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WORLD AND BRAZILIAN MARKET OF TEXTILE FIBRES EMPHASIZING THE DEVELOPMENT OF MAN-MADE FIBRES AND POLYESTER*

prepared by

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1) TEXTILE FIBERS WORLD MARKET

We start this research by presenting an abridged view on mundial market. We consider this presentation very opportune since Brazil is a very important textile fiber producer, whose capacity is already noticed in the world market.
Therefore the comparison between Brazil and world market development will permit a wider view and a better understanding of the conclusions of this study.
In the past very few textile fibers were used. In the XVII century cotton joined wool, flax, kemp and silk. Rayon appeared in the beginning of the XX century and a great variety of non-cellulosic fibers showed up during the two decades that followed the 2nd world war.
Nylon was the first non-cellulosic fiber put in the market in the decade of 1940. This was the very first synthetic fiber ever produced since rayon viscose and acetate, that existed for a certain while are more properly called artificial fibers since they aren't produced by synthesis but from cellulose, a natural product. This is the reason why they are also called cellulosic and non-cellulosic fibers.
Since then synthetic fiber production has risen vertiginously reaching 12.300.000 tons in 1983 with an increasing rate of 11,5% a year in 63 to 83 period. In the sequence below we show the most important fibers production reached in 1983

Cotton	-	14.525
Wool	-	1.606
Silk	-	55
Rayon + Acetate	-	3.013
Polyamide	-	3.176
Polyester	-	5.575
Acrylic	-	2.227
Olefins	-	1.185
Others	-	124

The following boards, illustrate consumption evolution of the most important fibers since 1963.

BOARD I

WORLD CONSUMPTION OF TEXTILE FIBERS

in 1000 tons.

YEAR	NATURAL FIBERS				MAN-MADE FIBERS *1		
	COTTON	WOOL	SILK	TOTAL	CELLULOSIC *2	SYNTHETIC	TOTAL
1963	10.950	1.510	31	12.491	3.058	1.335	4.393
1964	11.300	1.484	32	12.816	3.230	1.690	4.980
1965	11.600	1.488	33	13.121	3.335	2.053	5.388
1966	10.500	1.550	33	12.083	3.340	2.487	5.827
1967	10.400	1.570	34	12.004	3.335	2.878	6.213
1968	11.650	1.620	37	13.307	3.535	3.785	7.320
1969	11.250	1.610	39	12.899	3.560	4.415	7.965
1970	11.120	1.590	40	12.750	3.430	5.030	8.460
1971	12.750	1.550	40	14.340	3.440	6.010	9.450
1972	13.372	1.455	42	14.869	3.555	6.923	10.478
1973	13.537	1.425	44	15.006	3.661	8.298	11.959
1974	13.787	1.502	45	15.334	3.539	8.178	11.717
1975	11.863	1.514	40	13.417	2.965	8.060	11.025
1976	12.632	1.462	48	14.142	3.211	9.416	12.627
1977	13.841	1.488	49	15.378	3.281	10.111	13.392
1978	12.897	1.528	51	14.476	3.318	11.031	14.349
1979	14.080	1.576	55	15.711	3.371	11.659	15.030
1980	13.991	1.604	56	15.651	3.242	11.548	14.790
1981	15.343	1.625	57	17.025	3.204	11.913	15.117
1982	14.641	1.623	55	16.319	2.942	11.188	14.130
1983	14.525	1.606	55	16.186	3.013	12.287	15.300
Annual growth rate % (73/83)				1,0	0,0	4,0	

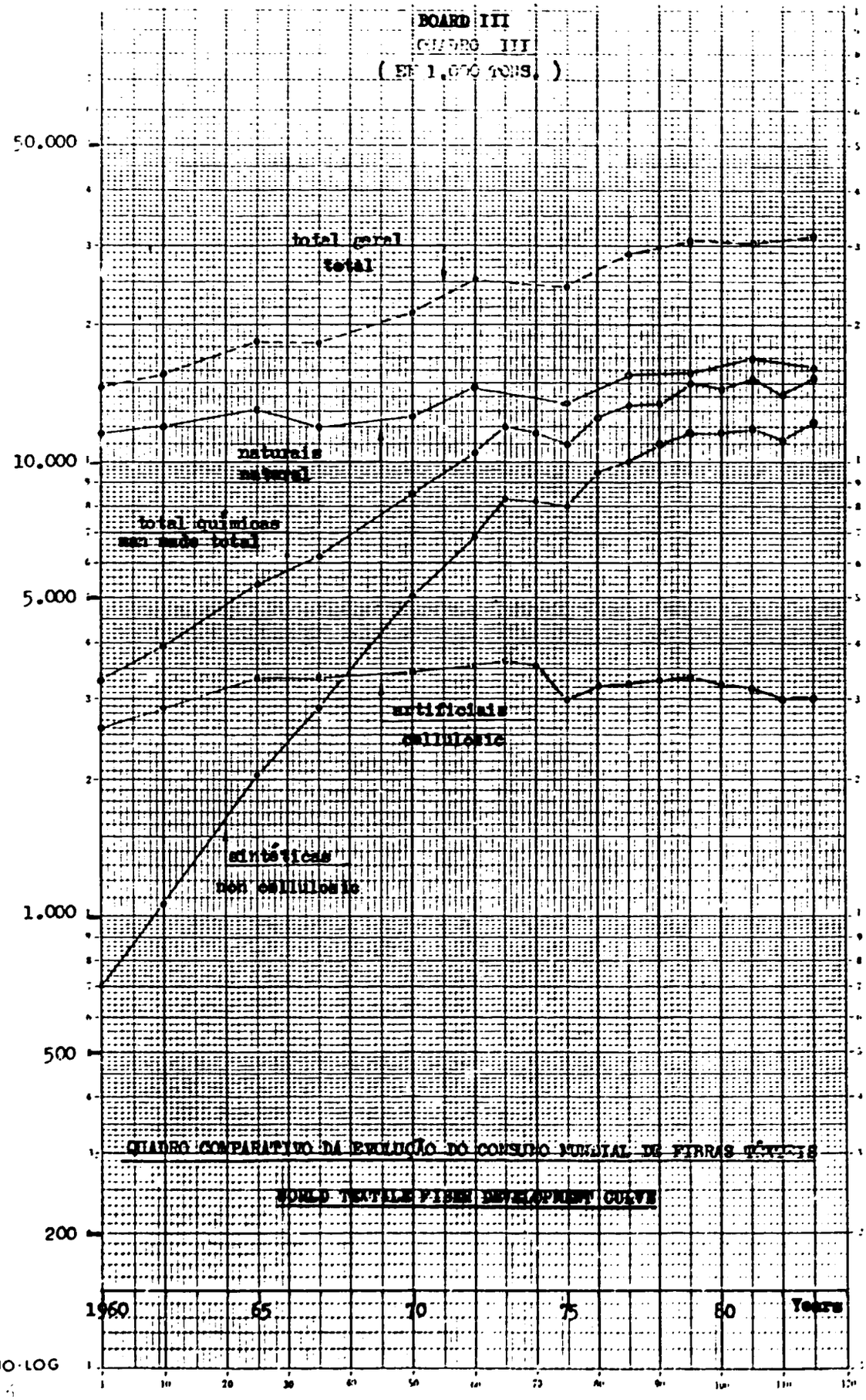
*1 Include Olefin

*2 Rayon + Acetate

BOARD II

PERCENT WORLD DEVELOPMENT OF TEXTILE FIBERS

YEAR	NATURAL	CELLULOSIC	SYNTHETIC
1963	74,0	18,1	7,9
1964	72,0	18,5	9,5
1965	70,9	18,0	11,1
1966	67,5	18,6	13,9
1967	65,9	18,3	15,8
1968	64,5	17,1	18,4
1969	61,7	17,1	21,2
1970	60,1	16,2	23,7
1971	60,2	14,6	25,2
1972	58,7	14,0	27,3
1973	55,6	13,6	30,8
1974	56,7	13,1	30,2
1975	54,9	12,1	33,0
1976	52,8	12,0	35,2
1977	53,5	11,3	35,2
1978	50,2	11,5	38,3
1979	51,1	11,0	37,9
1980	51,4	10,7	37,9
1981	53,0	10,0	37,0
1982	53,6	9,7	36,7
1983	51,4	9,6	39,0



QUADRO COMPARATIVO DA EVOLUÇÃO DO CONSUMO MUNDIAL DE FIBRAS TÊXTEIS

WORLD TEXTILE FIBER DEVELOPMENT CURVE

In 1983 the production is divided into chemical fibers (Artificial and Synthetic) with about 15.300.000 tons - 48,6% - and natural fibers with 16.200.000 tons i.e. 51,4% of the total.

