3.2
Liquid Bulk-Fuel Oil	388,657.4	122,980.7	3.2
Liquid Bulk-Petroleum Products	612,444.9	193,673.4	3.2
Liquid Bulk-Chemical Products	12,680.4	4,012.4	3.2
Liquid Bulk - Melasse	503.0	-	-
LIQUID BULK	1,458,469.5	461,217.1	3.2
Containers with severals	60,219.2	2,270.3	26.5
Several not specified	13,000.7	1,463.3	8.9
TOTAL	17,155,636.0	1,507,975.5	11.4

SOURCE:- Basic Data: DNPVN - Processed: TRANSCON.

(*) - Relating to expenses not included in the freight. Excludes storage.

BOARD 4.2

OPERATIONAL PERFORMANCES IN RECIFE HARBOR - FROM JANUARY TO AUGUST OF 1973 - EXPORT

KIND OF LOAD	KIND OF OPERATION	TON/HOUR PER MAN
General load with severals	Derrick with stockpiling machine	0.7
	Car carrier with stockpiling machine	0.6
Quantity of sacks with severals	Car carrier with stockpiling machine	1.5
	Car carrier with others	1.8
Packages with severals	Car carrier with stockpiling machine	0.3
	Car carrier with others	0.4
Bundle with severals	Derrick with others	0.3
	Car carrier with others	0.5
Metal Barrel, Barrels with severals	Derrick with stockpiling machine	0.8
	Car carrier with stockpiling machine	0.9
Cases, Packing Boxes with severals	Derrick with stockpiling machine	0.3
	Car carrier with stockpiling machine	0.5
Heavy Case with severals	Car carrier with stockpiling machine	0.7
General wood load	Derrick with stockpiling machine	0.2
	Car carrier with stockpiling machine	0.2
General coils load	Derrick with stockpiling machine	0.4
Solid Bulk - Wheat	Car carrier with Truck	*1 3.4
Solid Bulk - Fertilizers and Sulphur	Derrick with Truck	3.2
	Car carrier with Truck	2.9
Solid Bulk - Others	Derrick with Truck	0.2
	Car carrier with Truck	0.2
Containers with severals	Derrick with others	0.4
	Car carrier with open waggon	*2 1.5
Severals not specified	Car carrier with stockpiling machine	*2 0.3

NOTES:- *1 - Sundays and holidays
*2 - Daily - 1st period

BOARD 4.2

OPERATIONAL PERFORMANCES IN RECIFE HARBOR - FROM JANUARY TO AUGUST OF 1973 - IMPORT

KIND OF LOAD	KIND OF OPERATION	TON/HOUR PER MAN
General load with severals	Derrick with Stockpiling machine	0.4
	Car carrier with stockpiling machine	0.7
Quantity of Sack with severals	Derrick with stockpiling machine	0.6
	Car carrier with stockpiling machine	0.6
Packages with severals	Derrick with stockpiling machine	0.4
	Car Carrier with stockpiling machine	0.5
Bundles with severals	Derrick with stockpiling machine	0.4
	Derrick with others	*1 0.3
Pallets with severals	Derrick with stockpiling machine	*1 0.4
	Car carrier with stockpiling machine	1.2
Metal Barrel, Barrels with severals	Car carrier with stockpiling machine	1.1
	Car carrier with open waggon	1.0
Cases, Packing boxes with severals	Car carrier with stockpiling machine	0.5
	Car carrier with others	0.6
Heavy load with severals	Car carrier with others	0.3
General wood load	Derrick with stockpiling machine	0.2
	Car carrier with stockpiling machine	0.2
General coils load	Derrick with stockpiling machine	0.4
	Car carrier with stockpiling machine	0.6
Solid Bulk - Wheat	Car carrier with Truck	*1 3.4
Solid Bulk - Fertilizers and sulphur	Derrick with Truck	3.2
	Car carrier with Truck	2.9
Solid Bulk - Others	Derrick with Truck	0.2
	Car carrier with Truck	0.2
Containers with severals	Derrick with others	0.4
	Car carrier with open waggon	*2 1.5
Severals not specified	Car carrier with stockpiling machine	*2 0.3
	Pipe Line	0.0

NOTES:- *1 - Sundays and holidays

*2 - Daily - 1st period

- Data about liquid bulk and wheat unload with sucker not available

SOURCE: D.N.P.V.N. - Statistic Section

III-24/4.62

BOARD 4.3

MACEIO HARBOR

COSTS TO INSURE (*)

JANUARY TO AUGUST

1973

KIND OF LOAD	COST CR$	MOVED TON (+)	UNITARY COST
General Load with soverals	223,775.7	83,886.6	2.7
Quantity of Sacks with soverals	469,018.7	168,187.0	2.8
Packages with soverals	22,287.4	3,624.6	6.1
GENERAL LOAD	715,081.8	255,498.2	2.8
Solid Bulk - Wheat	231,108.9	50,162.1	4.6
Solid Bulk - Fertilizers and Sulphur	285,275.8	52,312.8	5,5
Solid Bulk - Cashew nut	786.8	150.3	5.2
Solid Bulk - Others	327,632.5	82,017.5	4.0
SOLID BULK	844,804.0	184,642.7	4.6
Liquid Bulk - Gasoline, Kerosene, Diesel	48,742.4	67,590.6	0.7
Liquid Bulk - Petroleum Products	4,188.5	5,808.2	0.7
Liquid Bulk - Soverals	1,800.8	2,497.2	0.7
Liquid Bulk - Raw Petroleum	402,181.2	48,621.0	8.3
Liquid Bulk - Molasse	144,507.5	200,387.0	0.7
Liquid Bulk	601,420.4	324,904.0	1.9
Soverals not specified	323.1	29.9	10.8
TOTAL	2,161,629.3	765,074.8	2.8

(*) - Only relating to expenses not included in maritime freight.

