UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

1 OF 5

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

24x
F

03161
(1 of 2)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

# REORIENTATION OF THE TRADITIONAL TEXTILE INDUSTRY IN BRAZIL

VOLUME I

**Research and Development**

ASSOCIATION
DE BUREAUX D'ETUDES
★
VERENIGING
VAN STUDIEBUREAUS
★
ASSOCIATION
OF CONSULTANTS' GROUPS
★
ASOCIACION DE OFICINAS
DE CONSULTORIA
★
RUE [illegible] STRAAT, 2
1000 BRUXELLES
PHONE : 12.[illegible]
CABLE : [illegible] BRUXELLES
TELEX : [illegible] BRU 2[illegible]

Ref. 123.3/G446/04/6

REORIENTATION OF THE TRADITIONAL TEXTILE INDUSTRY IN BRAZIL

UNIDO PROJECT N°SIS 70/900

CONTRACT N° 71/13

# RESEARCH & DEVELOPMENT IN COLLABORATION WITH ENGINEERING VESDRE

December 1971

# A B S T R A C T

This report concerning the reorientation of the traditionnal textile industry in Brasil is both analytic and normative.

The analysis has three components, information gathering, description of problems and diagnostic including a prospective view.

The normative part is a set of recommandations contributing to highlight a reorientation policy.

# S U M M A R Y

VOLUME I - TERMS OF REFERENCE

INTRODUCTION AND SYNTHESIS

o

o o

# INTRODUCTION AND SYNTHESIS

## 1. AIM OF THE PROJECT

The aim of the project is to make a general study of the Brazilian textile industry, its current and prospective structure and its potential for improvement and development, and to define a set of recommendations and reorientation guide-lines suitable to both the private and the public sectors. The methodological approach to achieve these ends consisted, for each field of study, in the following three-step program :

(i) information gathering and description of the system
(ii) analysis and evaluation
(iii) types of interventions required to improve the system.

The global view of the sequence of problems and fields of application has permitted to extend the scope of our study to include the basic guide-lines for a governmental action-program.

This action-program or development strategy provides the setting for our framework of recommendations while also defining a unified intersectoral policy designed for the textile system as a whole.

## 2. ACKNOWLEDGEMENTS

The conditions of realization of the present study required numerous permanent contacts with miscellaneous organizations, and the ready availability of various records and specific data; the former were often very difficult to reach and the latter were largely still to be compiled.

We take advantage of the opportunity to thank all the agencies and organizations which have contributed not only to the improvement of our working conditions but also to establish the factual foundations of the analyses and recommendations which are set forth herein.

We wish to acknowledge,in particular, the support of UNIDO Representatives in Rio - MIC - BNDE - IPEA -IBGE - Fundaçao G.Vargas - Banco do Nordeste - SUDENE - INDI - CACEX - CONCEX - CDI - Several industrial federations and textile Syndicates - Industrialists, distributors and export agents.

## 3. METHODOLOGICAL APPROACH

3.1. The first step in our methodological approach was the elaboration of an analysis on the economic evolution since 1960, concerning primarily the following topics : productivity, psychology (attitude towards modernization), organization, management, structures (equipment, machinery, installed capacity, obsolescence), distribution and its channels, export policies, industrial views of the governmental policy, investments and autonomous trends. The data concerning the 1960 situation, mainly in the field of equipment, was afforded by CEPAL.

3.2. The second component is the diagnosis of the 1970 situation. This was the result of extensive and intensive inquiries and surveys and was based on the documents pertaining to input/output analyses. The sample of industrial units surveyed for the study accounts for approximately 650,000 spindles in the cotton sector and 140,000 spindles in the wool and blends sector.

These premises were conducive to the global examination of intersectoral and interregional interactions and of the part played by the spontaneous sectors (crafts and unorganized activities).

3.3. The third step consists in defining a long-run perspective plan for the next ten years.

3.4. On the basis of these three steps and in the context of an intersectoral strategy which makes provision for the uncertainty factor, general developmental guide-lines are finally set forth.

The general guide-lines are designed to help define a general action program with specific interventions for each field of study.

3.5. Some of the outstanding results of the analysis concern :

- the overriding role of man-made fibers and the impact of synthetic fiber substitution;
- the wide range of performances and degrees of modernization of the production units;

- the significant lag between the tempo of equipment modernization and the operational infrastructure (i.e. training, management, communications, distribution...)

- the lack of harmony and coordination - both vertically and horizontally - between the various sectors and regions;

- the need of generating the most favorable conditions of competition, productivity and quality in keeping with the government's exports outlook.

- the major development prospects of the internal market which currently relies on a relatively low per capita consumption.

3.6. From the standpoint of our recommendations, the following guide-lines were made outstanding by our analyses :

- commitments have increased at a sharp rate from 1965 through 1970 but have remained at the 1970 level on 1971. Our analysis proves that it is advisable to carefully weigh and control any future investments;

- it has also been noted that the fast modernization of certain enterprises, the elimination of many marginal enterprises, the tentative modernization or, alternately, the stagnation of others have generated considerable inter-industrial unbalance and disparity. This state of fact, coupled to the high degree of dissemination of production units and the wide spread of productivities in most units yields lower than normal returns to investments, in terms of capital and labor productivity.

  The conclusion is therefore that greater diversification and differentiation of the effort will be achieved.

- the tendency towards integration, mergers and concentrations requires coordination and guidance by special agencies.

- Such phenomena as the boom of the knit-wear sector which was not followed or supported by the attendant sectors (nonintegrated spinning mills, dyeing, finishing factories) create various inadaptations and problems of adjustment which must be tackled by information campaigns; these are the subject of a special set of recommendations.

- The pheomenon of the spear-head invasion of synthetics demands that the intruder be kept in check by organising and coordinating its implantation;
- the constant and ever-increasing demands of productivity improvement call for special recommendations for the various fields of training.

•
• •

## 4. ABSTRACT OF RECOMMENDATIONS

4.1. In order to maintain the freedom of Brazilian enterprise while implementing the reorientation of this sector, we recommend the establishment of a Joint Advisory Agency. This is a multipurpose recommendation; it tackles among other things the general problems of interconnection, dialogue and consistency of the various activities implicated in or connected to the textile industry.

It would be a joint government-industry agency financed by both parties.

Among the suggested attributions we would mention the following :

- apply criteria of credit allocation and aids to investments
- contribute to the elaboration of relevant economic information
- study advanced technologies
- determine quality and control standards
- carry out market surveys and studies
- participate to education and training programs
- study the elaboration, coordination and implementation of various strategies for the sector.

4.2. Diversification of investment incentives.

Besides the recommendations concerning investments in equipments (point 4.3. herebelow) we recommend to stress the encouragement in related fields such as :

training of managerial staff and skilled labor, implementation of efficient managerial techniques, improvement of product quality, support of imaginative design, leading to an increase in overall productivity.

Propositions in this respect include for instance professional schools and training centers.

Diversification also implies a rational intersectoral and interregional effort distribution.

In the field of interregional distribution we would note for example, the tendency of the industry in Minas Gerais towards relinquishing its traditional manufacture of popular low-cost articles to join the over-crowded complementary sector. Regional incentives should promote such individualistic activities by creating central purchasing offices finishing and/or garment factories and common marketing services.

As regards intersectoral distribution, we could note here that the jute industry of the northern Amazon deserves support in the form of aid to the major producers for their reconversion towards polypropylene manufacturing.

4.3. Among the main recommendations in the field of equipments, we note :

- more investments are afforded to the spinning sector than to the weaving sector because of the latter's comparative over-capacity.

  Thus, for instance, we reach the conclusion that by counting on a reasonable evolution of productivity in the cotton sector, by 1980 there would be an increase of 20 % in spinning output with a 20 % decrease in the number of spindles. Likewise, for weaving there would be a 50 % increase of productivity with 15 % less looms.

- for the knitwear sector, investments in synthetics dyeing and finishing mills would enable them to overcome their current inadequacy and ill-adjustment.

- we recommend against the government's direct intervention in the implantation of equipments for advanced technologies (open-end for instance) until a technico-economic commission has evaluated the cost benefit ratio of such investments.

- our recommendations give priority to investments in infrastructure, i.e. air-conditioning, air-cleaning, handling facilities, laboratories, etc. which not only affect productivity but are often indispensable accessories to the operation of the primary equipment.

4.4. Export promotion

In order to avoid jeopardizing existing export potentialities it is recommended to create a central office for export promotion, the aim of which is above all to provide assistance and service. Some tasks which would be useful are :

- information of industrialists or sales agencies on the incentives which can be obtained and how to go about getting them;
- administrative assistance to exporters
- delivery of quality labels
- gathering of information about and prospection of potential markets and foreign distribution channels.

It is also recommended to promote some specialization where comparative benefits can be expected like for example : extra-wide yards and some typically Brazilian fabrics.

4.5. Market distribution

An important guide-line of the market and distribution recommendations derives from the economic role of the sellers' competition vis-à-vis the buyer market. Given that the present structure of the supply/demand ratio does not meet this sale requirement either for the inter-industry commercial links or for the consumer's choice opportunities, we recommend to develop the capability of the buyer to compare products on the basis of price and quality.

Practically, we show the interest of large garment factories : it is for example desirable that each make be endowed with its own label so as to distinguish it from its competitors. Moreover, it is preferable that the same make should not be exclusively represented in the stores in order to enlarge the range of the immediate consumer's choice.

4.6. Other types of recommendations concern for instance :

- financial problems with particular stress on the difficulties encountered by many enterprises for lack of working capital. This is generated among other things by the lack of harmony between credit procedures and delays of payment.

  We therefore recommend the conclusion of agreements or even the enactment of regulations governing the standardization of these procedures.

- the analysis of incentive request documents should be improved as should their structure. It is suggested that the requestees provide information on additional key questions required for proper evaluation. Also the entity in charge of these analyses will require a technico- economic framework of justification to enable him to make a knowledgeable judgement of the opportuneness and faesibility of submissions as well as of their parity with the global intersectoral growth policy.

## 5. FIELDS OF STUDY AND THE ORDER OF THEIR DISCUSSION IN THE PRESENT REPORT

Book I is strictly concurrent with the UNIDO terms of reference and their sequence of topics as reviewed herebelow in that order :

A. Market study for textiles

a) The production and consumption of textiles in 1970 broken down by raw materials, by types of products, by end uses.

b) The marketing procedures.

c) The role of garment industry.

d) Projection of demand for textiles.

e) General appraisal for exports.

B. Structure of the textile industry and its production facilities

a) Integration of production facilities.

b) Machinery in place.

c) Evaluation of existing equipment.

d) Guidelines for programming the modernization of equipment.

Book II forms a cohesive ensemble with Book I; it is designed on the one hand to extend the recommendations set forth in Book I and on the other to provide more concrete guide-lines.