Among natural fiber cotton and wool must be detached since other fiber production is irrelevant, in percent, relating to them.

Taking into account chemical fibers only, synthetic fiber consumption overcome artificial fiber in 1968 with 3.785.000 tons against 3.535.000 tons and tripling this consumption in 1983.

Analysing the former boards we can realise that the participation of man-made fibers in global consumption is rapidly increasing and attain natural fibers consumption in 1980 decade.

Synthetic fibers are the ones, among man-made fibers that show the biggest development rate. It's possible to forecast that synthetic production will overcome 50% of textile fiber world production, in 80's.

Concerning their uses and forms, man-made fibers are divided into two big groups: yarn and staple.

Technological process development of Synthetic yarn production and transformation in order to be used in knitting and hosiery stimulated a real "boom" in their applications and usages.

2) SYNTHETIC FIBERS

The demand growth of petrochemical synthetic fiber has been so high that has converged the attention of both textile fiber industries and their derivate products. Petrochemical four most important synthetic fibers that have received an excepcional development are: Polyamides(Nylon), Polyesters, Acrylics and Olefins.
Synthetic fiber overcame artificial fibers production and consumption with a development of 31% in 1968 attaining a total of 3.785.000 tons.
Only the development registered in 1968 (31%) that was of 907.000 tons. is equal to the total synthetic fiber production in 1961 (830.000 tons.) and it's half the production in 1964 (1.690.000 tons.). So far, synthetic fiber revolution has almost exclusively happened in U.S.A., West Europe and Japan.
These countrie production was of 3.416.500 tons., 2.316.100 tons. and 1.361.300 tons. respectively in 1983, this production was of 7.093.900 tons., what is 57,7% of the world production. Considering their importance we list below 15 of the major synthetic fibers producer countries and their production in 1983:

1º - United States	3.416.500 tons.	-	27,8%
2º - Japan	1.361.300 tons.	-	11,1%
3º - Germany F.R.	818.700 tons.	-	6,7%
4º - Taiwan	797.400 tons.	-	6,5%
5º - Korea R.	664.900 tons.	-	5,4%
6º - U.R.S.S.	640.000 tons.	-	5,2%
7º - Italy/Malta	522.000 tons.	-	4,2%
8º - China P.R.	400.000 tons.	-	3,2%
9º - United Kingdom	307.700 tons.	-	2,5%
10º - Mexico	289.200 tons.	-	2,3%
11º - Spain	265.800 tons.	-	2,2%
12º - France	227.300 tons.	-	1,9%
13º - Brasil	219.359 tons.	-	1,8%
14º - Romanie	156.000 tons.	-	1,3%
15º - Turkey	155.500 tons.	-	1,3%
	10.243.600 tons.		83,3%
Indonesia	138.500 tons.	-	1,1%
India	127.600 tons.	-	1,0%
Thailand	82.000 tons.	-	0,7%
Iran	40.000 tons.	-	0,3%
Colombia	40.000 tons.	-	0,3%
Pakistan	17.500 tons.	-	0,1%
Egypt	16.100 tons.	-	0,1%

These countries produced 83,3% of the world total, that was of 12.287.000 tons.
In the following board we show the world most important synthetic fiber production development from the very begining in 1942.

BOARD VI

WORLD SYNTHETIC FIBERS PRODUCTION DEVELOPMENT

1.000 tons.

YEAR	NYLON	ACRYLIC	POLYESTER	OLEFIN*2	OTHERS	TOTAL
1942	10					10
1947	24					24
1950	56	3			10	69
1952	102	7	1		19	129
1954	142	13	7		33	195
1956	212	37	23		37	309
1958	263	62	50		45	420
1960	407	110	123		65	705
1961	480	122	151		77	830
1962 *1	612	164	208		98	1.082
1963	799	212	264	36	84	1.335
1964	902	301	339	59	89	1.690
1965	1.020	405	457	66	105	2.053
1966	1.220	460	590	118	99	2.487
1967	1.325	540	758	146	109	2.878
1968	1.635	735	1.055	206	154	3.785
1969	1.830	856	1.360	227	143	4.415
1970	1.904	1.000	1.640	338	148	5.030
1971	2.166	1.170	2.127	449	146	6.058
1972	2.437	1.269	2.523	563	148	6.940
1973	2.730	1.577	3.177	682	156	8.322
1974	2.623	1.448	3.272	714	144	8.201
1975	2.489	1.391	3.360	716	106	8.062
1976	2.847	1.727	3.885	841	116	9.416
1977	2.938	1.790	4.300	962	121	10.111
1978	3.139	2.021	4.750	997	124	11.031
1979	3.274	2.069	5.126	1.058	132	11.659
1980	3.151	2.060	5.127	1.072	138	11.548
1981	3.139	2.090	5.465	1.086	133	11.913
1982	2.867	2.061	5.081	1.048	131	11.188
1983	3.176	2.227	5.575	1.185	124	12.287
ANNUAL GROWTH RATE % (73/83)	1,5	3,8	5,7	5,5	0,0	4,0
% GROWTH LAST TEN YEARS 73/83	16,3	41,2	75,5	73,8	0,0	47,6

*1 Up to 1962 Olefin were classified as "others"

*2 Olefin include the production of Yarn, Staple and Film Fiber

BOARD VIII

WORLD MARKET TEXTILE FIBER DEMAND FORECAST

in 1.000 tons.

FIBERS	1960	(%)	1970	(%)	1983	(%)
Natural	11.591	(77,8)	12.750	(60,1)	16.186	(51,4)
Cellulosic	2.606	(17,5)	3.430	(16,2)	3.013	(9,6)
Synthetic	705	(4,7)	5.030	(23,7)	12.287	(39,0)
TOTAL	14.902	(100,0)	21.210	(100,0)	31.486	(100,0)
Polyamide	407	(2,73)	1.904	(8,98)	3.176	(10,1)
Polyester	123	(0,82)	1.640	(7,73)	5.575	(17,7)
Acrylic	110	(0,74)	1.000	(4,71)	2.227	(7,0)
Olefin	-	(-)	338	(1,59)	1.185	(3,8)
Others	65	(0,44)	148	(0,70)	124	(0,4)
TOTAL	705	(4,70)	5.030	(23,70)	12.287	(39,0)

Admitting the demand growth rate avarage from 73/83 for all tertile fiber and considering each type of synthetic fiber and their demand development among the tertile fibers, we may forecast the demand capacity for 1987/1988.

DEMAND FORECAST FOR 87/88 IN 1.000 TONS.