- Excludes storage.

SOURCE: Basic Data - D.N.P.V.N. - Department of Trade Search - Processed Data - TRANSCON.

BOARD 4.4

PRINCIPAL PRODUCTS MOVED IN MACEIO HARBOR

IMPORT - JANUARY/AUGUST - 1973

PRODUCT	TON	%
Petroleum and its products	68.899	43.9
Wheat	46.895	29.8
Fertilizers	40.410	25.7
Others	813	0.5
TOTAL	157.017	100.00

EXPORT

PRODUCT	TON	%
Suggar and manufactures	304.255	56.9
Molasse	187.705	35.0
Raw Petroleum	38.740	7.2
Others	4.927	0.9
TOTAL	535.627	100.00

SOURCE: D.N.P.V.N. - STATISTIC SECTION.

BOARD 4.5

MACEIO HARBOR - OPERATIONAL PERFORMANCE - JANUARY TO AUGUST - 1973

KIND OF LOAD	KIND OF OPERATION	TON/HOUR PER MAN
Quantity of Sacks with severals	Car carrier with Truck	0.8 *2
Solid Bulk - Wheat	Car carrier with Truck	1.5
Solid Bulk - Fertilizers and Sulphur	Car carrier with Truck	2.4
Solid Bulk - Cashew nut	Car carrier with Truck	1.2 *1
	Car carrier with Truck	2.3 *3
EXPORT		
General load with severals	Car carrier with Truck	3.3
Quantity of Sacks with severals	Derrick with auto-derrick	3.0
	Car carrier with Truck	3.0
Packages with severals	Car carrier with Truck	0.8
Solid Bulk - others	Car carrier with Truck	3.3
	Readler with Derrick	3.8 *1
GENERAL INDEX OF THE HARBOR.		4.3

NOTES: - *1 - Night Common
*2 - Continuous
*3 - Daily - 1st period
- Data of liquid bulk not available

SOURCE: D.N.P.V.N. - Statistic Section

III-2/4.64

BOARD 4.6

MACEIO HARBOR

GENERAL MOVING OF THE VESSELS - JANUARY/AUGUST - 1973

KIND OF VESSEL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	TOTAL
Common general load	4	3	4	10	5	6	3	3	38
C.G.C./Solid Bulk	3	5	3	1	2	6	5	2	27
General Load	7	8	7	11	7	12	8	5	65
Solid Bulk - Wheat	1	1	1	3	1	2	1	1	11
Solid Bulk	1	1	1	3	1	2	1	1	11
Oil Tanker	3	4	4	2	3	3	3	4	26
Molasse	4	2	1	1	2	1	-	-	11
Liquid Bulk - Others	-	1	-	-	1	-	-	-	2
Liquid Bulk	7	7	5	3	6	4	3	4	39
Passengers	-	-	-	-	1	-	-	-	1
Fishing Lines	-	-	-	-	-	-	-	2	2
War	6	-	-	-	2	6	-	1	15
War	6	-	-	-	3	6	-	3	18
Others not specified	3	2	2	1	-	-	3	3	14
Others	3	2	2	1	-	-	3	3	14
TOTAL	24	18	15	18	17	24	15	16	147

SOURCE:- D.N.P.V.N. - Statistic Section

III-2/4.55

BOARD 4.7

MACEIO HARBOR

MOVING OF THE VESSELS ACCORDING TO THEIR CAPACITY (TDW) - JANUARY/AUGUST - 1973

KIND OF VESSEL	up to 2,499	2,500 to 4,999	5,000 to 9,999	10,000 to 14,999	15,000 to 24,999	25,000 to 49,999
Common general Load	3	4	14	14	3	
C.G.C./Solid Bulk	1	1	6	14	2	3
General Load	4	5	20	28	5	3
Solid Bulk - Wheat			10	1		
Solid Bulk			10	1		
Oil Tanker	1		9	15	1	
Molasse				2	7	2
Liquid Bulk - Others			1	1		
Liquid Bulk	1		10	18	8	2
Passengers		1				
Fishing Line	2					
War	15					
Severals	17	1				
Others not specified	13	1	1	2		
TOTAL	35	7	41	49	13	5

SOURCE: D.N.P.V.N. - Statistic Section

BOARD 4.8

CABEDELO HARBOR

GENERAL MOVING OF THE VESSELS

JANUARY TO AUGUST/1973

KIND OF VESSEL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	TOTAL
General Load	11	14	16	11	16	11	11	13	103
Solid Bulk	1	-	1	1	-	-	-	-	3
Liquid Bulk	5	3	3	6	5	5	4	5	36
Passengers	-	-	-	-	-	-	-	-	-
War	-	-	-	-	-	-	-	-	-
Others not specified	-	-	-	-	-	-	-	-	-
TOTAL	17	17	20	18	21	16	15	18	142

SOURCE:- Fiscal Inspector Department of Cabedelo Harbor.

REMARK:- Moving of war and passengers vessels is not included in the statistic boards of Cabedelo Harbor.