The entire work is focussed on a coordinated and carefully directed intersectoral and interregional policy for the sustained development of the textile industry.

o

o o

# C H A P T E R   I

## MARKET STUDIES FOR TEXTILES

# 1.1. PRODUCTION AND CONSUMPTION

## 1.1.1. Production and consumption of textiles in 1970 broken down by raw-materials

### 1.1.1.1. Production of raw materials

EVOLUTION OF RAW COTTON PRODUCE IN BRAZIL

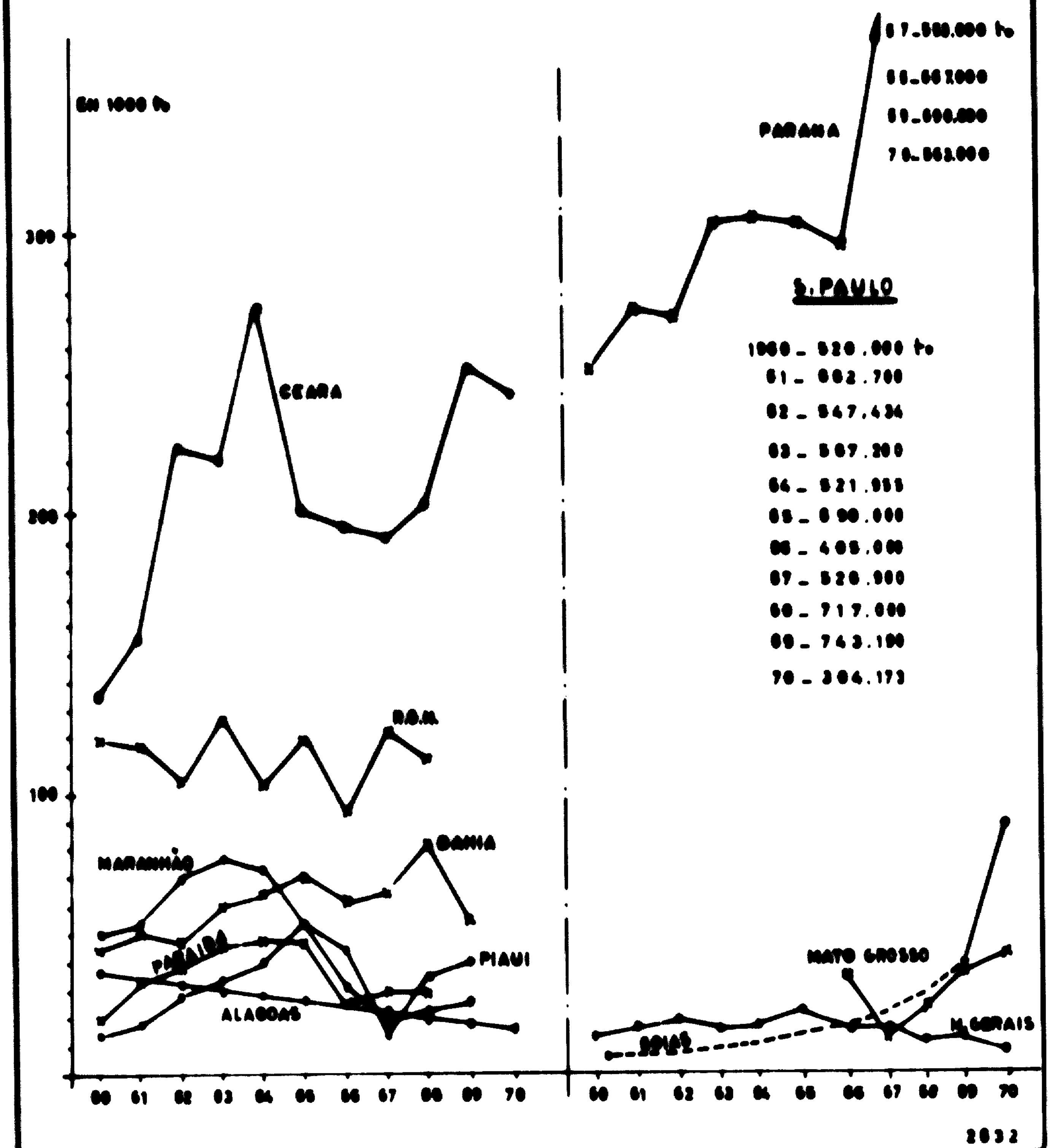
| Year | Production tonnage | Exports |
|---|---|---|
| 1960 | 397,000 | 95,400 |
| 1961 | 431,000 | 205,600 |
| 1962 | 550,000 | 215,900 |
| 1963 | 490,000 | 221,800 |
| 1964 | 504,000 | 217,000 |
| 1965 | 450,000 | 195,700 |
| 1966 | 540,000 | 235,900 |
| 1967 | 445,000 | 189,440 |
| 1968 | 617,000 | 247,550 |
| 1969 | 721,000 | 439,300 |
| 1970 | 595,000 | 342,800 |

In 1970, Brazil ranked fourth in world cotton production, after the United States, India and Pakistan.

The evolution of production from 1960 to 1970, except for incidental fluctuations usually due to draughts and environmetnal conditions, is definitely positive, jumping from 400,000 to 720,000 tons over the nine-year span. The exports follow the same trend, domestic consumption having remained at a stable 280-290,000 tons in the last few years.

The North-Eastern region was the top cotton producer prior to 1965. From this year on, it has progressively had to relinquish its position to the states of SP and PA of the Southern region which in addition concentrated on high-grade cotton production. Thereafter the NE specialized in average-type grades mostly of the long and extra-long varieties which are not produced in the southern region.

## EVOLUTION OF RAW COTTON PRODUCTION IN THE NORTH-EAST AND SOUTH



In the last few years the overall produce of the North-East floats at around 170-180,000 tons a year.

1970 was a devastating year for cotton production in the North-East. In fact it affected the general economy to some extent, internal prices having been subjected to drastic incrementation. Production fell by 178,000 tons down to 82,000 of raw cotton, i.e. 55 % of the mean tonnage for previous years.

The states of NE specialized in arborescent- or bushy-type plants, these suffered so much from the great draught of 1970 that the 1971 harvests will also strongly feel the after effects of this disaster.

EVOLUTION OF PRODUCTION/PRODUCTIVITY/QUANTITY 69-70

Northern States

| | Cultivated surface (Ha) | | | Production of seed coton | | | |
|---|---|---|---|---|---|---|---|
| | | | | in tons | | yield /tons/ha | |
| States | 1960 | 1965 | 1969 | 1960 | 1965 | 1960 | 1969 |
| Maranhao | 112,800 | 151,000 | 112,300 | 49,566 | 26,583 | 0.430 | 0.238 |
| Piaui | 50,436 | 120,000 | 124,000 | 14,800 | 41,000 | 0.293 | 0.330 |
| R.G.N. | 388,086 | 490,361 | 519,000 | 199,800 | 114,000 | 0.309 | 0.220 |
| Paraiba | - | - | 477,000 | 115,500 | 135,000 | - | 0.280 |
| P.C. | - | - | 378,000 | 87,470 | 103,000 | - | 0.273 |
| Alagoas | 87,323 | 77,462 | 75,000 | 27,523 | 23,000 | 0.315 | 0.306 |
| Sergipe | - | - | 35,000 | 10,233 | 11,200 | - | 0.320 |
| Bahia | 99,325 | 148,861 | 133,200 | 46,834 | 81,289 | 0.471 | 0.610 |
| Ceara | - | - | 201,000 | 136,068 | 334,000 | - | 0.277 |

As showed in the above table, only the states of Piaui, R.G.N., B.A. and CEARA have increased the area devoted to cotton growing since 1960. In spite of this, the production of R.G.N. state is diminishing as confirmed by the fall from 0.309 to 0.220 of Ha production. This is explained mostly by the specialization of this state in high-grade cotton, from the standpoint of fiber length .

The state of B.A. exhibits the strongest productivity growth : from 0.471 in 1960 to 0.610 in 1969. The state of Piaui also increased its productivity from 0.293 to 0.330 in the same lapse of time.

Generally speaking, productivity is low and ranges from 0.220 tons/ha to 0.610 ton/ha.

**Quality of cotton produced in the North-East**

| | | |
|---|---|---|
| Seridó | 19 % | 1 1/8 to 1 3/16" |
| Sertão | 65 % | 1 1/16 to 1 1/32" |
| Mata | 16 % | 15/16 to 1" |

The micronary index ranges from 3.8 to 4.3
The best uniformity of fiber length is achieved by CEARA with 82 % of 32/34 mm grade. RGN produces the longest grades, followed by Paraiba and PC.

The shortest grades are produced in small quantities by SE, with Bahia in an intermediate position.

In short, it can be said that cotton growing accounts for the major part, of agricultural activities in the NE, with a recorded 12.6 % in 1969.

In 1960, the cotton quota of cultivated ground was 26 to 29 %.
In spite of this stability of cultivated areas a diminution of productivity in the cotton sector was recorded. In fact it fell from 365 kg/ha in 1960 to 282 kg/ha in 1969. This situation reflects the fact that the increase of cultivated areas is not accompanied by a corresponding growth of productivity and that there is no co-ordination of cotton policies. The most respresentative states are :

| | Production of total NE % |
|---|---|
| CEARA | 38,7 % |
| PARAIBA | 15,3 % |
| RGN | 12,2 % |
| PC | 11,9 % |

PRODUCTION OF NE IN % BY FIBER TYPE AND LENGTH

| STATES | TYPES | | | | | FIBER LENGTHS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 24/26 | 26/28 | 28/30 | 30/32 | 32/34 | 34/36 | 36/38 | 38/40 |
| MARANHAO | | | | | | | | | | | | | |
| PIAUI | | | | | | | | | | | | | |
| CEARA | 33,0 | 48,2 | 14,8 | | | | | | 9,37 | 81,70 | | | |
| R.G.N. | 65,0 | 23,0 | 9,0 | | | | | 20,0 | | 13,0 | 37,0 | 16,0 | 10,0 |
| PARAIBA | 43,8 | 37,8 | 7,9 | 2,00 | | | | 7,8 | | 51,0 | 19,3 | | |
| PC | 7,62 | 45,6 | 30,85 | 13,22 | 2,23 | | | 27,95 | 4,4 | 58,4 | 7,4 | | |
| ALAGOAS | 25,4 | 58,5 | 13,6 | | | | | 90,3 | 5,2 | | | | |
| SERGIPE | 4,0 | 34,0 | 49,0 | 8,5 | 5,0 | 4,8 | 46,5 | 48,7 | | | | | |
| BAHIA | | 13,1 | 82,1 | 4,2 | | | | 60,0 | 37,0 | 3,0 | | | |

From the standpoint of cotton surface, the situation is as follows :

| % of total cultivated land | |
|---|---|
| CEARA | 39.2 % |
| RGN | 17 % |
| PARAIBA | 16 % |
| PC | 12 % |

As regards quality, 10 % of NE cotton production is composed of short-fiber grades (shorter than 28mm), 5 % of extra-long and the remaining 85 % of intermediate lengths, i.e. 28 to 36 mm. Manpower involved in cotton production is estimated at some 790,000 units in 1969, 82 % of which belong to the states of CEARA, RGN and PC. The NE accounts for 25 % of the country's cotton produce. This share may be called to increase considerably in the near future as predicted by world cotton demand statistics which call for proportionately greater demands for higher grades.