Natural	(1,0% year) -	17.000.000 tons. -	48,6%
Cellulosic	(0,0% year) -	3.000.000 tons. -	8,6%
Synthetic	(4,0% year) -	14.950.000 tons. -	42,8%
TOTAL		34.950.000 tons. -	100,0%
Polyamide	(1,5% year) -	3.400.000 tons. -	9,7%
Polyester	(5,7% year) -	7.300.000 tons. -	20,9%
Acrylic	(3,8% year) -	2.600.000 tons. -	7,4%
Olefin	(5,5% year) -	1.500.000 tons. -	4,4%
Others	(0,0% year) -	150.000 tons. -	0,4%
TOTAL		14.950.000 tons. -	42,8%

3) BRAZILIAN TEXTILE FIBER MARKET

Brazilian textile fiber consumption which was of 513.800 tons. in 1970 reached the amount of 644.200 tons. in 1983. During this period the growth rate average has been of 4,0% a year, a considerable rate if we take into account that the demographie growth rate has been smaller (about 2,7% a year). Market structure, however, has soffered very deeps transformations relating to its structure of consumption among different textile fibers.

Natural fiber reached their almost absolute predominance, 90,4% of the / market in 1950, to man-made fibers, since they fell to 76,2 in 1983.

Regarding to man made fibers, synthetic fibers has had a bigger penetration in the general context, since they passed from 0,1% in 1950 to 20,1% in 1983, while cellulosic fibers, whose percent was of 9,5 in 1950, fell to 3,7% in 1983. The following boards show the Brazilian market demand behaviour in 1983 :

- Cotton	556.700 t	643.100 t
- Wool	13.200 t	
- Jute	62.900 t	
- Natural others	10.300 t	

- Polyamide - Polyester - Acrylic - Olefin - Others	Synthetic	169.400 t

- Rayon Viscose - Acetate	Cellulosic	31.700 t

BOARD IX

BRAZILIAN TEXTILE FIBER CONSUMPTION DEVELOPMENT

in 1.000 tons.

YEAR	NATURAL FIBERS					MAN MADE FIBERS			TOTAL
	COTTON	WOOL	JUTE	OTHERS *1	TOTAL	CELLULOSIC	NON-CELLULOSIC	TOTAL	
1950	178,5	14,8		0,1	193,4	20,4	0,2	20,6	214,0
1960	261,3	13,4		34,6	309,3	40,7	4,9	45,6	354,9
1961	298,7	17,2		31,6	347,5	42,1	6,0	48,1	395,6
1962 *2	312,6	17,7		32,0	362,3	41,7	9,2	50,9	413,2
1963	274,8	12,4	54,9	7,9	350,0	39,5	11,9	51,4	401,4
1964	267,7	8,7	53,3	9,3	339,0	41,2	13,3	54,5	393,5
1965	270,3	7,9	64,6	10,6	353,4	41,6	14,9	56,5	409,9
1966	263,0	6,3	58,8	14,9	343,0	47,4	21,3	68,7	411,7
1967	270,0	9,1	63,5	14,1	356,7	49,4	24,4	73,8	430,5
1968	283,5	10,8	54,0	19,1	367,4	57,5	36,7	94,2	461,6
1969	288,6	11,0	51,5	20,1	371,2	51,8	37,8	89,6	460,8
1970	291,3	13,8	66,7	23,1	394,9	56,1	62,8	118,9	513,8
1971	296,1	15,6	62,7	24,1	398,5	58,7	78,8	137,5	536,0
1972	325,0	15,2	69,4	25,8	435,4	60,1	102,2	162,3	597,7
1973	379,3	13,0	86,0	21,2	499,5	67,1	139,6	206,7	706,2
1974	397,0	11,0	84,8	20,1	512,9	65,8	159,9	225,7	738,6
1975	420,0	8,9	87,7	18,6	535,2	58,0	161,9	219,9	755,1
1976	445,0	14,5	86,1	15,6	561,2	59,9	201,9	261,8	823,0
1977	452,6	11,1	85,3	13,8	562,8	49,5	214,9	264,4	827,2
1978	510,0	13,7	75,0	9,2	607,9	45,4	224,8	270,2	878,1
1979	552,5	16,6	97,5	16,2	682,8	48,6	219,8	268,4	951,2
1980	572,4	18,4	109,7	18,7	719,2	48,8	240,4	289,2	1.008,4
1981	561,9	16,3	94,0	14,5	686,7	42,1	183,1	225,2	911,9
1982	580,6	17,5	85,9	9,6	693,6	41,4	193,2	234,6	928,2
1983	556,7	13,2	62,9	10,3	643,1	31,7	169,4	201,1	844,2
ANNUAL GROWTH RATE % (70/83)					4,0	0,0	8,0	-	4,0

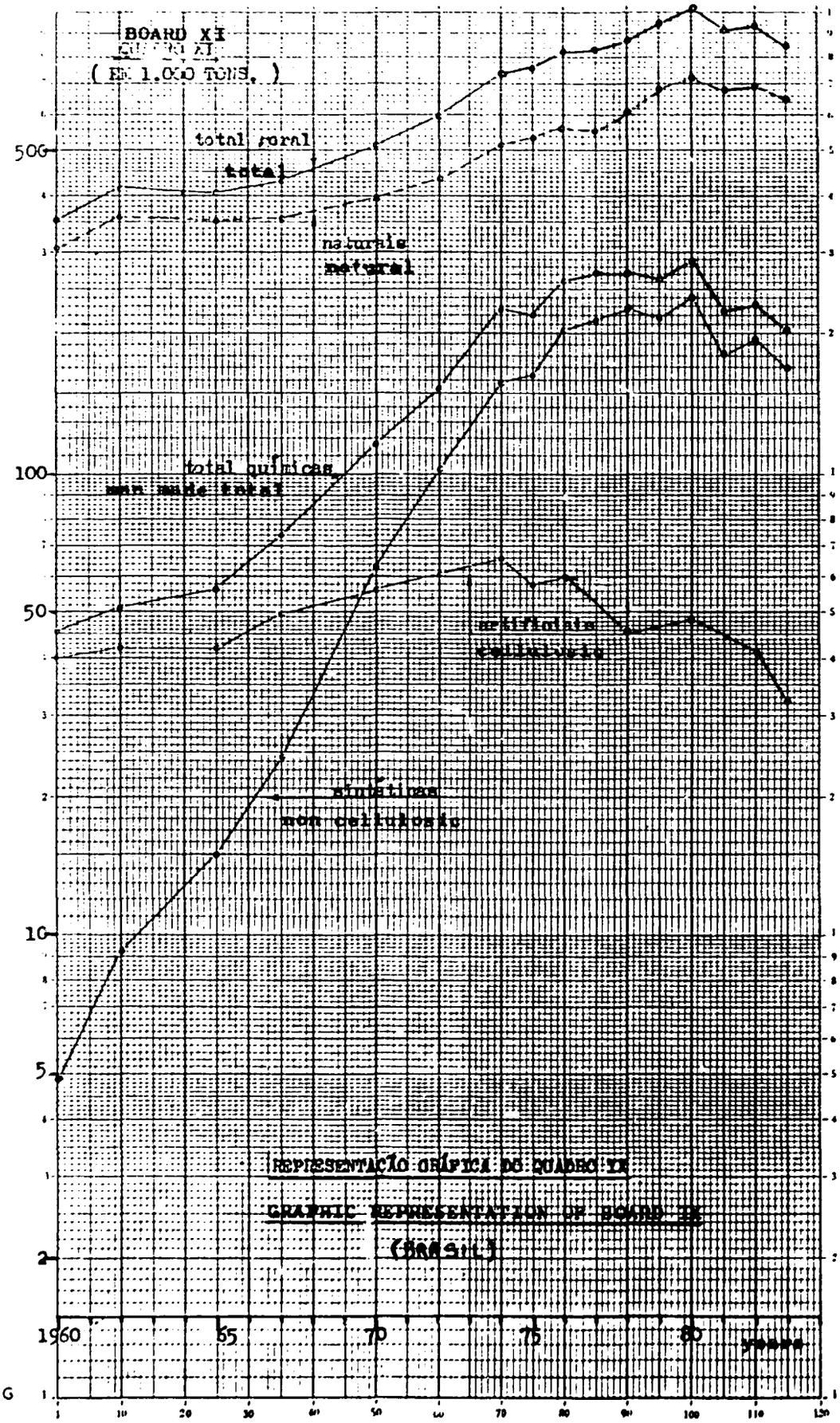
*1 Included Silk, Ramie and Flax

*2 Up to 1962 Jute was classified as "Others"