III-2/4.67

BOARD 4.9

CABEDELO HARBOR

GENERAL MOVING OF GOODS (TONS) - JANUARY/AUGUST OF 1973

KIND OF LOAD	LONG DISTANCE		COAST SHIPPING		TOTAL OF THE HARBOR	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
Machinery, Wheat in grain						
Chemical Products	25,185	-	-	-	25,185	-
Petroleum Products, Rice	-	-	96,832	-	96,832	-
Wood and severals	-	-	-	-	-	-
Cement, agave, pineapple	-	75,723	-	-	-	75,723
Cotton, agave string						
Cement and severals	-	-	-	48,613	-	48,613
TOTAL	25,185	75,723	96,832	48,613	122,017	124,336

SOURCE:- Fiscal Inspector Department of Cabedelo Harbor
4th D.R.
TECHNICAL SECTION

11-24.69

BOARD N.10

MACEIO HARBOR

GENERAL MOVING OF GOODS (TONS) - JANUARY/AUGUST - 1973

KIND OF LOAD	LONG DISTANCE		COAST SHIPPING		TOTAL OF THE HARBOR	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
Wheat	46,895				46,895	
Neuter Potash	893				893	
Nitrogen-fixing Fertilizers	22,065				22,065	
Phosphate Fertilizers	12,390		499		12,889	
Potassium Fertilizers	5,456				5,456	
Common Gasoline			35,378		35,378	
Kerosene			4,025		4,025	
Diesel Oil			25,652		25,652	
Fuel Oil			3,844		3,844	
Sugar and Manufacture		277,855		26,400		304,255
Molasse		187,705				187,705
Tobacco or Tobacco leaves		4,025				4,025
Board Consumption		780				780
Raw Petroleum				38,740		38,740
Cotton in a several forms				1		1
TOTAL	87,699	470,365	69,398	65,141	157,097	535,506

III-24.69

TABLE 4.11

NORTHEAST - LOAD MOVING.

(IN 1.000 TONS)

YEAR	NORTHEASTERN NORTHEAST					NORTHWESTERN NORTHEAST					SOUTHERN NORTHEAST				
	IMPORT			EXPORT		IMPORT			EXPORT		IMPORT			EXPORT (1)	
	PETROLEUM AND ITS PRODUCTS	WHEAT	TOTAL (2)	PETROLEUM AND ITS PRODUCTS	TOTAL (2)	PETROLEUM AND ITS PRODUCTS	WHEAT	TOTAL (2)	PETROLEUM AND ITS PRODUCTS	TOTAL (2)	PETROLEUM AND ITS PRODUCTS	WHEAT	TOTAL (2)	PETROLEUM AND ITS PRODUCTS	TOTAL (2)
1969	1,643	255	1,739	33	1,621	405	128	843	2	427	160	105	528	7,917	8,655
1970	1,672	274	2,187	36	1,701	584	151	957	6	396	154	123	422	8,264	8,413
1971	1,695	311	2,033	41	1,630	590	135	983	58	326	149	156	515	8,057	8,853
1972	1,195	279	2,033	52	2,349	673	157	960	12	413	188	159	573	8,430	8,555
1973	1,877	333	2,402	63	2,383	841	198	1,143	33	391	196	168	762	8,291	8,981

(1) - Including Madre de Deus Terminal.
(2) - Including other loads.

SOURCE: D.N.P.V.N.

BOARD 4.12

PRIVATE AND STATE COMPANIES OPERATING WITH VESSELS ABOVE 300 TDW (PRIVATE VESSELS, FREIGHTED AND ADMINISTERED) IN 1971.

TON TRANSPORTED ACCORDING TO KIND OF LOAD.-INCLUDING ARGENTINIAN HARDSPRODS NOT INCLUDE PETROLEUM AND ITS PRODUCTS). 1970