The cotton from NE is strong and resistant and can, at relatively low cost, meet world demands. Besides, the foreigh exchange provided by its exports and the labor employed for its cultivation provide a substantial economic boost for the country. However, it seems that this high-grade cotton is sold in foreign markets as low-grades, resulting in considerable loss of potential foreign exchange revenues.

The reason for this state of affairs is that there is no technical aid policy, i.e. no organization handling the problem as a whole.

The potential benefits from the NE cotton plantations could be realized by appropriate technical aid programs to the producers and "beneficiamentos" aimed at improving or obtaining the lacking technical standards. Subsequently a promotion on the world market should be made, on the basis of these standards. The improved "MOCO" variations prove that it is possible to obtain a more uniform cotton production, having a high ratio of fiber/refuse. The productivity of plantations can also be substantially augmented with pulverization and spraying operations and the appropriate selection of cotton fields; improved irrigation programs are mandatory.

If these principles were applied on a large scale to these cotton varieties these would most probably turn out to be highly marketable abroad as well as on the national market where they are currently sold, provided the seed-cotton processing plants provide them with a "beneficiamento" in relation to these objectives, namely the matching and maintenance of world standards.
Furthermore it will be essential to provide NE cotton buyers and their partial processing plants with financial support and terms geared to ensure the maintenance of NE cotton production quotas available for exports, so as to regularize the country's offer.
In short, what the North-Eastern region is most in need of is a regional, homogenous cotton organization, possibly including a technical aid program.

Following table gives the results obtained under similar circumstances, which corroborates predicted results.

The findings and results of the research program on cotton parasites are now applied throughout southern Afrioa and have enabled the obtention of yields in excess of 2,000 pounds per acre (2,244 kg/ha). In Rhodesia, cotton production which was formerly practically non-existant has now soared to more than 30,000 bales and in Zambia to more than 3,000 bales, which represents a total value of more than one million pounds sterling. An even more appreciable benefit : this development of cotton production has contributed to the diversification of agricultural economy. In Malawi, the utilization of new methods in established cultivation procedures, somewhat curtails the increase of production; nonetheless, spraying has been applied to more than 6,000 acres (2,400 ha). Also, the total area of cotton plantations has increased and overall production now tops 35,000 bales, against 8,000 in 1957/58.

The UK "Tropical Pesticides Reseach Committee" was formed to study the hazards resulting from the toxicity of sprayed pesticides. This is but another aspect of the close cooperation between the Group of Research on cotton parasites and the relevant foreign organizations which has been further asserted by the arrival in Gatooma of numerous eminent specialists. The total area of sprays has rapidly extended and the average yield has remained above 1,000 pounds an acre (1,122 kg) of unginned cotton. This increase of cotton production has also promoted the development of the local textile industries, both in Rhodesia and in Malawi.

The merits of several methods of combatting the various cotton pests and parasites have been studied and tested : they consist among other things in the change of sowing dates and in deep-plough methods; however, the only method which has proven its effectiveness so far is based on the periodic spray of insecticides and pesticides.

It follows from the analyses and tests to which the insecticides and pesticides were subjected on the field and in the laboratory, that the pests can only be entirely eliminated with a blend of several pesticides including carbaryl for the pink worm, the dysderchus and other pests, DDT for the American bollworm, and dimethyl-esther for the greenfly and red arachnids.

During the growth period of the cotton plant, it may be necessary to make up to fourteen sprays. The schedule of operations and the choice of chemical products depends on the symptoms revealed by frequent inspections, namely as regards the presence of bollworm eggs or larvae.
To achieve the optimal efficiency of sprays, a mechanical pressurized spray device was especially designed in Gaatoma. This appliance is composed of a vertical tube affixed to the rear of the sprayer and having eight spraying nozzles ; its height can be adjusted to the heigt of the plants at the time of spray. This apparatus can be coupled either to a back-strap sprayer or to a tractor-borne sprayer or again to a mobile-type ground-pipe.

YIELDS OF COTTON PLANTATIONS WITH PERCENTAGE OF SPOTTED
OR SPOILED UNGINNED COTTON - 1961

(Data obtained from the survey entire plantation plots)

| N° of plot | Yield (kg/ha of unginned cotton) | | | Percentage of unginned, spotted and spoiled cotton | |
|---|---|---|---|---|---|
| | with pulverisation | without pulverisation | augmentation | with pulverisation | without pulverisation |
| **MALAWI** (south.region) | | | | | |
| 1 | 1,353 | 781 | 572 | 13.5 | 36 |
| 2 | 1,297 | 610 | 687 | 19.5 | 32.2 |
| 3 | 1,660 | 938 | 723 | 21.9 | 27.4 |
| 4 | 1,345 | 888 | 458 | 5.4 | 18.4 |
| 5 | 1,758 | 999 | 748 | 2.2 | 14.8 |
| 6 | 2,229 | 590 | 1,629 | 13.1 | 35.1 |
| 7 | 1,532 | 780 | 752 | 11.1 | 34 |
| 8 | 1,710 | 520 | 1,190 | 5.6 | 25.2 |
| 9 | 1,324 | 554 | 714 | 5.1 | 15.9 |
| 10 | 1,318 | 358 | 961 | 9.4 | 53.2 |
| 11 | 306 | 550 | 243 | 44.8 | 67.7 |
| 12 | 2,163 | 795 | 1,368 | 17 | 31.6 |
| 13 | 1,184 | 947 | 237 | 18.8 | 19.1 |
| 14 | 1,204 | 441 | 763 | 15.7 | 39.5 |
| 15 | 957 | 530 | 433 | 22 | 35.7 |
| 16 | 1,024 | 298 | 726 | 35.6 | 50.5 |
| 17 | 805 | 226 | 579 | 31.8 | 53.1 |
| 18 | 2,136 | 695 | 1,386 | 8.2 | 14.3 |
| 19 | 1,447 | 328 | 1,120 | 4.8 | 21.5 |
| 20 | 691 | 18 | 673 | 8.6 | 36.4 |
| **Average** | **1,174** | **484** | **690** | **11.5** | **36.3** |
| **MALAWI** (central reg.) | | | | | |
| 21 | 1,501 | 1,177 | 884 | 4.5 | 11.5 |
| 22 | 2,017 | 652 | 1,365 | 6.8 | 24.5 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

| | | | | | |
|---|---|---|---|---|---|
| 8 | 1,71[illegible] | 52[illegible] | [illegible] | [illegible] | [illegible] |
| 9 | 1,324 | 554 | 714 | 5.1 | 15.9 |
| 10 | 1,318 | 358 | 961 | 9.4 | 53.2 |
| 11 | 306 | 550 | 243 | 44.8 | 67.7 |
| 12 | 2,163 | 795 | 1,368 | 17 | 31.6 |
| 13 | 1,184 | 947 | 237 | 18.8 | 19.1 |
| 14 | 1,204 | 441 | 763 | 15.7 | 39.5 |
| 15 | 957 | 530 | 433 | 22 | 35.7 |
| 16 | 1,024 | 298 | 726 | 35.6 | 50.5 |
| 17 | 805 | 226 | 579 | 31.8 | 53.1 |
| 18 | 2,136 | 695 | 1,386 | 8.2 | 14 3 |
| 19 | 1,447 | 328 | 1,120 | 4.8 | 21 5 |
| 20 | 691 | 18 | 673 | 8.6 | 36.4 |
| **Average** | 1,174 | 484 | 690 | 11.5 | 36.3 |
| **MALAWI** (central reg.) | | | | | |
| 21 | 1,501 | 1,177 | 884 | 4.5 | 11.5 |
| 22 | 2,017 | 652 | 1,365 | 6.8 | 24.5 |
| 23 | 1,454 | 522 | 932 | 4.1 | 24.5 |
| 24 | 1,593 | 140 | 145 | 8.1 | 44.7 |
| 25 | 710 | 517 | 193 | 11.7 | 7.9 |
| 26 | 935 | 102 | 833 | 2.4 | 21.4 |
| 27 | 1,401 | 480 | 921 | 7.1 | 28.2 |
| 28 | 1,223 | 212 | 1,011 | 16.5 | 33.5 |
| 29 | 2,176 | 847 | 1,328 | 3.1 | 27.4 |
| 30 | 1,912 | 726 | 1,186 | 3.8 | 23.9 |
| 31 | 664 | 270 | 394 | 3.2 | 2.3 |
| 32 | 1,491 | 981 | 499 | 0.1 | 13.2 |
| Average | 1,579 | 727 | 852 | 4 | 20.3 |
| RHODESIE (central veld) | | | | | |
| 33 | 2,751 | 347 | 2,404 | 0.1 | 21 |
| 34 | 2,060 | 233 | 1,827 | 0.6 | 6.9 |
| 35 | 1,933 | 358 | 1,575 | 0.3 | 15.9 |
| 36 | 1,695 | 928 | 772 | 1.1 | 9 |
| 37 (1) | 2,464 | 1,399 | 1,065 | 2.2 | 9.6 |
| Average | 2,178 | 580 | 1,598 | 0.9 | 11.6 |

(1) plot having received extra irrigation

## Southern Regions

The southern region of Brazil c .prises the states of SP, PA, MG, Matto Grosso, Goias, RJ and GB.
Its cotton production has, for the past few years, represented the major portion of the country's overall turnover and in 1970 accounted for 80 % overall cotton output.

PRODUCTION OF THE LAST THREE HARVESTS OF RAW COTTON - in tons

| STATES | 67/68 | 68/69 | 69/70 |
|---|---|---|---|
| SP | 191,800 | 265,500 | 267,500 |
| PA | 204,400 | 233,500 | 195,000 |
| Others | 25,000 | 42,000 | 42,000 |

## State of Goias

Cotton cultivation in this state has undergone remarkable development in the past few years. This is due primarily to the favorable climate and sophisticated organization geared mostly to increased productivity and efficiency of cultivation methods.

| YEARS | Cultivated area (ha) | Production in Caroço (tons) | Productivity (tons/ha |
|---|---|---|---|
| 69/70 | 4.8 | 41.439 | 8.63 |
| 70/71 | 9.5 | 75 | 7.9 |

The beneficiamento units consists of three major plants well adapted to the imposed quality requirements, and some of which are related to the cotton factories of SP. The productivity and quality of Goias state plantations should be taken as model by the Northern and North-Eastern States, although it is true they have a climatic disadvantage. Rational organization, assistance from competent agrarian bodies, seriousness of enterprises are as many factors responsible for the magnificent results of the expansion drive initiated a few years ago.