BOARD X

PERCENT BRAZILIAN DEVELOPMENT OF TEXTILE FIBER

YEAR	NATURAL	CELLULOSIC	NON CELLULOSIC
1950	90,4	9,5	0,1
1960	87,1	11,5	1,4
1961	87,8	10,7	1,5
1962	87,7	10,1	2,2
1963	87,2	9,8	3,0
1964	86,1	10,5	3,4
1965	86,2	10,2	3,6
1966	83,3	11,5	5,2
1967	82,8	11,5	5,7
1968	79,5	12,5	8,0
1969	80,6	11,2	8,2
1970	76,9	10,9	12,2
1971	74,3	11,0	14,7
1972	72,8	10,1	17,1
1973	70,7	9,5	19,8
1974	69,4	8,9	21,7
1975	70,9	7,7	21,4
1976	68,2	7,3	24,5
1977	68,0	5,9	26,0
1978	69,2	5,2	25,6
1979	71,8	5,1	23,1
1980	71,3	3,9	23,8
1981	75,3	4,6	20,1
1982	74,7	4,4	20,9
1983	76,2	3,7	20,1



REPRESENTAÇÃO GRÁFICA DO QUADRO XI

GRAPHIC REPRESENTATION OF BOARD XI

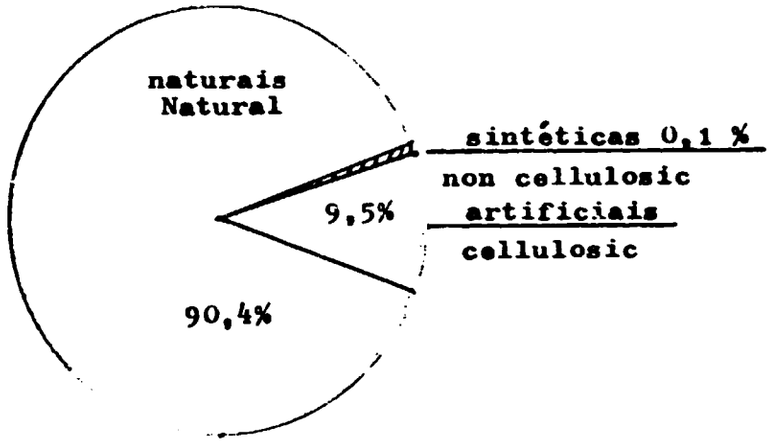
(BRASIL)

BOARD XII
QUADRO XII

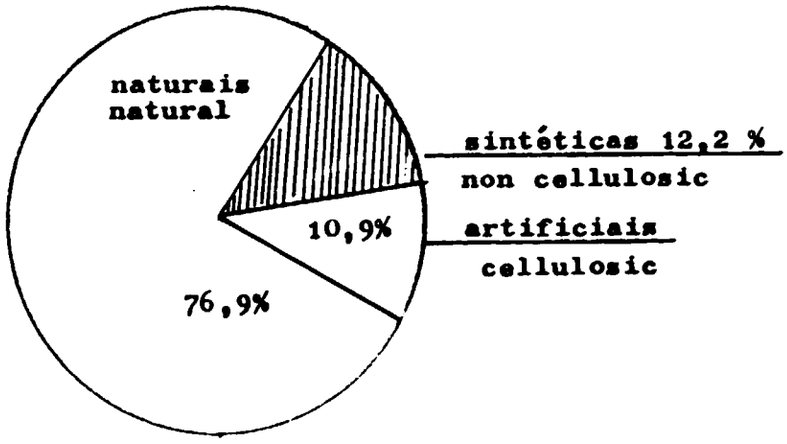
REPRESENTAÇÃO GRÁFICA DO QUADRO X

GRAPHIC REPRESENTATION OF BOARD X

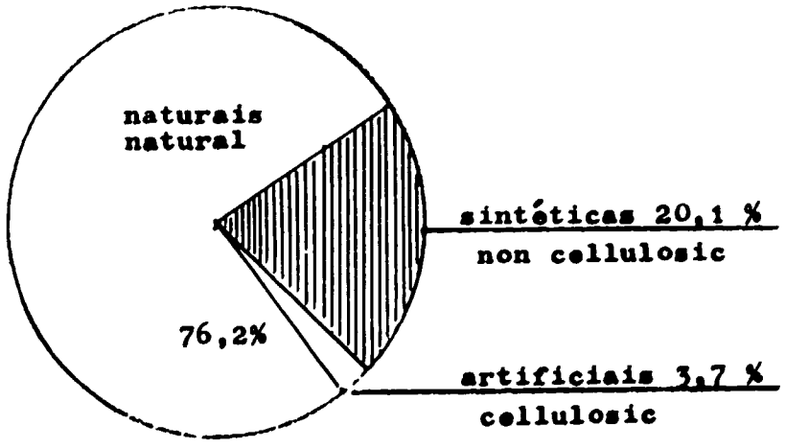
1950



1970



1983



BOARD XIII

BRAZILIAN MARKET TEXTILE FIBER DEMAND FORECAST

in 1.000 tons.

FIBERS	1960	(%)	1970	(%)	1983	(%)
Natural	309,3	(87,1)	394,9	(76,9)	643,1	(76,2)
Cellulosic	40,7	(11,5)	56,1	(10,9)	31,7	(3,7)
Synthetic	4,9	(1,4)	62,8	(12,2)	169,4	(20,1)
TOTAL	354,9	(100,0)	513,8	(100,0)	844,2	(100,0)

Admitting the maintenance of 70/83 avarage consumption development for all textile fiber and considering as a term of comparison the world market we may forecast / that Brazilian market demand for 87/88 will be :

FIBERS		1987/1988 tons.	(%)
Natural	(4,0% year)	780.000	(73,9)
Cellulosic	(0,0% year)	40.000	(2,7)
Synthetic	(8,0% year)	250.000	(23,4)
TOTAL		1.070.000	(100,0)

Comparing Brazilian and world market we can immediately realize that Brazil is not an exception to the rule.

In this way we can perfectly forecast a mean-term demand by projecting to the future statistics data, percentages and/or market development curves.

4) SYNTHETIC FIBERS IN BRAZIL

Brazilian synthetic fiber production was of 221.300 tons. in 1983. This amount is only 2,2% of the world production which reached 12.287.000 tons.

Brazilian synthetic production in 1983 includ Brazil among the 15 most important producers: (see pg. 6)

Synthetic fiber penetration in the Brazilian market started around 1950 when / Brazil imported 200 tons. of Nylon.