	BULKS														GENERAL LOAD		FROZEN LOAD		GENERAL [illegible]	
	SOLIDS										LIQUIDS		SUB-TOTAL							
	Wheat		Salt		Ore and coal		Others		Sub-total											
	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
A - PRIVATE COMPANIES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.1 - LONG DISTANCE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1 - Cia. de Nav. Marítima Netumar	44,451	3.5	31,526	5.4	-	-	-	-	75,381	2.9	18,321	22.3	94,232	3.5	77,947	9.8	-	-	172,[illegible]	4.4
2 - L. Figueiredo Nav. S/A	35,871	4.4	18,682	3.7	-	-	813	3.3	57,482	2.4	-	-	57,421	2.1	46,114	4.8	-	-	93,355	1.9
3 - Empresa Nav. Aliança S/A	3,333	0.4	2,303	9.4	2,258	0.2	2,688	3.3	9,116	0.4	-	-	9,344	0.4	2,746	0.3	37,323	100.0	49,385	1.9
4 - Frota Oceânica Brasileira S/A	45,340	3.3	-	-	-	-	-	-	47,364	1.7	-	-	45,318	1.7	-	-	-	-	45,[illegible]	1.3
5 - Mesquita - Soc. Nav. Com. Ltda.	30,316	3.3	-	-	-	-	-	-	30,316	0.8	-	-	25,336	0.8	7,335	0.9	-	-	37,971	1.0
A.2 - WITH INDUSTRIAL ENTAILMENT	2,413	2.1	[illegible]	12.5	37,331	4.2	-	-	[illegible]	5.4	4,916	6.6	[illegible]	[illegible]	[illegible]	9.5	-	-	[illegible]	[illegible]
1 - Comércio ... Ind. Nav. S/A	-	-	45,716	6.2	-	-	-	-	45,716	1.8	-	-	45,716	1.7	47,237	5.4	-	-	93,[illegible]	2.6
2 - H. Dantas Com. Nav. Ltda.	-	-	13,950	2.1	37,105	4.3	-	-	38,235	2.7	-	-	33,055	1.7	18,129	2.1	-	-	52,174	2.2
3 - Soc. Paulista Nav. Matarazzo Ltda.	7,413	0.9	25,233	4.5	-	-	-	-	32,189	1.3	-	-	32,645	1.2	26,746	2.9	-	-	41,326	1.4
4 - Joaquim Fonseca Ind. Com. Nav. S/A	-	-	15,003	3.0	-	-	-	-	15,003	0.6	338	0.4	16,241	0.6	10,727	1.2	-	-	27,221	0.8
5 - Emp. Mateus Nav. Costeira S/A	-	-	-	-	-	-	-	-	-	-	4,312	5.6	4,352	0.2	-	-	-	-	4,522	0.1
A.3 - TRADING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]
1 - Linhas Bras. Nav. Ltda. - LIBRA	331,311	43.2	141,612	31.7	-	-	22,781	56.1	493,316	27.0	31,221	37.4	520,456	19.6	244,184	31.7	-	-	764,[illegible]	26.3
2 - Santos Mecânica Nav. S/A	-	-	-	-	231,812	24.2	-	-	231,838	11.8	-	-	231,839	10.7	-	-	-	-	231,[illegible]	7.9
3 - Cia. Navegação [illegible]	26,115	3.3	-	-	87,032	7.4	-	-	113,252	4.4	-	-	113,252	4.3	-	-	-	-	113,252	2.1
4 - Navegação Antônio Ramos S/A	2,315	0.3	55,[illegible]	9.7	-	-	2,331	6.8	58,976	2.3	-	-	58,976	2.2	22,361	5.5	-	-	[illegible]	3.3
5 - Navegação Mercur Ltda.	34,119	4.3	42,149	7.5	-	-	3,377	33.1	82,207	3.3	3,333	2.6	83,666	3.1	17,855	2.0	-	-	[illegible]	3.3
6 - Navegação [illegible] Ltda.	33,233	4.3	7,303	1.7	32,420	4.5	2,951	7.6	72,176	3.6	-	-	72,[illegible]	2.5	2,323	0.3	-	-	[illegible]	2.1
7 - Cia. Nav. Norte - CONAN	18,147	2.2	13,971	2.3	-	-	95	0.2	35,133	1.3	3,223	13.8	37,332	1.4	35,103	4.8	-	-	72,[illegible]	2.5
8 - Navegação Alegrandense S/A	2,473	0.3	21,621	4.1	433	-	838	3.3	27,013	1.1	-	-	27,011	1.0	41,133	4.7	-	-	68,177	2.9
9 - Nav. [illegible] S/A	1,616	0.2	13,183	2.7	-	-	-	-	14,793	0.6	-	-	16,793	0.6	29,241	3.3	-	-	46,[illegible]	2.2
10 - Navenaldo Nav. S/A	-	-	18,721	3.4	-	-	-	-	18,721	0.7	-	-	18,721	0.7	14,122	1.6	-	-	32,847	0.3
11 - Rinque & Cia. Ltda.	1,713	0.2	7,427	1.4	21,630	1.8	1,819	2.7	21,642	0.8	-	-	21,642	0.8	8,612	1.0	-	-	39,[illegible]	0.3
12 - Nav. Litor. Bras. S/A - [illegible]	1,987	0.3	7,633	1.1	-	-	-	-	9,420	0.4	-	-	9,410	0.4	13,411	1.5	-	-	22,121	0.6
13 - Antônio G. Silva Nav. Ltda.	-	-	7,325	1.3	-	-	-	-	7,321	0.3	-	-	7,325	0.3	8,325	1.0	-	-	16,652	0.5
14 - Brasileira [illegible] Nav. Ltda.	-	-	-	-	-	-	-	-	-	-	12,011	14.6	12,623	0.5	-	-	-	-	12,611	0.4
15 - Nav. [illegible] Ltda.	-	-	3,833	0.7	-	-	-	-	3,133	0.2	-	-	[illegible]	0.1	3,483	0.4	-	-	7,311	0.2
16 - Cia. Nav. Amazônia	-	-	-	-	-	-	-	-	-	-	5,202	6.4	5,252	0.2	-	-	-	-	5,252	0.2
B - STATE COMPANIES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]
B.1 - WITH INDUSTRIAL ENTAILMENT	[illegible]	4.3	-	-	[illegible]	[illegible]	-	-	[illegible]	[illegible]	-	-	[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]
1 - Cia. Siderúrg. Nacional S/A - CSN	-	-	-	-	365,[illegible]	44.1	-	-	366,363	22.0	-	-	366,363	21.3	-	-	-	-	366,[illegible]	15.7
2 - Vale do R. Doce Nav. S/A - DOCENAVE	50,140	6.2	-	-	105,145	9.1	-	-	155,[illegible]	6.2	-	-	155,365	5.9	-	-	-	-	155,365	4.3
B.2 - Trading	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]
1 - Cia. Nav. Lloyd Brasileiro	133,333	19.1	58,520	17.3	[illegible]	[illegible]	1,944	5.3	219,155	8.3	-	-	219,155	8.2	254,220	32.1	-	-	473,[illegible]	13.5
2 - Emp. Nav. Amazônia S/A - ENASA	-	-	3,232	1.1	-	-	-	-	3,233	0.1	-	-	3,332	0.2	13,[illegible]	2.1	-	-	16,[illegible]	0.5
TOTAL	836,[illegible]	100.0	532,[illegible]	100.0	[illegible]	100.0	39,[illegible]	100.0	2,573,617	100.0	82,[illegible]	100.0	2,657,[illegible]	100.0	823,[illegible]	100.0	37,323	100.0	[illegible]	100.0

SOURCE: List of Loads.