Pesticide and insecticide spraying campaigns are scientifically prepared and carried out according to modern methods (aerial spraying). The credits allocated by the Bank of Brazil to deserving enterprises are very consequent but invariably utilized with efficiency.

Minas Gerais

This state has all the necessary pre-requisites to become a major cotton producer : ideal climatic soil and labor conditions.

The cotton processing units absorb 48,000 tons of raw cotton a year. However, local production currently does not exceed 15,000 tons of raw cotton, i.e. a mere third of the state's actual consumption. It appears that some recent tests have given positive results (TRIANGULO MINEIRO),and that a development and reorganization plan for the production of high-grade cotton is in process of elaboration.

Paranà

This state shows close prospects of topping the cotton output of SP in the near future. However, a series of unfavorable circumstances such as shortage of seeds, inadequate selection of same, unfavorable climatic conditions during the crucial stages of growth, cataclysms, inexperience of the farmers and unavailability of manpower are threatening to inhibit the remarkable development of this state until 1967.

| Years | Cultivated area (ha) | Production Caraço (tons) | Productivity (tons/ha) |
|---|---|---|---|
| 68/69 | 587,878 | 667,554 | 0.880 |
| 69/70 | 573,540 | 650,000 | 1,020 |

It should be noted that the yield of the cotton fields has significantly increased from 68/69 to 69/70.

Sao Paulo

PRODUCTION AND YIELD IN 69/70

| YEARS | Cultivated areas (ha) | production Caraço (tons) | Yield T/ha |
|---|---|---|---|
| 1960 | 568,700 | 520,122 | 0.914 |
| 1965 | 477,000 | | |
| 1969 | 702,000 | | |
| 1970 | | 743,191 | 1.058 |

Quality of cotton

Types 3 and 4 are practically non-existant in Sao Paulo whereas in the northern regions they predominate. As regards length, type 32/34 is dominant in the NE while the southern states produce mainly type 30/32 with a 30 mm dominant trend.

Productivity

It is comparatively higher than in the NE, ranging from 0.8 to more than one ton per ha. Broadly speaking, the producti-vity of the South is 4 to 5 times greater than that of the NE.

Conclusions

We feel that the cotton production of NE should be promoted and developed to the extent it justly deserves, namely because :

- it gives this part of the country a chance of hastening its development : after sugar and cocoa, cotton accounted for 10 % of total NE exports in 1969, and represented 29.1 % of total cultivated land;
- the fundamental virtue of NE cotton, is the length of its fibers which makes it the most likely type to meet the quality demands of the world market. However, it must first be improved by a well studied classification and appropriate processing methods. Uniformity of quality should become the major concern of the producers and should be the object of a global analysis.

QUALITY OF COTTON PRODUCTION (in %)

| STATES | TYPE | | | | | | | | FIBER LENGTHS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 28/30 | 30/32 | 32/34 | 34/36 |
| GOAIAS | | | | 12.0 | 18.0 | 33.0 | 20.0 | 9.0 | | 97.5 | | |
| M. GROSSO | | | | 34.0 | 47.0 | 7.5 | 4.0 | | | | | |
| M. GERAIS | | 13.75 | | 24.3 | 29.0 | 17.3 | 10.1 | 3.3 | 52.3 | 47.7 | | |
| PARANA | | | | 7.4 | 53.0 | 29.5 | 6.23 | | 14.0 | 85.5 | | |
| S.P. | | | | 5.3 | 48.5 | 40.0 | 4.5 | | | 52.5 | 47.3 | |

This development cannot, in our opinion, be implemented without organized technical aid including seed selection, farmer information, systematic preservation of cultivated areas with modern means and methods as well as efforts towards the merging of small farms to enable the implementation of the above measures on the scale currently applied in the South.

WOOL

Brazilian wool production is mostly concentrated in the state of RGS.

The federation of wool cooperatives (FECOLAN) groups the majority of producers. It has provided the study group with all available statistics for this sector.

TABLE OF RAW WOOL PRODUCTION AND EXPORTS

| Years | Raw wool prod. in RGS state | Exports | Imports | N° of affiliation to FECOLAN |
|---|---|---|---|---|
| 59/60 | 21,701.6 | 1,298.6 | - | 7,370 |
| 60/61 | 24,111.5 | - | - | 7,752 |
| 61/62 | 25,057.4 | 15.0 | - | 8,728 |
| 62/63 | 23,871.5 | 869.9 | - | 10,000 |
| 63/64 | 26,754.2 | 12,644.6 | - | 10,149 |
| 64/65 | 31,041.2 | 11,707.7 | 6 | 12,174 |
| 65/66 | 34,585.0 | 16,826.9 | - | 13,127 |
| 66/67 | 26,088.6 | 19,079.3 | - | 14,576 |
| 67/68 | 30,533.6 | 17,573.4 | 700.0 | 15,273 |
| 68/69 | 38,537.7 | 18,839.5 | 1,218.0 | 15,674 |
| 69/70 | 36,416.4 | 14,811.0 | 655.0 | 16,000 |

It should not be inferred that the production of wool has evolved as indicated in the first column of the above table. Indeed, these figures are those recorded by FELCOLAN for its affiliates alone. As shown by the last column, the number of affiliates has steadily risen from 1960 to 1970 at approximately the same rate as that of production growth.

Since 1963/1964, from 50 to 55 % of wool produced in RGS is consumed by the domestic market. Imports consist of special wool types required for specific manufactures and which are not produced in Brazil (very fine wools, for instance).

MARKETING OF RAW WOOL ON THE BRAZILIAN MARKET

| Years | RGS | | SP | | Others | |
|---|---|---|---|---|---|---|
| | T | % | T | % | T | % |
| 60/61 | 4,281.3 | 19.0 | 17,031.4 | 75.8 | 1,174.4 | 5.2 |
| 61/62 | 5,413.0 | 22.0 | 17,719.3 | 71.9 | 1,481.5 | 6.0 |
| 62/63 | 3,950.6 | 21.0 | 12,836.6 | 68.8 | 986.5 | 5.3 |
| 63/64 | 5,399.5 | 19.1 | 9,755.5 | 34.6 | 435.3 | 1.5 |
| 64/65 | 6,298.5 | 21.6 | 10,486.5 | 36.0 | 647.4 | 2.2 |
| 65/66 | 7,522.2 | 20.8 | 11,540.4 | 32.0 | 177.6 | 0.5 |
| 66/67 | 4,671.0 | 16.5 | 4,502.7 | 16.0 | 94.2 | 0.3 |

It is significant that the only state which has a stable relative annual production is RGS, although its absolute annual turnover appears to be engaged in an upward trend.
We believe that this apparent increase is due to the appearance in the statistics of wool quotas previously sold direct from producer to industrialist without being recorded in FECOLAN statistics.

On the other hand, the wool demand in SP and other producing states has fallen sharply both in relative and real volume. This diminution is imputable to the growing penetration of synthetic fibers in the wool market, either by complete substitution or as a mixture of synthetics and wool. Thus the relative increase in SP and other states from 66/67 to 68/69 must be attributed, in our opinion, to the demand of the knitwear sector, strongly implanted in SP, to the north of SC, RJ/GB and in southern MG.

## CLASSIFICATION OF WOOL TYPES IN % OF FECOLAN PRODUCTION

| QUALITE / YEARS | 65/66 | 66/67 | 67/68 | 68/69 | 68/69 in Tons | 69/70 x |
|---|---|---|---|---|---|---|
| SUPRA | 5.1 | 3.7 | 4.9 | 7.9 | 1,613 | 5.6 |
| SPECIAL | 56.6 | 36.1 | 38.3 | 51.6 | 10,780 | 40.0 |
| BOA | 25.5 | 31.9 | 31.2 | 27.3 | 5,696 | 32.5 |
| CORRENTE | 11.8 | 26.7 | 23.7 | 12.0 | 2,522 | 20.1 |
| MISTA | 1.0 | 1.6 | 1.9 | 1.2 | 248 | 1.8 |
| TOTAL % | 100.0 | 100.0 | 100.0 | 100.0 | 20,859 | 100.0 |

Other categories

| | |
|---|---|
| Lombo (Borrego) | 2,439 |
| Others | 3,722 |
| | 6,161 |
| Rejected wools | 1,845 |
| | 28,865 to. |

(x) Wool qualities produced in R.G.S.

The improvement of qualitative production is witnessed by the domination of the "special" grade which was practically absent in 1950. However, statistics show that since 66/67 the quota of special wool has engaged in a downward trend.

This could be due to the incorporation to the federation of a large number of small producers, in recent years, which only produce un-ameliorated categories. Indeed, according to the latest survey of the federation's affiliates, 7,000 small farmers producing from 1 to 500 kg of wool accounted for 43 % of overall membership.

The overall domestic production, including non-members can be estimated at some 19,000 tons per annum.

Thus it is evident that 50 % of the wool produced by this sector does not enjoy the benefits of modern farming techniques. The breeds reared in Southers Brazil are mostly merino or cross-breeds of merino which provide the best quality.
In recent years a special kind of merino called IDEAL was imported from Australia. It is a cross between Corriedale, Polworth and Merino.
The per head production of these shepp is much higher than that of pure Merino and of approximately the same quality.

CLASSIFICATION OF BREEDS AND AVERAGE FIBER LENGTH IN R.G.S.

| RACE | MERINOS | IDEAL | | POLWORTH | | | | LINCOLN | | CRIOULA |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CORRIEDALE | | ROMNEY-MARSH | | | | |
| Wool classes | MERINA | AMERI-NADA | PRIMA/A | PRIMA/B | HYBRID I | HYBRID II | HYBRID III | HYBRID IV | HYBRID V | CRIOULA |
| Average length in cm | 3.8/4.2 | 4.5/5.3 | 6.0/7.0 | 6.8/7.5 | 7.5/8.5 | 9.0/10.0 | 11.8/13.0 | 13.2/14.5 | 15.5/17.0 | 18.0/22.0 |

## SILK

Until the end of World War II, the silk-worm breeding industry was fairly flourishing in Brazil. However, from the end of the war, the industry underwent a sharp and deeply rooted decline under the pressure of synthetic fibers, only to be revived, some five or six years ago, as a result of renewed domestic and foreign demand. The silkculture department of SP is situated in Campinas and is the best informed and documented on this sector.

The entire Brazilian silk production is concentrated in the state of SP where climatic conditions are ideal for the culture of the worm (altitude of 500 meters or more, constant temperature of 24° C, relative humidity 70 %), and in particular in the vicinity of Gallia, Duartina, Fernão Dias, Bastor, Lucianopolis, Charqueada, Agudos and Linas (which has a number of silk weaving mills).

The production in 68/69 was 2,000 tons of which 60 % was exported. Exports are absorbed by Japan (55 %), Germany, Switzerland and the United States.