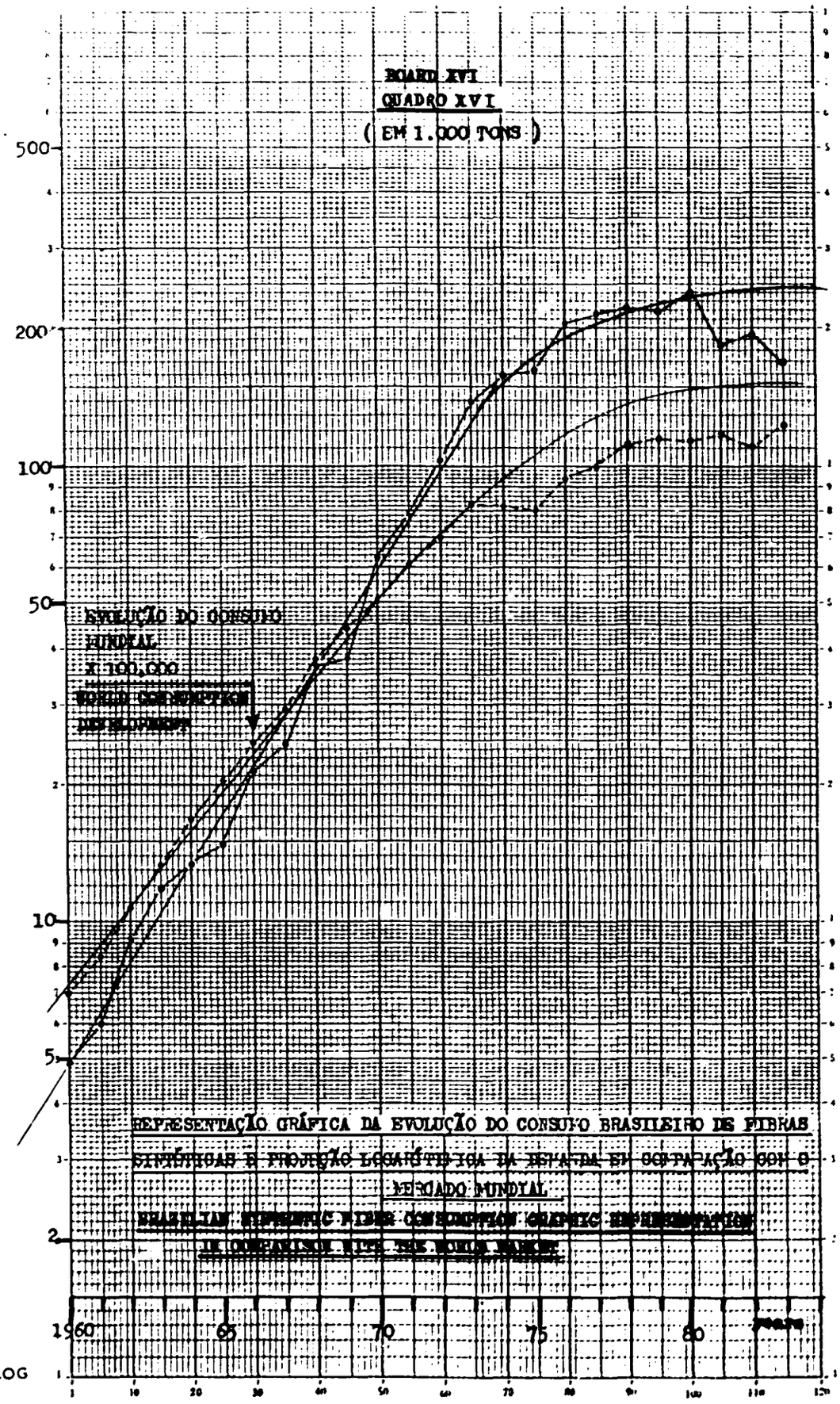
Brazilian demand projection of synthetic yarn from 60 to 83 allows a forecast with a close estimate of these fibers future demand for the next years:

Analysis on the boards IX, X, XI, XII, XIII, XVI and XVII.

The analysis on the former boards demonstrates that the synthetic fiber penetration in the Brazilian market is not an exception to the world market rule.

We can perfectly notice that natural fiber percent participation in the market is falling off (90,4% in 1950 and 76,2% in 1983). Artificial fibers, after having show a relative development also diminished their participation (9,5% in 1950 and 3,7% in 1983) while synthetic fibers are gradually absorbing the biggest part of the market (0,1% in 1950 and 20,1% in 1983).

This greater development of synthetic fibers in the consumption is a tendency that will be kept until Brazil reaches "per capita" consumption rates according to our size and importance in the world market (see Board XIX).



REPRESENTAÇÃO GRÁFICA DA EVOLUÇÃO DO CONSUMO BRASILEIRO DE FIBRAS SINTÉTICAS E PROJEÇÃO LOGARÍTMICA DA MESMA EM COMPARAÇÃO COM O MERCADO MUNDIAL

BRAZILIAN SYNTHETIC FIBER CONSUMPTION GRAPHIC REPRESENTATION IN COMPARISON WITH THE WORLD MARKET

5) BRAZILIAN SYNTHETIC FIBER PRODUCTION CAPACITY

Brazilian synthetic fiber production was of 4.500 tons. in 1960 reaching about 220.000 tons. in 1983.

Considering the last four years of retraction in Brazilian market specially in the textile market, we can forecast the below stimated situation for 1987/1988:

- Market demand — 250.000 tons.
- Producing capacity — 260/280.000 tons.

In spite of the development of Brazilian synthetic fiber industry, we can forecast the future demand by projecting the last years consumption (70/83) what / shows us the situation in the nearly future when the demand will reach again the producing capacity.

BOARD XVII

BRAZILIAN SYNTHETIC FIBER PRODUCTION DEVELOPMENT

in ton.

YEAR	POLYAMIDE			POLYESTER			ACRYLIC	OLEFIN			LYCRA	TOTAL
	YARN	STAPLE	INDUSTR YARN	YARN	STAPLE	INDUSTR YARN	STAPLE	YARN	MONO TAPE	STAPLE		
1960	4.500											4.500
1961	5.500											5.500
1962	8.000	200			1.000							9.200
1963	8.000	300			1.600							9.900
1964	8.000	1.000	1.000		2.600							12.600
1965	7.674	1.022	1.855	60	3.815							14.424
1966	9.444	1.314	2.561	213	5.688							19.220
1967	8.366	1.195	3.228	545	6.500							19.834
1968	11.862	1.538	4.100	1.120	8.300		700		150			27.770
1969	11.800	1.435	4.690	2.000	9.500		1.000		450	150		31.025
1970	16.300	1.850	6.420	4.200	12.470	130	2.850	150	2.000	160		46.530
1971	19.100	1.970	6.850	5.710	15.140	80	4.100	160	2.500	300		55.910
1972	23.550	3.270	6.800	14.000	19.030	80	6.530	400	3.200	400		77.260
1973	26.531	4.131	9.307	27.218	26.593	120	9.209	464	11.897	692		116.162
1974	26.734	5.522	10.793	31.105	30.329	106	11.105	960	14.600	1.651		132.905
1975	32.694	4.722	12.351	34.865	28.553	132	12.198	1.440	16.500	1.872	360	145.687
1976	37.244	6.416	14.239	43.092	39.275	1.911	15.054	900	23.740	2.600	360	184.831
1977	38.288	6.951	15.143	39.962	43.304	2.165	13.969	1.023	28.328	3.267	400	192.800
1978	43.912	7.923	16.492	42.679	50.210	2.246	16.407	1.500	34.000	4.500	400	220.269
1979	42.410	8.213	28.031	49.227	62.380	2.372	20.803	1.450	32.750	4.800	420	252.856
1980	44.733	8.600	33.673	52.827	63.892	2.840	22.530	1.480	33.670	4.850	410	269.505
1981	31.374	5.560	32.109	46.467	62.713	2.921	20.219	1.300	34.100	4.600	380	241.743
1982	36.528	6.313	26.073	47.399	55.653	4.191	21.837	1.320	33.430	4.250	370	237.364
1983	29.297	5.869	26.719	44.466	54.980	4.606	20.440	1.280	30.520	4.200	320	222.697

BOARD XVIII

BRAZILIAN SYNTHETIC FIBER CONSUMPTION "PER CAPITA"

YEAR	INHABITANTS * X 1000	CONSUMPTION PER YEAR TONS.	PER CAPITA CONSUMPTION GR
1950	51.944	200	3,8
1960	70.119	4.900	69,9
1961	71.800	6.000	83,6
1962	73.900	9.200	124,5
1963	76.200	11.900	156,2
1964	78.400	13.300	169,6
1965	81.000	14.900	183,9
1966	85.000	21.300	250,6
1967	87.600	24.400	278,5
1968	90.200	36.700	406,9
1969	92.500	37.800	408,7
1970	93.139	62.800	674,3
1971	96.000	78.800	820,8
1972	98.700	102.200	1.035,5
1973	101.430	139.600	1.376,3
1974	104.240	159.900	1.534,0
1975	107.150	161.900	1.511,0
1976	110.120	201.900	1.833,5
1977	113.210	214.900	1.898,2
1978	115.900	224.800	1.940,0
1979	118.700	219.800	1.852,0
1980	121.500	240.400	1.980,0
1981	124.500	183.100	1.470,0
1982	127.500	193.200	1.515,0
1983	130.500	169.400	1.300,0
1987/88	146.000	250.000	1.712,3

* ONU - Monthly Bulletin of Statistics
IBGE - Annual Bulletin of Statistics

The 1987/88 years has been obtained from projections of the XIII BOARD and from forecast of Brazilian demographic growth.