BOARD 4.12

PRIVATE AND STATE COMPANIES OPERATING WITH VESSELS ABOVE 500 TDW IN 1973.

OPERATIONAL INDEXES OF TRIPS STARTED AND FINISHED IN 1973 (PRIVATE VESSELS).

RESULT OF COAST SHIPPING AND LARGE COAST SHIPPING TRAFFIC

COMPANIES \ OPERATIONAL INDEXES	Nº of vessels	Nº of trips	[illegible]	Operational days in % of the total per company: Productive [illegible]			[illegible]	[illegible]	TOTAL	% UTILIZATION (1)	(2)	(3)	TOTAL	TON MOVED (LOADED) ACCORDING TO LOAD % of total per company: SOLID BULKS					LIQUIDS	[illegible]	General load	Frozen load	TOTAL	(4)	(5)	(6)
				[illegible]	[illegible]	Total																				
A - PRIVATE COMPANIES	11	222	1,221	42	44	45	11	5	103	51	31	21	103	21	22	22	2	47	2	21	29	2	102	327	31	23
A.1 - LONG DISTANCE	22	22	1,821	35	44	72	23	1	102	45	12	43	101	20	13	1	1	31	6	25	21	24	102	617	45	15
• 1 - Cia. de Nav. Mercantil Netumar	6	27	2,771	26	46	72	27	1	100	71	16	13	100	26	18	-	-	44	10	54	46	-	100	616	46	31
• 2 - A. Figueiredo Nav. S/A	4	8	2,473	52	33	85	13	-	100	39	19	42	100	37	21	-	1	59	-	59	41	-	100	551	43	23
• 3 - Empresa Nav. Aliança S/A	8	36	1,515	48	28	76	8	2	100	38	5	57	100	4	3	4	3	14	-	14	4	82	100	335	23	10
• 4 - Frota Oceânica Brasileira S/A	2	2	932	63	21	84	11	-	100	5	5	90	100	100	-	-	-	100	-	100	-	-	100	2,487	33	33
• 5 - Netúnia - Soc. Nav. Cost. Ltda.	2	6	1,633	53	47	100	-	-	100	33	3	65	100	73	-	-	-	73	-	73	27	-	100	468	47	28
A.2 - WITH INDUSTRIAL ENTAILMENT	5	22	1,345	41	24	65	13	18	100	67	15	21	103	2	22	21	-	55	2	47	21	-	100	455	50	23
• 1 - Conteiro FF Ind. Nav. S/A	4	19	1,476	45	34	79	15	6	100	78	17	4	100	-	49	-	-	49	-	49	51	-	100	249	51	22
• 2 - F. Santos Com. Nav. Ltda.	2	10	796	27	35	62	17	21	100	63	13	24	100	-	16	71	-	87	-	87	13	-	100	1,299	57	29
• 3 - Cia. Paulista Nav. Materais Ltda.	2	3	1,982	57	33	90	6	4	100	25	20	37	188	15	51	-	-	66	-	66	34	-	100	946	64	71
• 4 - Joaquim Fonseca Ind. Com. Nav. S/A	(4)	-	-	-	-	-	-	-	-	-	-	-	-	-	59	-	-	59	1	60	40	-	100	-	-	-
• 5 - Comt. Peres Nav. Conteiro S/A	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100	-	-	100	-	-	-
A.3 - TRADING	33	174	1,444	44	46	92	4	4	102	21	28	23	109	29	12	25	2	71	1	72	26	-	100	316	22	27
• 1 - Linhas Bras. Nav. Ltda. - LIBRA	11	74	1,780	53	44	97	3	-	100	65	11	24	100	42	19	-	3	64	4	68	32	-	100	371	34	24
• 2 - Santos Moreira Nav. S/A	1	24	881	28	59	87	13	-	100	96	4	-	100	-	-	100	-	100	-	100	-	-	100	4,431	32	32
• 3 - Cia. Navegação Mercal	1	8	621	22	27	49	14	37	100	71	9	20	100	23	-	77	-	100	-	100	-	-	100	3,413	46	12
• 4 - Navegação Antônio Ramos S/A	4	33	1,981	41	55	96	2	2	100	58	11	31	100	2	49	-	2	53	-	53	47	-	100	431	75	42
• 5 - Navegação Cônsul Ltda.	3	24	2,111	39	49	88	8	4	100	72	14	14	100	33	42	-	5	80	2	82	18	-	100	431	65	26
• 6 - Navegação Marvinave Ltda.	3	33	781	41	42	83	13	4	100	51	4	45	100	33	4	55	5	97	-	97	3	-	100	1,247	53	31
• 7 - Cia. Nav. Porto - CINAV	2	14	2,111	50	43	93	4	3	100	82	12	6	100	25	15	-	-	40	11	51	49	-	100	454	62	27
• 8 - Navegação Riograndense S/A	2	9	2,357	60	38	98	4	-	100	81	19	-	100	4	34	1	3	40	-	40	60	-	100	329	61	17
• 9 - Nav. Mineira S/A	1	6	2,076	41	45	86	13	1	100	82	16	6	100	5	41	-	-	46	-	46	54	-	100	542	60	32
• 10 - Navatlas Nav. S/A	3	8	1,509	50	36	86	9	5	100	37	13	50	100	-	37	-	-	37	-	57	43	-	100	241	69	18
• 11 - Diego & Cia. Ltda.	1	14	2,122	39	52	91	9	1	100	95	5	-	100	6	28	36	3	71	-	71	29	-	100	262	64	71
• 12 - Nav. Litor. Bras. S/A - NAVELIBRA	1	3	1,981	61	29	90	1	29	100	79	24	7	100	9	34	-	-	43	-	43	57	-	100	221	48	19
• 13 - Antônio S. Silva Nav. Ltda.	1	7	2,326	34	50	82	13	3	100	76	11	13	100	-	47	-	-	47	-	47	53	-	100	294	74	43
• 14 - Brasileira Ferid. Nav. Ltda.	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100	-	-	100	-	-	-
• 15 - Nav. Urbano Gera Ltda.	1	9	1,952	32	52	84	9	7	100	92	10	-	100	-	50	-	-	50	-	50	50	-	100	150	77	43
• 16 - Cia. Nav. Amazônia	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100	-	-	100	-	-	-
B - STATE COMPANIES	24	119	1,539	31	25	56	12	2	100	41	2	49	100	11	1	31	-	43	-	43	18	-	100	874	21	31
B.1 - WITH INDUSTRIAL ENTAILMENT	2	41	613	37	27	64	34	-	100	74	4	22	100	2	-	31	-	120	-	122	-	-	100	5,643	30	13
• 1 - Cia. Siderúrg. Nacional S/A - SCN	2	41	613	37	37	66	34	-	100	74	4	22	100	-	-	100	-	100	-	100	-	-	100	5,643	30	13
• 2 - Vale do R. Doce Nav. S/A - DOCENAVE	(1)	-	-	-	-	-	-	-	-	-	-	-	-	33	-	66	-	100	-	100	-	-	100	-	-	-
B.2 - TRADING	22	79	2,226	33	25	88	5	2	100	45	11	41	100	25	21	1	-	52	-	53	47	-	100	437	27	23
• 1 - Cia. Nav. Lloyd Brasileiro	11	60	2,434	61	36	97	3	-	100	36	11	53	100	37	14	1	1	53	-	53	47	-	100	432	27	13
• 2 - Empr. Nav. Amazônia S/A - ENASA	3	18	1,273	26	37	63	27	14	100	45	21	34	100	-	36	-	-	36	-	36	64	-	100	231	44	6
TOTAL	47	475	1,637	44	43	44	10	4	100	56	18	56	100	22	16	33	1	72	2	74	24	2	100	625	45	15