Brazilian silk production is slowly increasing. There are currently 3,000 small family concerns selling their produce directly to the mills which extract the silk from the coccons and sometimes spin the thread.
There are eight to ten important mills, in addition to a sprinkling of minor handicraft concerns which sell their production to textile industry proper.

The sericulture institute of Campinas, which houses common laboratory equipment, classifies all Brazilian silk production according to specific quality standards, a fact which promotes quality improvements.

## RAMI AS A SUBSTITUE FOR LINOLEUM

Rami growing is currently concentrated in the state of SP, particularly in northern Paranà. Productivity is 2 tons of dried pre-cut fiber par ha.

## EVOLUTION OF LINOLEUM/RAMI PRODUCTION

| Years | Linoleum + rami | Imports |
|---|---|---|
| 1960 | 30,200 | 4,200 |
| 1961 | 28,000 | 4,500 |
| 1962 | 43,500 | 4,700 |
| 1963 | 20,500 | 3,500 |
| 1964 | 54,000 | 2,000 |
| 1965 | 42,000 | 200 |
| 1966 | 36,500 | 100 |
| 1967 | 28,500 | 800 |
| 1968 | 28,000 | 1,200 |
| 1969 | 30,700 | 400 |
| 1970 | 23,000 | 500 |

The production of linoleum and rami has strongly receded since 1960.
It should be explained that this evolution is imputable to two predominant factors, namely :

- progressive substitutions, of respectively 54, 42 and 36,000 tons a year correspond to the years when both fibers where simultaneously produced.
  From 1967, only rami was grown in any appreciable quantities. Actually turnover was at the time 28,000 tons per annum.

- Decline of internal demand for linoleum and rami articles under pressure from synthetics. In 1970, rami exports amounted to 7,500 tons of which raw materials accounted for 5,500 tons. It should be noted that the sharp fall of 1970 was due to the severe draught.

## HARD FIBERS

### Jute and Malva/Guaxima

EVOLUTION OF JUTE AND MALVA/GUAXIMA PRODUCTION

| Years | Tons (raw) | Malva/ Guaxima | Total raw exports |
|---|---|---|---|
| 1960 | 38,891 | 11,585 | 170 |
| 1961 | 48,219 | 13,130 | 180 |
| 1962 | 47,477 | 13,152 | 43 |
| 1963 | 44,122 | 13,144 | 554 |
| 1964 | 51,235 | 12,692 | 545 |
| 1965 | 61,585 | 15,701 | 442 |
| 1966 | 44,457 | 17,201 | 1,518 |
| 1967 | 56,000 | 17,000 | 480 |
| 1968 | 51,206 | 14,500 | - |
| 1969 | 48,687 | 13,200 | - |
| 1970 | 59,350 | 13,500 | 1,740 |

It can be seen that from 60/61 to 1970 jute production increased markedly while that of malva remained stable. Export being of little moment, practically all production is absorbed by the domestic market and consumed as finished or semi-manufactured articles. Plantations are mostly located in the Amazon and Para states with a few in SP. In 1966, Amazon state accounted for 71 % of jute output and Parà for the remainder. 90 % of Malva comes from Parà.

EVOLUTION OF JUTE PLANTATION AREAS AND YIELDS

| Years | Surface (ha) | Yield in kg/ha |
|---|---|---|
| 1962 | 40,688 | 1.167 |
| 1964 | 41,795 | 1,226 |
| 1966 | 33,694 | 1,320 |
| 1968 | 48,424 | 1,057 |
| 1969 | 45,237 | 1,076 |

From the economic standpoint, jute represents 31 % in value of Amazon state overall turnover in 1965/1966. For the state of Parà, jute and Malva represent 14 % of overall revenue in 1966.

Therefore, it appears that, in spite of the new poles of attraction recently promoted for the economic development of the Amazon region, it might pay to activate jute production in view of the new possibility of exports to Europe and the United States, which are currently being supplied by India and Pakistan.

To attain this goal, production costs at farmer level would have to be cut, although there are currently no prospects of its becoming a fact, and the quality of semi-finished products would have to be improved if the US or European markets are to be entered. The quality of Indian and Pakistani products is higher and selling prices lower in these markets than that of Brazilian products.

Sisal/Agave

The entirety of Brazilian sisal production is concentrated in the NE region.

SISAL PRODUCTION

| Years | According to IBGE | According in the US dept. of agriculture |
|---|---|---|
| 1966 | 283,379 | 201,600 |
| 1967 | 328,276 | 208,200 |
| 1968 | 332,362 | 208.800 |
| 1969 | 311,000 | 209,100 |
| 1970 | 325,000 | 208,000 |

The discrepancies between these two statistical sources are due to the fact that sisal does not have to be collected at a specific time of year to ensure optimal yield. It can remain standing until some more appropriate time in the future. This is justifiable for low-productivity plantations for which harvest expenditures are excessive in view of going market prices.

There are 140,000 ha in the NE which are forced to operate under such precarious conditions.

## CULTIVATED AREAS IN THE NE

| Years | Area in ha | Yield per ha according to IBGE | True yield |
|---|---|---|---|
| 1962 | 160,240 | 1,087 | - |
| 1964 | 221,839 | 1,031 | - |
| 1966 | 339,765 | 869 | 590 |
| 1968 | 344,589 | 953 | 606 |
| 1969 | 323,278 | 1,028 | 660 |

## EVOLUTION OF EXPORTS

| Years | Tonnage |
|---|---|
| 1966 | 153,000 |
| 1967 | 128,200 |
| 1968 | 146,600 |
| 1969 | 143,700 |

The above figures can be summarized as follows :

- the potential output of NE plantations is approximately 300,000 tons
- actual harvests amount to some 210,000 tons
- exports : 150,000 tons, i.e. 25 % of world production
- domestic consumption is therefore estimated at some 50 to 60,000 tons.

93 % of cultivated areas are situated in the states of Bahia Paraiba and PC; Brazil ranks second, after Tanzania with 32 % of world production. Two thirds of sisal exports are designed for consumption as agricultural rope, the remainder being dedicated to wrapping and packaging thread and rope, the paper, carpet and finishing industries.

The pressure of synthetic products, especially polypropylene whose price is competitive with that of sisal and which has equivalent or better qualities has created an unbulance between availability and demand on the world markets which translated by a sharp decline of world rates :

EVOLUTION OF SISAL PRICES

| Years | Price of raw sisal per ton |
|---|---|
| 1964 | 288,5 US $ |
| 1965 | 168,2 US $ |
| 1966 | 157,3 US $ |
| 1967 | 130,1 US $ |
| 1970 | 118,0 US $ |

In view of this situation, the producing countries adopted an informal provisional export policy as of 1967 in an effort to maintain world prices. In the past three years, this policy has allowed to cushion the fall initiated in 1964. To the same ends and in order to avoid undue price increases which would enhance the competitive position of synthetics, cultivated areas have had to be reduced.

We believe that the prices of such synthetic fibers as polypropilene will continue to be tightened whereas the sisal producing countries can hardly achieve better yields of their plantations, or cut their prices. In Brazil, this state of affairs is intensified by the fact that sisal plantations usually are implanted on poor soils offering a low degree of productivity as compared to other world producers. This is another reason for which plantations are often left standing until world prices are such as to cover harvesting costs.

Other hard fibers (Caroa-Tucuma)

This group of fibers provides an overall production of 11 to 13,000 tons. Tucuma is especially utilized for the manufacture of fishing nets on a handicraft scale. Its annual production is negligible and of approximately 70 tons/annum.

Man-made fibers

Viscose

EVOLUTION OF APPARENT PRODUCTION AND
CONSUMPTION OF RAYONNE AND VISCOSE IN BRAZIL

| Years | Production in tons or apparent consumption | Processing capacity | imports | Rate of utilization of processing capacity |
|---|---|---|---|---|
| 1960 | 35,000 | - | - | - |
| 1961 | 36,500 | - | - | - |
| 1962 | 33,100 | - | - | - |
| 1963 | 34,200 | - | - | - |
| 1964 | 34,200 | - | - | - |
| 1965 | 35,400 | - | - | - |
| 1966 | 39,000 | - | - | - |
| 1967 | 41,400 | - | - | - |
| 1968 | 44,900 | 55,960 | - | 80.2 |
| 1969 | 42,700 | 56,660 | - | 75.3 |
| 1970 | 40,777 | 56,660 | - | 72.0 |

From 1968 to 1970, the apparent consumption of rayonne and viscose decreased and the rates of utilization fell from 80.2 to 72 %.

This regression was due to the pressure of synthetic fibers and to the appearance on the market of polynosic imported fibers, some estimated 1,500 tons of which were utilized by the cotton mills in 1970.

## EVOLUTION OF WORLD VISCOSE AND ACETATE PRODUCTION

| Years | Production in tons |
|---|---|
| 1960 | 2,597,000 |
| 1965 | 3,327,000 |
| 1966 | 3,346,000 |
| 1967 | 3,320,000 |
| 1968 | 3,530,000 |

Which means a regression from 1966 to 1967 of 26,000 tons of world production.

### Acetate rayonne

In the sector of rayonne products we have not taken stock of pre-cut fibers utilized in the manufacture of cigarette filters. The production of this type of fiber was 3,600 tons in 1969 and 3,500 tons in 1970.

## EVOLUTION OF TEXTILE ACETATE FIBERS IN BRAZIL

| Years | Production in tons | Installed | Imports | Apparent consumption |
|---|---|---|---|---|
| 1960 | 4,900 | - | - | 4,900 |
| 1961 | 5,500 | - | - | 5,500 |
| 1962 | 6,400 | - | - | 6,400 |
| 1963 | 6,800 | - | - | 6,800 |
| 1964 | 6,800 | - | - | 6,800 |
| 1965 | 6,400 | - | - | 6,400 |
| 1966 | 7,800 | - | - | 7,800 |
| 1967 | 8,700 | - | - | 8,700 |
| 1968 | 8,600 | 8,900 | 1,000 | 10,400 |
| 1969 | 8,500 | 8,900 | 1,740 | 10,240 |
| 1970 | 8,320 | 8,900 | 2,350 | 10,670 |

It can be inferred that in the past three years there has been a sharp growth of apparent consumption, due to the jump of exports in 1970 from 1,200 to 2,350 tons. This phenomenon was brought about by the texturization sector which, since 1968, has been utilizing pure acetate and a mixture of acetate and nylon filament. The tonnage of acetate thus processed and which goes to the knitwear sector can be estimated at around 1,800/2,200 tons a year.