BOARD XIX

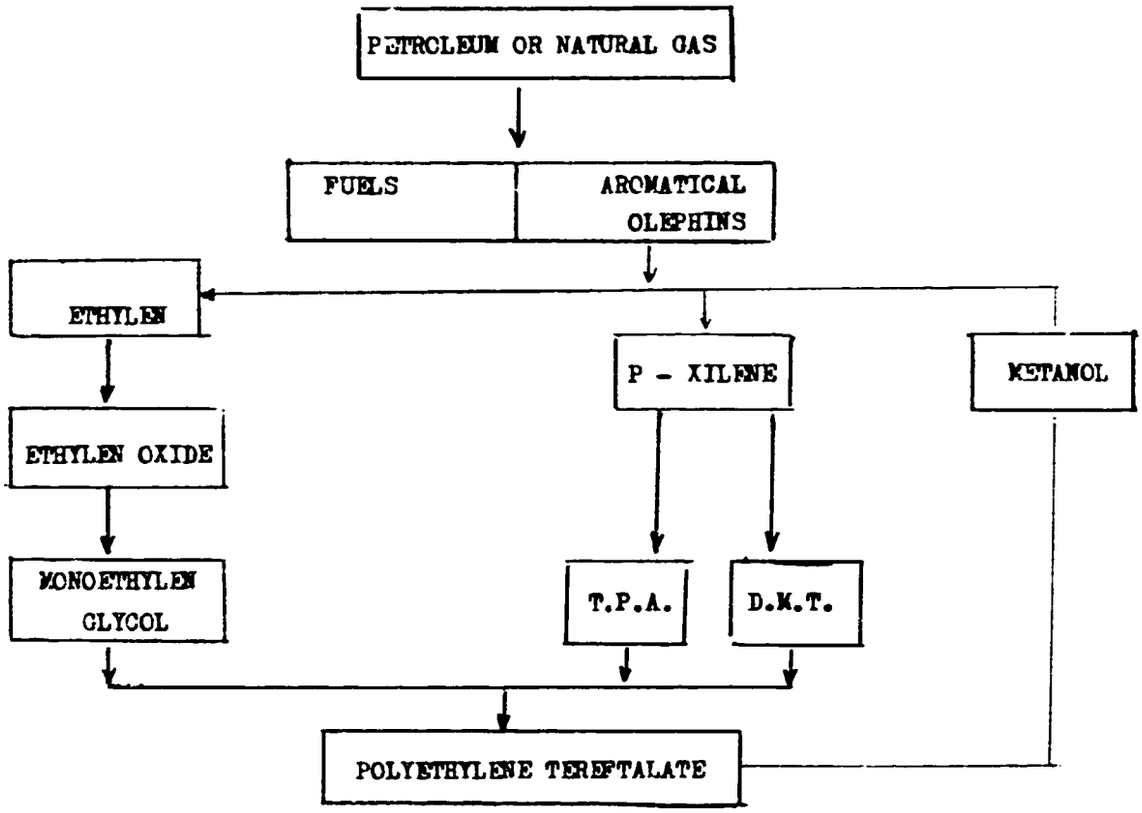
WORLD SYNTHETIC FIBER BIGGEST CONSUMERS AND THEIR "PER CAPITA" INDEX

1977

COUNTRY	INHABITANTS	CONSUMPTION PER YEAR TONS.	PER CAPITA CONSUMPTION KG
1º) Taiwan	17.000.000	395.000	23,2
2º) U.S.A.	216.820.000	3.183.000	14,7
3º) Corea Rep.	36.500.000	374.000	10,3
4º) Benelux	24.200.000	209.000	8,6
5º) Japan	114.500.000	948.000	8,3
6º) Canada	23.240.000	194.000	8,3
7º) United Kingdon	56.000.000	432.000	7,7
8º) West Germany	62.000.000	440.000	7,1
9º) Spain	36.300.000	225.000	6,2
10º) Italy / Malta	56.870.000	326.000	5,7
11º) Poland	34.100.000	194.000	5,7
12º) France	53.000.000	247.000	4,7
13º) Mexico	65.800.000	200.000	3,0
14º) Brazil	113.210.000	214.900	1,9
15º) Indonezia	143.000.000	194.000	1,4
	OTHER COUNTRIES OF SOUTH AMERICA		
- Venezuela	13.000.000	30.900	2,4
- Colombia	25.000.000	48.600	1,9
- Argentina	25.900.000	51.000	2,0

6) TEXTILE POLYESTER FIBER IN BRAZIL

Polyesters are polymers produced by polyesterification of and acid (DMT or TPA) with a diol (ethylene-glycol) technically known as Polyethylene Tereftalate.



Polyester textile fibers are divided in two main groups:

- YARN
- STAPLE

In Brazil textile polyester was put on the market in the beginning of 50's decade. At that time the first quantities of staple had been imported to be tested and blended with cotton - SUDANTEX and RHODIA - put the product in the market under Nycron and Tergal brands respectively.

BOARD XX

STATISTICAL BALANCE OF CONSUMPTION AND PRODUCTION DEVELOPMENT OF BRAZILIAN TEXTILE POLYESTER

in 1.000 tons.