• Data not available

BOARD 4.14

PRIVATE AND STATE COMPANIES OPERATING WITH VESSELS ABOVE 500 TPW IN 1971

OPERATIONAL INDEXES OF TRIPS STARTED AND FINISHED IN 1972 - (ONLY PRIVATE VESSELS)

COMPANIES	Nº of Vessels	Nº of Trips	Navigated Miles	Loaded Ton	PRODUCT TON x MILE (P.T.M.) Used	PRODUCT TON x MILE (P.T.M.) Produced	DAYS Operational Days In Port	In the Sea	Waiting	Repair	Total	Average to Vessel/year	Nº of Mission Days per Round Trip
A - PRIVATE COMPANIES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.1 - LONG DISTANCE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1 - Cia. de Nav. Marítima Netumar	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2 - [illegible] Nav. S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
3 - Empresa Nav. Aliança S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4 - Frota Oceânica Brasileira S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
5 - [illegible] - Soc. Nav. Cost. Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	*	[illegible]	[illegible]	[illegible]
A.2 - WITH INDUSTRIAL ENTAILMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1 - [illegible] Ind. Nav. S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2 - M. Santos Com. Nav. Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 - Soc. Paulista Nav. Matarazzo Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4 - Joaquim Fonseca Ind. Com. Nav. S/A	[illegible]	*	*	*	*	*	*	*	*	*	*	*	*
5 - Empr. [illegible] Nav. Costeira S/A	[illegible]	*	*	*	*	*	*	*	*	*	*	*	*
A.3 - TRADING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1 - Linhas Bras. Nav. Ltda. - LIBRA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
2 - [illegible] Nav. S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
3 - Cia. Navegação [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4 - Navegação Antônio Ramos S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5 - Navegação [illegible] Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6 - Navegação [illegible] Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7 - Cia. Nav. [illegible] - CONAV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8 - Navegação Riograndense S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9 - Nav. [illegible] S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10 - [illegible] Nav. S/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11 - [illegible] e Cia. Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12 - Nav. Litor. Bras. S/A - [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13 - Antônio G. Silva Nav. Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14 - Brasileira [illegible] Nav. Ltda.	[illegible]	*	*	*	*	*	*	*	*	*	*	*	*
15 - Nav. [illegible] Ltda.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16 - Cia. Nav. [illegible]	[illegible]	*	*	*	*	*	*	*	*	*	*	*	*
B - STATE COMPANIES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.1 - WITH INDUSTRIAL ENTAILMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
1 - Cia. Siderúrg. Nacional S/A - CSN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
2 - Vale do R. Doce Nav. S/A - DOCENAVE	*	*	*	*	*	*	*	*	*	*	*	*	*
B.2 - TRADING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1 - Cia. Nav. Lloyd Brasileiro	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]
2 - Empr. Nav. Amazônia S/A - ENASA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Data not available