Synthetic fibers

EVOLUTION OF POLYESTER FILAMENT PRODUCTION AND APPARENT CONSUMPTION

| Years | Production (tonnnage) | Installed capacity | Imports | Apparent consumption |
|---|---|---|---|---|
| 1960 | - | - | - | - |
| 1961 | - | - | - | - |
| 1962 | 1,020 | - | 380 | - |
| 1963 | 2,590 | - | 110 | - |
| 1964 | 2,870 | - | 230 | - |
| 1965 | 4,030 | - | 70 | - |
| 1966 | 7,130 | - | 170 | - |
| 1967 | 6,980 | - | 120 | - |
| 1968 | 9,070 | 11,240 | 2,173 | 11,873 |
| 1969 | 11,200 | 11,240 | 1,603 | 12,843 |
| 1970 | 16,529 | 20,650 | 1,301 | 17,830 |

From 1966 onwards, there was a striking development of production imports and apparent consumption of polyester.

This situation is primarily accounted for by the popularity and appeal of the unbroken filament, as demonstrated by the following table :

| Year | Production | | Imports | | app.consumtion | |
|---|---|---|---|---|---|---|
| | underbroken fil. | fiber | filament | fiber | filament | fiber |
| 1968 | 1,105 | 8,328 | 1,226 | 947 | 2,331 | 9,275 |
| 1969 | 1,970 | 9,446 | 829 | 774 | 2,800 | 10,220 |
| 1970 | 4,162 | 12,367 | | | | |

The texturization of polyester is for the most part, responsible for this demand for unbroken filament and, we believe, this sector will continue to develop substantially.
The broken polyester filaments are shared by the combed filament sector and by the cotton/polyester blend in the short-fiber or cotton sector. The current invasion of the latter sector does not exceed 4 %, which warrants the prediction that this sector will be called to develop substantially in the next decade as a consumed of polyester.

## EVOLUTION OF NYLON PRODUCTION

| Years | Installed capacity | Prod.including industr.thread | Prod. without ind. thread |
|---|---|---|---|
| 1960 | - | - | 4,470 |
| 1961 | - | - | 5,550 |
| 1962 | - | - | 8,240 |
| 1963 | - | - | 8,280 |
| 1964 | - | - | 9,590 |
| 1965 | - | - | 10,150 |
| 1966 | - | - | 11,060 |
| 1967 | - | - | 12,760 |
| 1968 | 20,950 | - | 14,400 |
| 1969 | 27,910 | 21,320 | 15,300 |
| 1970 | 31,280 | 27,577 | 18,060 |

## TABLE OF NYLON TYPES PRODUCED

| Years | Nylon 6 | | Nylon 66 | | Industrial threads | |
|---|---|---|---|---|---|---|
| | thread | fibre | thread | fibre | Nylon 6 | Nylon 66 |
| 1968 | | - | | | | |
| 1969 | x | -<br>13,650 | x | 1,560 | - | 6,120 |
| 1970 | 7,010<br>x | -<br>16,228 | 9,218<br>x | 1,831 | 170 | 6,288 |

The augmentation of nylon production is regular, with a slightly higher rate of increase since 1967. This is accounted for both by the substitution, in the field of rubber tyres, of rayonne by nylon HT.
The normal unbroken filament can also influence this production increase (nylon stockings, blouses, etc...).

The nylon filaments are increasingly popular in the rug, carpet and home furnishing sectors which are developing fast.

## EVOLUTION OF ACRYLIC FIBER PRODUCTION AND APPARENT CONSUMPTION

| Years | Production tonnage | Import tonnage | App. consumption |
|---|---|---|---|
| 1960 | - | 200 | 200 |
| 1961 | - | 200 | 200 |
| 1962 | - | 200 | 200 |
| 1963 | - | 300 | 300 |
| 1964 | - | 200 | 200 |
| 1965 | - | 200 | 200 |
| 1966 | - | 800 | 800 |
| 1967 | - | 4,000 | 4,000 |
| 1968 | - | 3,600 | 3,600 |
| 1969 | 1,200 | 3,600 | 4,800 |
| 1970 | 2,853 | 3,600 | 6,453 |

The first Brazilian production units began operating in 1969. Until then, the few existing mills were supplied with imported fiber.

Since 1967 knitwear absorbs an ever increasing proportion of acrylic fiber; the home furnishing sector (carpets, blankets) is also a major potential consumer.

POLYPROPYLENE CONSUMPTION

| Years | Pronduction in tons | Imports | Installed capacity | App. consumption |
|---|---|---|---|---|
| 1968 | - | - | - | - |
| 1969 | - | 350 | - | 350 |
| 1970 | 1,590 | - | 2,500 | 1,590 |

Since 1970, two production units have begun operating in Brazil : one with a capacity of 1,500 tons and the other of 1,000 tons a year. These fibers are absorbed mostly by the knitwear, home furnishing and rope sectors. The industrial sack sector has not yet been affected but it will find i difficult to withstand the economic pressure op polypropylene unless the production costs of jute are sufficiently compressed, in which case it might maintain its "place in the sun" for another decade.

## OVERALL CONSUMPTION OF NATURAL PRIME MATERIALS BY THE TEXTILE INDUSTRY

| YEAR | SOFT NATURAL FIBERS | | | HARD AND ASSIMILATED NATURAL FIBERS | | | |
|---|---|---|---|---|---|---|---|
| | Cotton | Wool | Silk | Lin-Rami | Jute-Malva | Sisal | Others |
| 1960 | 262,800 | 18,400 | | 24,500 | 50,306 | | 11,200 |
| 1961 | 275,600 | 18,400 | | 24,500 | 55,169 | | 13,250 |
| 1962 | 275,600 | 14,200 | | 47,500 | 60,586 | | 13,320 |
| 1963 | 271,000 | 14,100 | | 23,300 | 56,712 | | 14,200 |
| 1964 | 255,700 | 13,600 | | 54,700 | 63,382 | | 12,750 |
| 1965 | 260,600 | 13,900 | | 40,700 | 76,844 | | 16,460 |
| 1966 | 266,000 | 14,400 | | 33,500 | 60,140 | 70,000 | 16,230 |
| 1967 | 270,000 | 14,900 | 200 | 29,200 | 72,520 | 70,000 | 13,420 |
| 1968 | 283,500 | 12,500 | 400 | 23,200 | 66,000 | 52,000 | 13,500 |
| 1969 | 281,400 | 15,000 | 600 | 24,900 | 56,500 | 50,000 | 13,200 |
| 1970 | 287,800 | 19,000 | 800 | 11,500 | 56,350 | 45,000 | 11,800 |

1970 Situation : Soft natural fibers : 319,100 tons a year.
Overall consumption : 422,688 tons a year, i.e. 4.26 Kg per capita.

## TABLE OF APPARENT CONSUMPTION OF THE ENTIRE FIBER RANGE

| YEAR | MAN-MADE FIBERS | | | | NATURAL FIBERS | | | |
|---|---|---|---|---|---|---|---|---|
| | Viscose | Tyre viscose | Acetate | Others | Nylon | Polyester | Acrylic | Others |
| 1960 | 35,000 | | 4,900 | - | 4,700 | - | 200 | - |
| 1961 | 36,500 | | 5,500 | - | 5,800 | - | 200 | - |
| 1962 | 33,500 | | 6,400 | - | 8,600 | 1,400 | 200 | - |
| 1963 | 34,200 | | 6,800 | - | 8,800 | 2,700 | 300 | - |
| 1964 | 34,200 | | 6,800 | - | 10,000 | 3,100 | 200 | - |
| 1965 | 35,400 | | 6,400 | - | 10,500 | 4,100 | 200 | - |
| 1966 | 39,000 | | 7,800 | - | 11,700 | 7,300 | 800 | - |
| 1967 | 41,400 | | 8,700 | - | 13,700 | 7,100 | 4,000 | - |
| 1968 | 44,900 | | 10,400 | - | 19,800 | 11,800 | 3,600 | - |
| 1969 | 33,700 | 9,000 | 10,240 | 800 | 19,600 | 13,100 | 4,000 | 350 |
| 1970 | 31,748 | 9,030 | 11,250 | 1,200 | 24,470 | 17,850 | 6,450 | 1,590 |

**1970 Situation** : 103,588 tons per annum.

1.1.1.2. Cotton and Blends.

Apparent consumption of cotton in 1970 topped 287,800 T/yr. In 1968 and 1969, it was 283,500 and 281,400 respectively. In order to take stock of the realities of the market and in view of the inadvisability of considering annual consumption as representative, we have preferred to base our evaluation on the mean consumption in the past three years : 68-69-70, namely 284,200 Tons/year.

The tonnage of polyester fiber consumed in the form of open-yarn in 1970 was 12,367 Tons of domestic production and 1,500 Tons of imported fiber. The overall consumption of polyester in Brazil was therefore 13,867 Tons in 1970.

These threads go to feed the sectors of wool-synthetics blends spun on combed-wool spindles, synthetics : pure or blended with viscose and cotton-polyester blends.

Currently, the production of polyester-cotton blends for the country as a whole is 4 % of the cotton-viscose input, i.e. 11,370 Tons in terms of the apparent consumption of cotton.

It should however be noted that 12,500 Tons of viscose are spun in cotton mills, blended with polyester; this means that more than 700 Tons of polyester go into the viscose-synthetic blend. This blend is spun in cotton mills.

Fibers spun in cotton mills in 1970.

| Materials | Tonnage |
|---|---|
| Cotton | 284.200 |
| Polyester | 12.070 |
| Viscose | 12.500 |
| Total | 308.770 |

1.1.1.3. Wool and blends.

In 1970, the apparent consumption of wool on the yolk was 19,000 T., a figure which corresponds to 10,500 Tons of bleached wool, i.e. free of fat, grease and mineral or vegetable impurities.

The total of production of thread in combed wool mills was 20,000 Tons in 1970.

The difference of 9,500 Tons between these two figures represents pure synthetics, man-made + synthetics wool + synthetics and wool + man-made blends.

In 1970, the break-down of MMF fibers entering into blends with wool were as follows :

| Fibers | Tonnage for 1970 |
|---|---|
| Polyester | 1,400 |
| Viscose | 600 |
| Acrylics | 500 |
| Total | 2,500 |

To this should still be added 200 Tons of nylon entering into nylon-wool blends.

1.1.1.4. Man-made fibers.

The following fibers were used in the combed or spinning mills :

| Fibers | Tonnage for 1970 |
|---|---|
| Nylon | 1,750 |
| Polyester | 1,200 |
| Viscose | 4,300 |
| Acrylics | 3,000 |
| Total | 10,250 |

## 1.1.1.5. Rami - Jute - Flax - Sisal.

A. Rami.

Considering the 1970 consumption figures for flax, it can be assumed that 9,000 Tons of rami were consumed, the remaining 2,000 being utilized for cordage and rope.

B. Jute.

In 1970, the apparent consumption of jute and malva fiber in spinning mills was 56,000 Tons.

C. Sisal.

In 1970, the consumption of sisal was 55,000 Tons. The reader is referred to Chapter 1.1.1.1. which supplies the necessary explanations as to the distribution of sisal production in the domestic and foreign markets.