YEAR	YARN				STAPLE				TOTAL			
	CONS.	PROD.	IMPORT.	(EXPORT)	CONS.	PROD.	IMPORT.	(EXPORT)	CONS.	PROD.	IMPORT.	(EXPORT)
1960	-	-	-	-	-	-	0,2	-	-	-	0,2	-
1961	-	-	-	-	-	-	0,3	-	-	-	0,3	-
1962	-	-	-	-	1,4	1,0	0,4	-	1,4	1,0	0,4	-
1963	0,1	-	0,1	-	2,6	1,6	1,0	-	2,7	1,6	1,1	-
1964	0,1	-	0,1	-	3,0	2,6	0,4	-	3,1	2,6	0,5	-
1965	0,1	0,1	-	-	4,0	3,8	0,2	-	4,1	3,9	0,2	-
1966	0,2	0,2	-	-	6,7	5,7	1,0	-	6,9	5,9	1,0	-
1967	0,7	0,5	0,2	-	6,5	6,5	-	-	7,2	7,0	0,2	-
1968	2,3	1,1	1,2	-	9,1	8,3	0,8	-	11,3	9,4	2,0	-
1969	3,1	2,0	1,1	-	10,9	9,5	1,4	-	14,0	11,5	2,5	-
1970	7,5	4,3	3,2	-	15,0	12,5	2,5	-	22,5	16,8	5,7	-
1971	15,0	5,8	9,2	-	21,1	15,1	6,0	-	36,1	20,9	15,2	-
1972	22,2	14,1	8,1	-	25,2	19,0	6,2	-	47,4	33,1	14,3	-
1973	36,3	27,3	9,0	-	30,1	26,6	3,5	-	66,4	53,9	12,5	-
1974	40,8	31,2	9,6	-	35,8	30,3	5,5	-	76,6	61,5	15,1	-
1975	38,1	35,0	3,1	-	30,4	28,6	1,8	-	68,4	63,6	4,9	-
1976	46,8	45,0	1,8	-	41,8	39,3	2,5	-	88,6	84,3	4,3	-
1977	42,0	42,1	1,2	(0,4)	45,1	43,3	1,4	(0,5)	87,1	85,4	2,6	(0,9)
1978	43,0	44,9	1,9	(0,4)	48,7	50,2	0,8	(3,8)	91,7	95,1	2,7	(4,2)
1979	51,1	51,6	0,3	(0,7)	59,8	62,4	1,0	(5,9)	110,9	114,0	1,3	(6,6)
1980	54,7	55,7	1,5	(0,5)	61,0	63,9	1,1	(4,7)	115,7	119,6	2,6	(5,2)
1981	44,5	49,4	0,6	(5,6)	47,2	62,7	1,1	(17,5)	91,7	112,1	1,7	(23,1)
1982	46,6	51,6	0,5	(3,6)	47,2	55,7	0,6	(7,9)	93,8	107,3	1,1	(11,5)
1983	40,0	49,1	0,3	(6,6)	38,7	55,0	0,6	(16,3)	78,7	104,1	0,9	(22,9)
ANNUAL GROWTH RATE % 70/83	14,0				7,5				10,0			

BOARD XXI

TEXTILE POLYESTER COMPARATIVE EVOLUTION

PRODUCTION — in 1.000 tons.

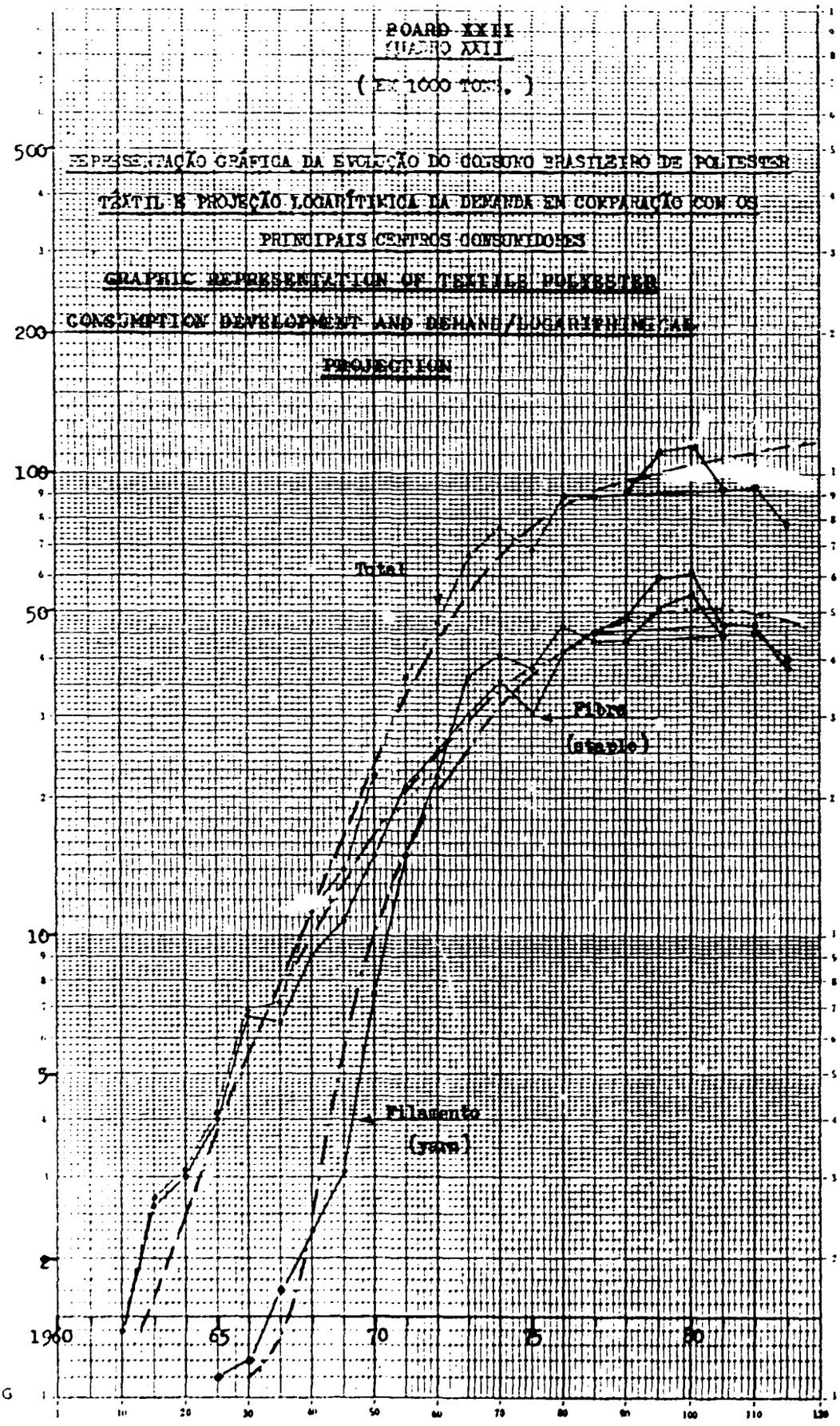
YEAR	U.S.A.	WESTERN EUROPE	JAPAN	BRAZIL
1970	666	459	309	16,8
1972	1.055	657	390	83,1
1974	1.327	784	466	61,5
1976	1.515	799	535	84,3
1978	1.724	822	637	95,1
1980	1.809	766	626	119,6
1982	1.437	827	628	107,2
1983	1.608	843	630	104,1
GROWTH RATE AVERAGE % 70/83	7,0	4,9	5,6	15,0

BOARD XXII
QUADRO XXII

(Em 1000 Tons.)

REPRESENTAÇÃO GRÁFICA DA EVOLUÇÃO DO CONSUMO BRASILEIRO DE POLIESTER TÊXTIL E PROJEÇÃO LOGARÍTMICA DA DEMANDA EM COMPARAÇÃO COM OS PRINCIPAIS CENTROS CONSUMIDORES

GRAPHIC REPRESENTATION OF TEXTILE POLYESTER CONSUMPTION DEVELOPMENT AND DEMAND/LOGARITHMIC PROJECTION



MONO LOG

The consumption growth will maintain this accelerate rhythm until 1977. In the next future Brazilian demand reaches consumption per capita levels within more realistic rates to its importance.

A Brazilian reasonable consumption per capita of synthetic fibers, if compared to rates of the countries listed on board XIX, should be :

2,5 Kg year/inhabitant

that means that in a near future, probably in 1995, when Brazilian population will reach

170 million people

our synthetic fiber demand should be of about

430.000 tons.

This unavoidable growth of the demand should be followed by an equal production development in order to avoid a disastrous unbalance in the market whose deficit should be fulfilled through importation.

To calculate the Brazilian percent consumption growth of textile polyester, using the historical relationship showed on board XX, we may make some choice according to what is shown on board XXIII.

BOARD XXIII

DEMAND STATISTICAL SERIES ACCORDING GROWTH PERCENTAGES OF BOARD XX

PERIOD	Nº YEARS	YARN	STAPLE	TOTAL
63/83	20	35,0	15,0	19,0
67/77	10	51,0	21,5	28,0
70/77	7	28,0	17,0	21,5
70/83	13	14,0	7,5	10,0

1) Period from 63 to 83 embraces the very beginning of the product consumption and the depression in the market, therefore the rates belonging to this period are not reliable as growth average rates.