SOURCE: Trade Companies of Shipping lines - SUNAMAM

BOARD 4.15

STRUCTURE OF THE FLEET AND COAST SHIPPING AND LAKE COAST SHIPPING TRAFFIC

1970/1980

KIND OF VESSELS AND TRAFFIC	FLEET (a)												TRAFFIC					
	1970				1975 (b)				1980 (b)				1970 (d)		1975 (e)		1980 (e)	
	Vessels		DW		Vessels		DW		Vessels		DW							
	N°	%	TDW	%	N°	%	TDW	%	N°	%	TDW	%	TON	%	TON	%	TON	%
General load	83	31.2	333,332	79.5	55	74.3	225,628	82.9	36	69.2	179,495	61.8	1,190,235	25.6	1,853,700	17.2	2,000,300	14.8
Solid bulk	9	8.9	59,367	14.2	12	16.2	111,521	31.1	9	17.3	80,926	28.8	3,227,173	69.5	8,329,000	75 6	9,928,600	73.6
Frozen Load	4	4.0	16,209	3.9	-	-	-	-	-	-	-	-	83,456	1.8	-	-	-	-
Liquid bulk																		
Vegetal Oils and Petroleum Products (EXCLUDING FROZEN)	6	5.9	10,295	2.4	-	-	-	-	-	-	-	-	162,772	3.5	-	-	-	-
Others	-	-	-	-	(c)7	9.5	(c)21,630	6.0	(c)7	13.5	(c) 20,931	7.4	-	-	(f)737,800	7.2	(f) 1,049,500	14.6
TOTAL	101	100.0	419,103	100.0	74	100.0	338,779	100.0	52	100.0	281,352	100.0	4,643,636	100.0	10,920,500	100.0	14,958,300	100.0

(a) Vessels above 500 TDW

(b) Remaining and new joined vessels

(c) Freighters, vegetal oils and solid/liquid bulks

(d) Data of accomplishment - List of Load

(e) Forecasts Data - Selected Products

(f) Frozen load, vegetal oils and chemichal/petrochemical products.

SOURCE: PLANAVE - GENACON

5.0 RIVER SHIPPING SYSTEM IN THE MIDDLE COAST OF SÃO FRANCISCO RIVER

5.0 RIVER SHIPPING SYSTEM IN THE MIDDLE COAST OF SÃO FRANCISCO RIVER

5.1 NAVIGABLE NETWORK

The principal part of the middle coast of São Francisco River, adding its tributary stream, has a navigable network of approximately 2,517 km.

According to tables of "Companhia de Navegação do São Francisco", the navigable canal has 1,371 km in the principal part of the river. It goes from Pirapora waterfall, in the State of Minas Gerais, up to Petrolina City, in the left edge and in the State of Pernambuco and also up to Juazeiro City, in the right edge and in the State of Bahia. Both cities are connected by Presidente Dutra highway - railroad bridge.

But the following part, with 150 km, has an irregular shipping line.

After this part, Itaparica and Paulo Afonso waterfalls eliminate the connection between the shipping line of middle distance and the shipping line existing in the navigable 208 km of the low coast of São Francisco River.

In the middle coast of São Francisco River, the course shows little curves, generally very much concordal and of large ray without meandering or hard changes of direction. The navigable canal is very much irregular and there are

several sand banks, islands and circular - shaped beach which frequently divide the river bed in secondary branches. Middle width between the high and steep banks changes from 300 m, in the nearest part of Pirapora, up to 800 m in the lowest part of the river.

The edges are generally formed by high and steep banks of small height and which are covered in the flood period. There are parts of several riverside territories where water reaches 10 km during this period.

In the studied part we may observe only one small waterfalls in Sobradinho which is 40 km from Juazeiro and where a difference of level of 4.50 m in an extension of 9 km is verified.

In the middle coast of São Francisco River there are several navigable tributary streams in its lower part. The following board will show these navigable tributary streams

NAVIGABLE EXTENSIONS

RIVER	NAVIGABLE EXTENSION (KM)	PART
São Francisco	1,371	Pirapora (MG) - Juazeiro (BA).
Grande	351	Mouth in São Francisco River (near to the coast)-Barreiras.
Preto	273	Mouth in Grande River - Formosa.
Corrente	155	Mouth in São Francisco River(near to the Mato ranch)-Sta.Maria da Vitória.
Carinhanha	80	Mouth in São Francisco River - Maruã Waterfall
Urucuia	93	Mouth in São Francisco River (the lowest part of São Romão)-Higher waterfall
Paracatu	104	Mouth in São Francisco River (140 km below of Pirapora) - Cavalos Harbor
Das Velhas	90	Mouth in São Francisco River (36 km below of Pirapora) - Lower waterfall

5.2 SHIPPING LINES

The principal lines of river shipping in the region of the middle coast of São Francisco River and its tributary streams are distributed by the following four (4) branches:

1st - By São Francisco River in Pirapora part (MG) up to Juazeiro (BA), in an extension of 1,371 km.

2nd - By São Francisco River up to its tributary stream (corrente) in Santa Maria da Vitoria City (BA) and it is 852 km from Juazeiro.

3rd - By Grande River up to Barreiros City (BA) and it is 671 km from Juazeiro.

4th - By the navigable part of Preto River, which is the tributary stream of Grande River, up to Ibipetuba (BA) and it is 850 km from Juazeiro.

The shipping line with mechanic propulsion in São Francisco Basin is done, presently, by two companies: "Companhia de Navegação do São Francisco", company of mixed economy and with the participation of Federal Government, and "União dos Barqueiros do São Francisco", company which has several private amateurs.

Companhia de Navegação do São Francisco has vessels of several kinds, since old river vessels with wheel and which use wood as fuel up to modern vessels which are moved by diesel

and which form convoys of 4 semi-integrated flatboats with capacity of 200 T per unit.