1.1.2. Production and consumption of textile in 1970 broken down by type of products.

1.1.2.1. Yarns.

1.1.2.1.1. Cotton and blends.

Tonnage of cotton and cotton blends in 1970.

| Components | Tonnage of yarn |
|---|---|
| Cotton | 254,400 |
| Polyester | 10,200 |
| Total | 264,600 |

Break-down into pure cotton yarn and cotton/polyester yarn in 1970.

| Type of thread | Tonnage |
|---|---|
| Pure cotton | 244,300 |
| Cotton/polyester | 15,300 |
| Total | 265,600 |

For this survey to be comprehensive, there remains to be mentioned that the amount imported of polynosic or viscose fibers which went into cotton blends in 1970 was 600 Tons.

Table of counts in cotton thread and blends used in Brazil and Sao Paulo.

| | Brazil | | Sao Paulo | |
|---|---|---|---|---|
| English counts | % | % combed | % | % combed |
| 0 to 9 | 25.0 | - | 15.5 | 1 |
| 10 to 15 | 21.0 | 2.0 | 31.0 | 2 |
| 16 to 19 | 19.0 | 3.0 | 18.0 | 3 |
| 20 to 24 | 17.0 | 12.0 | 17.0 | 11.7 |
| 25 to 29 | 7.0 | 4.0 | 6.1 | 4.2 |
| 30. to 34 | 10.0 | 24.0 | 11.5 | 21.5 |
| 35 to 39 | 1.0 | 5.0 | 0.0 | 4.4 |
| 40 to 44 | - | 31.0 | 0.01 | 34.0 |
| 45 to 54 | - | 9.0 | - | 12.0 |
| 55 to 64 | - | [illegible].0 | - | 5.2 |
| 65 and above | - | 4.0 | - | 1.6 |

The average English count for the entire country is N° 23,2. For the State of Sao Paulo it is 21,9.

Interregional and international comparative table of cotton counts.

| Regions or countries | Average English counts |
|---|---|
| Brazil | 23.2 |
| Colombia | 24.5 |
| Hong Kong | 24.0 |
| Japan | 31.4 |
| Pakistan | 18.0 |
| Congo | 15.0 |
| Nigeria | 18.0 |
| Sao Paulo | 21.1 |
| Nordeste | 17.1 |
| Santa Catarina | 28.5 |

Comparison of average counts in the North Eastern states of Brazil

| States | Average English counts |
|---|---|
| Maranhao | 10.0 |
| Ceara | 13.4 |
| Rio Grande do Norte | 7.8 |
| Paraiba | 18.1 |
| Pernambuco | 19.4 |
| Alagoas | 23.8 |
| Sergipe | 14.8 |
| Bahia | 16.5 |
| Nordeste | |

Source : SUDENE ( 1969 survey)

It can be inferred that the regions or states which manufacture thread counts of 19 or less are specialized in poor-quality thread, with a predominant trend towards carded cotton.

In the North East, only the states of Alagoas and Pernambuco are exceptions to the rule thread production is largely for counts of less than 19 (N° 17.1)

This is incompatible with the availability of raw materials in these regions. However, it should be noted that the North East is still strongly attached to the manufacture of coarse-thread, mass-designed articles, sacks, etc... The state of Minas Gerais seems to be in the same position, its average count being in the vicinity of 16. These discrepancies between average counts show that the states of Brazil have all specialized to a certain extent and provides ample evidence of the regional nature of the cotton industry.

1.1.2.1.2. Wool yarn and blends.

Break-down of raw materials consumed in 1970 in combed-wool spinning mills. (•)

| Yarn | Tons/year |
|---|---|
| Wool | 10 500 |
| Polyester | 1 400 |
| Viscose | 600 |
| Acrylics | 500 |
| Total | 13 000 |

A. Carded thread.

The industry of carded wool absorbs essentially waste materials or miscellaneous refuse from other sectors. Is is difficult and even impossible to draw a reference table for this type of thread.

Average relative annual production of carded thread
in the various producing counties (USA = 100)

| Region or country | Average output of |
|---|---|
| United Kingdom | 73.8 |
| U.S.A. | 100.0 |
| Austria | 66.7 |
| Holland | 71.5 |
| West Germany | 73.6 |
| Hong Kong | 136.7 |
| India | 71.4 |
| Japan | 83.7 |
| Pakistan | 80.4 |
| France | 64.4 |
| Portugal | 90.7 |
| Brazil | 64.5 |

It will be noted that Brazil ranks with other countries like France and Austria as a producer of high-count or low-quality carded thread.

B. Combed or semi-combed thread.

See table on previous page.

Distribution of raw materials utilized in the carpet thread sector in 1970.

| Fibers | T/yr |
|---|---|
| Wool | 900 |
| Nylon | 720 |
| Acrylics | 720 |
| Viscose | 360 |
| Others | 250 |
| Total | 2.950 |

These figures do not include the tonnage of jute or other threads which do not enter into the manufacture of the frameworks.

Break-down of combed and semi-combed thread for special uses in 1970.

| Uses | Tons/year |
|---|---|
| Weaving : | |
| Polyester/wool | 3.800 |
| Polyester/viscose | 5.300 |
| Others (100 % wool and wool/viscose) | 1.900 |
| Knit-wear : | |
| Wool | 2.000 |
| Acrylics | 3.500 |
| Knitting wool : | 4.370 |
| Carpet wool : | 2.900 |

Blankets : In this sector, approximately 3,000 T/yr of thread are used in the manufacture of blankets.

Spinning : combed types, the most usual grades are 40/2 - 44/2 and 60/2.

The blends wool/polyester (55/45) and polyester/viscose (67/33) often incorporate 7 to 9 % nylon.

Small quantities of polyester/acrylics thread are also produced in Brazil.

1.1.2.1.3. Threads of man-made fibers.

A. Open-yarn fiber threads.

It was quite impossible, in the context of our survey, to make a break-down into open-yarn cotton or wool man-made and pure man-made. The position is undergoing such constant change that an apparently settled situation may be completely different a month later. The country is clearly in the process of searchig for its orientation and the spinning and weaving sectors are tossed around both by natural and spontaneous consumer trends and by the advertising of man-made and synthetic fiber producers.

Table of production in 1970.

| Fibers | Textile fibers | fibers | fibers | cigarette filters |
|---|---|---|---|---|
| Viscose | 17.175 | 14.575 | 9.029 | - |
| Acetate | 8.321 | - | - | 3.590 |
| Total | 25.496 | 14.575 | 9.029 | 3.590 |

B. Open-yarn fibers.

1. Man-made fibers.

Break-down of acetate filament end-uses.

| Uses | Tons/yr | |
|---|---|---|
| Texturing | 1.800 | (1.500 T.<br>(<br>(300 T. pure |
| Chain-knit | 3.000 | |
| Weaving | 4.000 | |
| Total | 8.800 | |

In 1970 Brazilian imports of continous acetate filament was 600 Tons.

Break-down of viscose filament end-uses.

| Uses | Tons/yr |
|---|---|
| Weaving | 11,500 |
| Chain-knit | 4,200 |
| Narrow fabrics | 1,500 |
| Total | 17,200 |

2. Synthetic fibers.

Table of production in 1970.

| Fibers | Textile filament | Industrial thread | |
|---|---|---|---|
| Nylon 6 | 7,010 | 133 | - |
| Nylon 66 | 9,218 | 6,290 | 1,830 |
| Total nylon | 16,228 | 6,423 | 1,830 |
| Polyester | 4,072 | 90 | 12,367 |
| Polyacrylic | - | - | 2,870 |
| Polypropylene | 1,440 | - | 156 |

Table of imports for 1970.

| | Filaments | Industrial thread | Staple |
|---|---|---|---|
| Nylon | 800 | - | - |
| Polyester | 650 | - | 100 |
| Acrylics | - | - | 1,600 |

a) Threaded nylon.

Break-down by end-uses in 1970.

| Uses | Tons/yr | |
|---|---|---|
| | Nylon 66 | Nylon 6 |
| Texturing | 6,000 | - |
| Haberdashery | 1,300 | 1,200 |
| Chain-knit | 3,000 | 4,000 |
| Weaving | 600 | 1,800 |
| High tenacity | 6,290 | 140 |

Break-down of uses by thickness.

| Uses | Tons/yr. | | | | |
|---|---|---|---|---|---|
| | 15/20 | 30/40 | 60/70 | 100/200 | 840/1260 |
| Textured | 100 | 200 | 4,650 | 1,200 | - |
| Haberdashery | 1,100 | 1,200 | 300 | - | - |
| Chain knit | 100 | 5,000 | 1,200 | 700 | - |
| Weaving | - | - | - | 2,400 | - |
| High tenacity | - | - | - | - | 6,290 |
| | 1,300 | 6,400 | 6,000 | 4,300 | 6,290 |

b) Polyester.

Distribution by end-uses in 1970.

| Uses | | Tons/yr |
|---|---|---|
| 65 | weaving | 500 |
| 205 | weaving | 2,500 |
| 135 to 150 texturing | | 1,000 |
| 65 chain knitwear | | 300 |
| Industry | | 90 |
| Total | | 4,390 |

Conclusions.

The demand for polyester filament is rising sharply and it is expected to continue along this trend. Tha average price per kilo is around 4.25 US. $.

The consumption of nylon filament tends to settle down under the pressure of acetate and polyester filaments.

| Yarn | Price U.S.$/KG | Contribution to weighted average, U.S. $/KG |
|---|---|---|
| 15 d. | 6.70 to 7.60 | .20 to .23 |
| 40 d. | 4.60 to 5.70 | 1.06 to 1.31 |
| 70 d. | 3.90 to 4.15 | .86 to .91 |
| 140 d. | 3.00 | .36 |
| High tenacity | 1.85 | .55 |