2) The same happens to period 67/77.

3) Period 70/77 could be considered normal but in order to avoid estimate mistakes due to the great development ocurred in 70/71 (100% Yarn and 40,7% Staple - 60% total) it won't be taken into accounts.

4) Period 70/83, statistical of the last thirteen years. It shows normal developping rates, even if taking into account the crisis of 77/83.

BOARD XXIV

BRAZILIAN MARKET TEXTILE POLYESTER DEMAND FORECAST

in 1.000 tons.

TYPE	1970 (%)	1977 (%)	1983 (%)
YARN	7,5 (33,3)	42,0 (48,2)	40,0 (50,8)
STAPLE	15,0 (66,7)	45,1 (51,8)	38,7 (49,2)
TOTAL	22,5 (100,0)	87,1 (100,0)	78,7 (100,0)

Admitting that the growth rate of the last thirteen years (70/83) will be maintained, as we have already explained on BOARD XXIII, and considering as a term of comparison the percent development of production of the most important producers (BOARD XXI) we have:

TYPE	RATES	1987/88 tons.	%
YARN	(14,0% year)	77.000	58,1
STAPLE	(7,5% year)	55.500	41,9
TOTAL		132.500	100,0

The maintenance of the non-cellulosic rate (8%) until 1995 will give to Brazil the possibility of reaching a consumption of synthetics 430.000 tons. This number confirms the thesis that a "per capita" rate of 2,5 Kg year/inhab. is a reasonable and rational number.

BOARD XXV

BRAZILIAN PRESENT CAPACITY OF TEXTILE POLYESTER PRODUCERS

PRODUCERS	LOCATION CITY	1985 PRESENT CAPACITY YARN	STAPLE	FEEDSTOCK
BANYLSA	Aratú (BA)	2.200	-	PET
HOECHST	Osasco (SP)	13.000	-	DMT
CELANESE	P. Caldas (MG)	-	25.000	TPA
CELANESE NORD.	Aratú (BA)	-	5.000	DMT
COBAPI/AKZO	Camaçari (BA)	2.000	-	PET
FIBRA II	S. Paulo (SP)	12.000	-	PET
POLYENKA/AKZO	Americana (SP)	13.000	-	DMT
POLYNOR	J. Pessoa (PB)	1.700	5.000	TPA
RHODIA	S. André (SP)	12.000	20.000	TPA
RHODIA	Cabo (PE)	-	20.000	TPA
RHODIA	S. Bernardo (SP)	2.400	-	TPA
GRISBI NORD.	Camaçari (BA)	*1		DMT
		58.300	73.000	
Total Capacity		131.300		

*1 At present GRISBI NORD.starts up implanting a plant with capacity of 10.000 tons./year of texturised yarn.

7) POLYESTER RAW-MATERIAL

Considering the present situation of raw-material production (DMT/TPA/EG) and Polyester Polymers (Polyethylene Tereftalate) we have :

D.M.T. - PRONOR - PRODUTOS ORGÂNICOS DO NORDESTE

- Camaçari / BA
- 60.000 tons./year

T.P.A. - RHODIA INDÚSTRIAS QUÍMICAS

- Paulínea / SP
- 75.000 tons./year

E.G. - OXITENO S/A. INDÚSTRIA E COMÉRCIO

- Camaçari / BA
- 60.000 tons./year

POLYETHYLENE TEREFTALATE :

1 - EASTMAN KODAK DO NORDESTE S/A.

- Aratú / BA
- 20.000 tons./year
  (plant production start in 1986 for technical aplications)

2 - I.C.I. DO NORDESTE S/A.

- Camaçari / BA
- 30.000 tons./year
  (plant production start in 1987 for technical aplications)

3 - CELANESE / RHODIA / POLYENKA have surplus of P.E.T. and sales this polymer in the market.

- All the producers indicated on Board XXV, except BANYLSA, COBAFI and FIBRA II, have got their own plant of Polycondensation.

- Perspectives about plastic field are very good since there are applications for technical polyester polymers still / unknown and unexplored in Brazil. As soon as these types of polymers are available in the Brazilian market these applications will have a quick development.

8) FINAL CONCLUSIONS

Within the global view showed in the former items where we focus textile fibers situation in both Brazilian and World market, we can perfectly realize that synthetic fibers have been accepted more and more. This unquestionable acceptance isn't a casual but a previsible market reality based on real and logical facts such as :

WORLD MARKET

1) The constant increasing application of synthetic fibers with an average annual growth that is four times that of natural fibers in the last ten years (73/83) (Board II).

2) A particularly expressive growth of polyester fibers and olephines (Polypropylene) in the last decade (73/83) if compared with other synthetic fibers (Board VI).

3) The forecast that the chemical fiber demand will overcome the natural fiber demand before the end of this decade (Board VIII).

BRAZILIAN MARKET

1) Although synthetics acceptance has been resisted, for Brazil is a great cotton producer, synthetic fibers has had an average annual growth that is twice the growth of natural fibers in the last thirteen years (70/83) (Board IX).

2) Both the evolution of synthetic fiber consumption in the world and in Brazil are very similar (Board XVI).

3) The low synthetic fiber per capita consumption in Brazil (Board XVIII) if compared with the per capita consumption in other developing countries (Board XIX) lets assume that an accelerating growth in consumption is to be forecast for the next decades.

4) Despite the Brazilian production growth rythm has been above the standard of the developing countries. (Board XXI)

- The internal consumption growth rates have been very low in the last years (70/83) (Boards IX and XIII).

- This consumption growth rates will make Brazil reach a total consumption of 430.000 tons. in 1995 (per capita consumption of 2,5 Kg). That will urge the synthetic fiber industrial field to double its present production in the next 10 years.

5) Polyester fibers in Brazil will be more than half of the whole synthetic fiber consumption until the end of this decade if the rythm of growth of the last years (70/83) is kept.

9) POLYESTER FIBER CAPACITIES IN CHINA

in 1.000 tons.

COMPANY	LOCATION	FEEDSTOCK	1981		1982		1983		1984	
			YARN	STAPLE	YARN	STAPLE	YARN	STAPLE	YARN	STAPLE
China National Import. Corp.	Shanghai	D.M.T.	16	-	16	-	16	-	16	-
	Shanghai (a)	P.T.A.	-	-	-	-	-	-	-	50*
	Xinhui (b)	P.T.A.	-	-	-	-	2*	-	6	-
	Nanging (c) (Yi Zheng)	P.T.A.	-	-	-	-	-	-	-	20*
Liao Yang Petrochemical Fibre	Liao Yang	D.M.T.	-	87	-	87	-	87	-	87
Nantong Textile (d)	Nantong	Chip (P.T.A.)	-	-	-	-	-	-	2*	-
Tianjin Petrochemical Fibre	Tianjin(e) (Tientsin)	D.M.T.	-	52	-	52	-	52	-	52
Yanshan Petrochemical Fibre	Beijing (Peking)	P.T.A.	-	20*	-	40	-	40	-	40
	TOTAL CAPACITY		16	159	16	179	18	179	24	249

(a) 220 polycondensation and fibre units contracted, PTA based. Start up 1984-85.
(b) 5.5 POY plant contracted to EMS-Inventa. Start up mid 1983.
(c) The first unit of 37 staple will be built by Sumitomo/Toyobo by mid 1984.
A polycondensation unit (capacity 220) and a staple plant (capacity 180) are under construction by Zimmer and eventually will be followed by a further two units each of 180 capacity.
(d) Final capacity 4.7
(e) Polycondensation unit of 88. Chip supplier to filament unit in Shanghai. No confirmed plans for filament plant at Tianjin.
(f) A small polyester filament plant was contracted from SNIA, but no further details are yet known.
* Effective capacity for the year allowing the start up of new units.

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