"União dos Barqueiros" has vessels of wood hulls and diesel motors with a capacity of load which changes from 20 up to 100 tons.

"Companhia de Navegação do São Francisco" has been keeping on its activities mainly in order to supply loads and passengers transport in Juazeiro-Pirapora line alongside of the middle coast of São Francisco River.

But vessels which are affiliated to União dos Barqueiros accomplish, besides the transport, activities of trade business which are characterized as barters. Vessels which leave from Juazeiro transport manufactured products as salt, kerosene, gasoline, lubricants, medicines and other products. There they change to cattle raising and farming production which proceeds from ranches and farms of ribeirinhas localities and which are mainly composed by cotton, castorbean, wheat, caw cattle, leathers, furs and other products.

5.3 OPERATIONAL SYSTEMS

5.3.1 OPERATIONAL SYSTEM OF CIA. DE NAVEGAÇÃO DO SÃO FRANCISCO

São Francisco River shows different navigability conditions during the seven months of drought (May to December) and during the five months of high tide (December to May).

"Manual do Tráfego" of CNSF establishes operative rules to integrated convoys, which are composed by one push vessel and four (4) flatboats, but other vessels neither in service or passengers transport are not considered.

During the drought period, when natural obstacles appear in a larger number, Pirapora-Juazeiro trip is done in 11 days. The convoy sails only during the daylight and during the night it stops, therefore, it stops eleven times. In the return trip, Juazeiro-Pirapora, the convoy takes 13 days and a half.

During the high tide, with the majority of obstacles covered, Pirapora-Juazeiro trip can be done in 5 days and the return trip in 9 days. The easiest transposal of the most difficult parts during this period allows to finish with the overnight stay and avoid the dismemberment of the convoy. Even so, in Pirapora-Juazeiro trip the convoy is obliged to one dismemberment, in Sobrado, and a stop during the night loning around 23 hours.

According to the last data divulged by SUNAMAM (Year Book of 1972), in São Francisco Basin, 33.5 thousand tons were moved in 1972 and 29.8 thousand tons were moved in 1971. Therefore, we may observe an increase of 12%.

Predominant products were salt (22.7%), grains and cakes not specified (15.4%)magnesite (7.7%), cement (6.8%), cotton and threads (6.1%) oily seeds and medicinal plants, all as general load. Everything is specificated in the following board:

PRODUCTS	TONS	%
1 - Salt - Quantity of Sacks	7,616	22.7
2 - Grains, Cakes not specified - Quantity of sacks	5,156	15.4
3 - Magnesite	2,557	7.7
4 - Cement	2,274	6.8
5 - Cotton and Threads	2,058	6.1
6 - Oily Seeds, Medicinal Plants not specified	1,771	5.3
7 - Animals	1,712	5.1
8 - Wood and its manufacture	1,350	4.0
9 - Manioc Flour - Quantity of Sacks	1,256	3.7
10 - Several Loads	966	2.9
11 - Rice - Quantity of Sacks	834	2.5
12 - Machines and Mechanic Facilities	803	2.4
13 - Castor-bean	774	2.3
14 - Sugar - Quantity of Sacks	683	2.0
15 - Sugar and Confectioner's share Products not specified	510	1.5
16 - Corn - Quantity of Sacks	485	1.4
17 - Others - 173 Products	2,730	8.1
TOTAL OF THE ITEM	33,541	100.0

SOURCE: SUNAMAM

The most important harbors in export were: Juazeiro (60.9%), Santa Maria da Vitoria (11.0%) and Pirapora (9.0%) which have accomplished 80.9% of the load; on the other hand, the most important harbors in import were: Pirapora (31.8%) Juazeiro (18.5%) and Santa Maria da Vitoria (13.5%).

Cia. de Navegação do São Francisco has moved 19.1 thousand t. which is equivalent to 56.9% of the total while groups which are affiliated to União de Banqueiros had parcels very much decreased of road volume and among them we may stand out Raul Nunes dos Santos group which has moved 4%. To accomplish this transport, Cia. de Navegação do São Francisco has reckon upon the help of the following fleet.

KIND	Nº
Mixed Vessels (using wood as fuel)	5
Motor-boats for Passengers (using diesel oil)	2
Towboats (Pushers, motor-boats, towboats)	10
Lighters	1
Flatboats for several purposes	34
TOTAL	52

5,3,2 OPERATIONAL SYSTEM OF UNIÃO DOS BARQUEIROS DO SÃO FRANCISCO

UBSF (União dos Barqueiros do São Francisco) works with motor vessels which belong to private amateurs. In 1970, they had 58 vessels of which only 10 vessels had a metallic sheet bottom and the others were wood vessels. These vessels changed from 10 up to 20 tons of capacity and they had maritime diesel motors of 40 up to 147 HP.

The ferrymen change the manufactured products, which are obtained, generally, in Petrolina and Juazeiro cities, to agricultural products of the region and which are taken in the localities alongside the river. Generally, they obtain, in the cities, salt, kerosene, gasoline, lubricants, medicines and cigarretes which are changed to cotton, castorbean, caw cattle, leathers and furs.

The performance of the ferrymen may be observed alongside the principal part of São Francisco River, from Petrolina-Juazeiro to Januária City. Their performance is more important in the region of the navigable tributary streams (Corrente River, Grande River and its tributary stream Preto River).

Based on previous data, in 1972 these groups have accomplished 43.1% of the transport, which was verified in São Francisco Basin, and which was equivalent to 14.4 thousand tons.