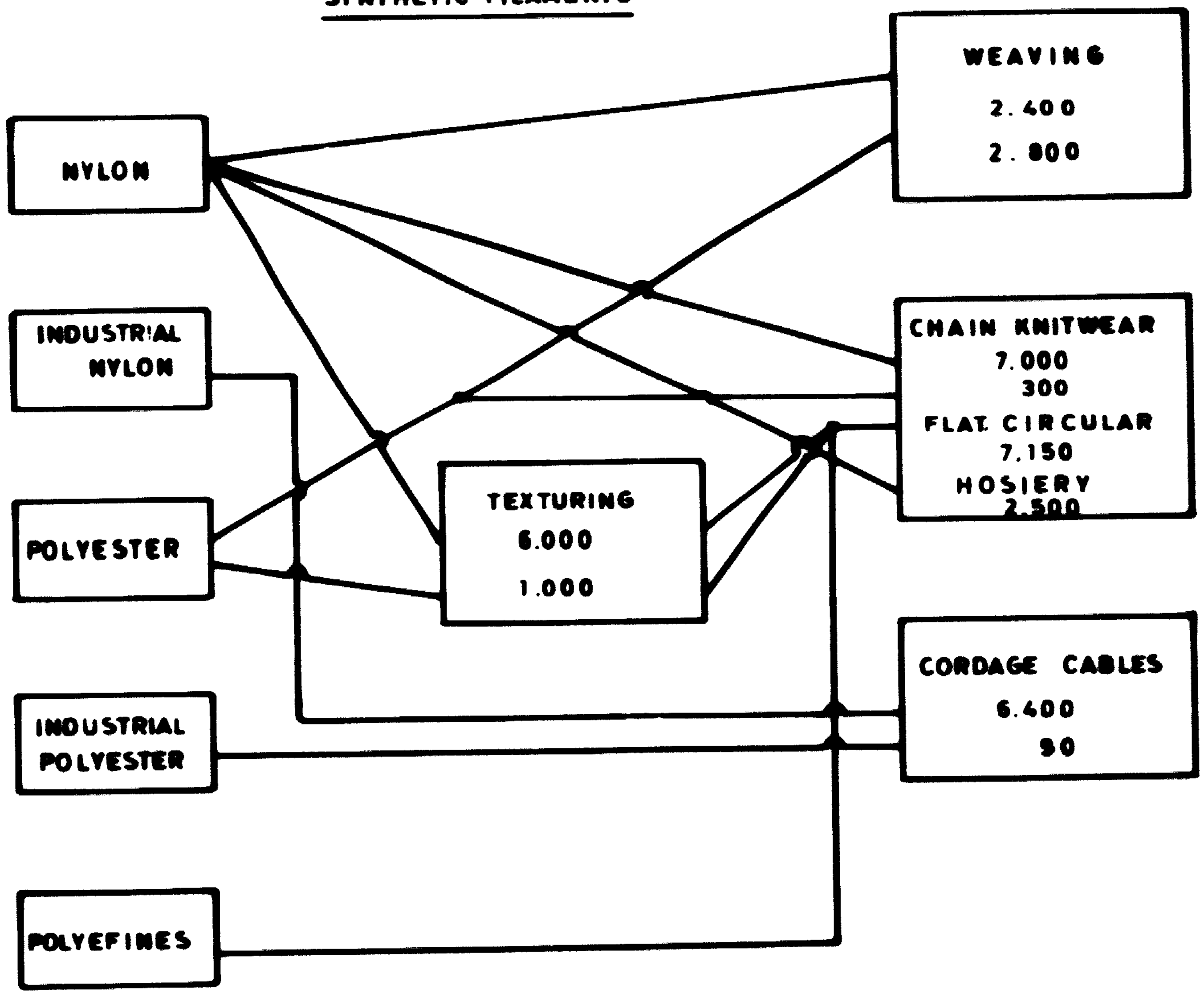
c) Polypropylene.

Prolypropylene texturing is beginning although it is still in the experimental stage at industrial level.

The main industrial use appears to be in the sector of textile thread for knit-wear. However, one enterprise which has a production capacity of 2,000 Tons of cut fibers per year, markets its prolypropylene thread in the wool, blankets and carpets industry. According to an unpublished survey by an international organization the current demand for such yarn in Brazil is only 300 Tons a year.

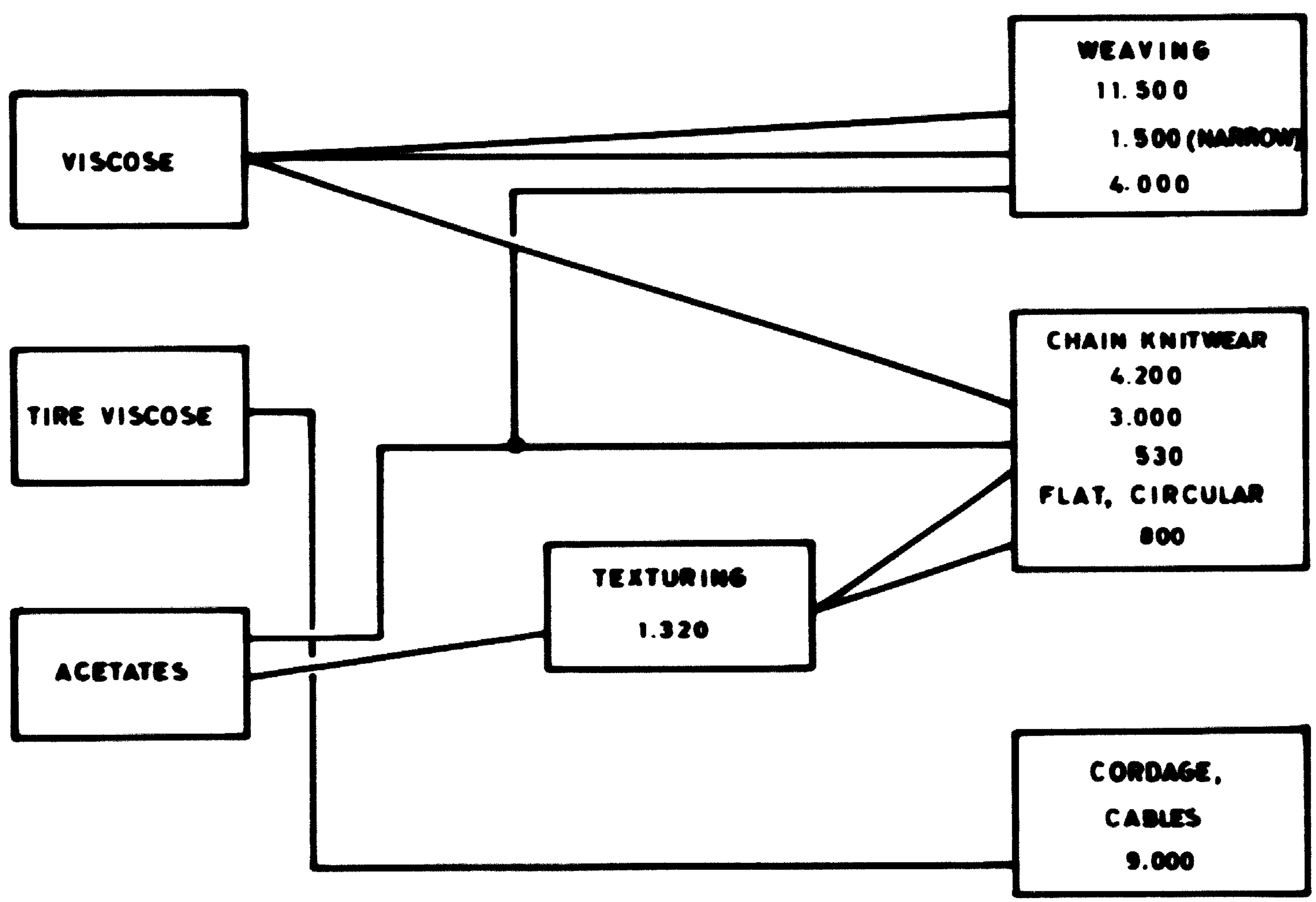
## 1.1.2.2. INPUT-OUTPUT TABLES OF RAW MATERIALS BROKEN DOWN BY END USES

### SYNTHETIC FILAMENTS



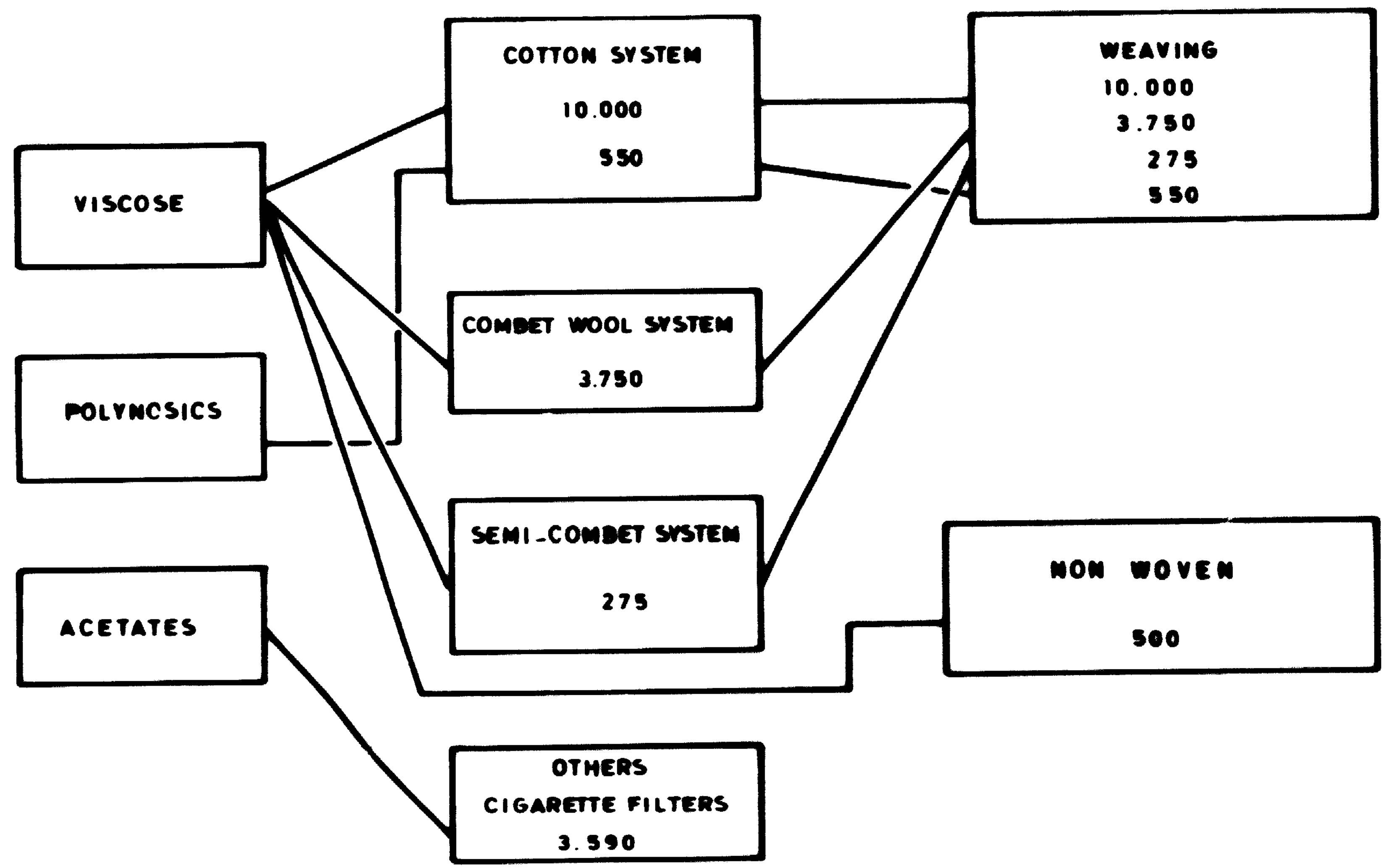

2611

ARTIFICIAL STAPLE

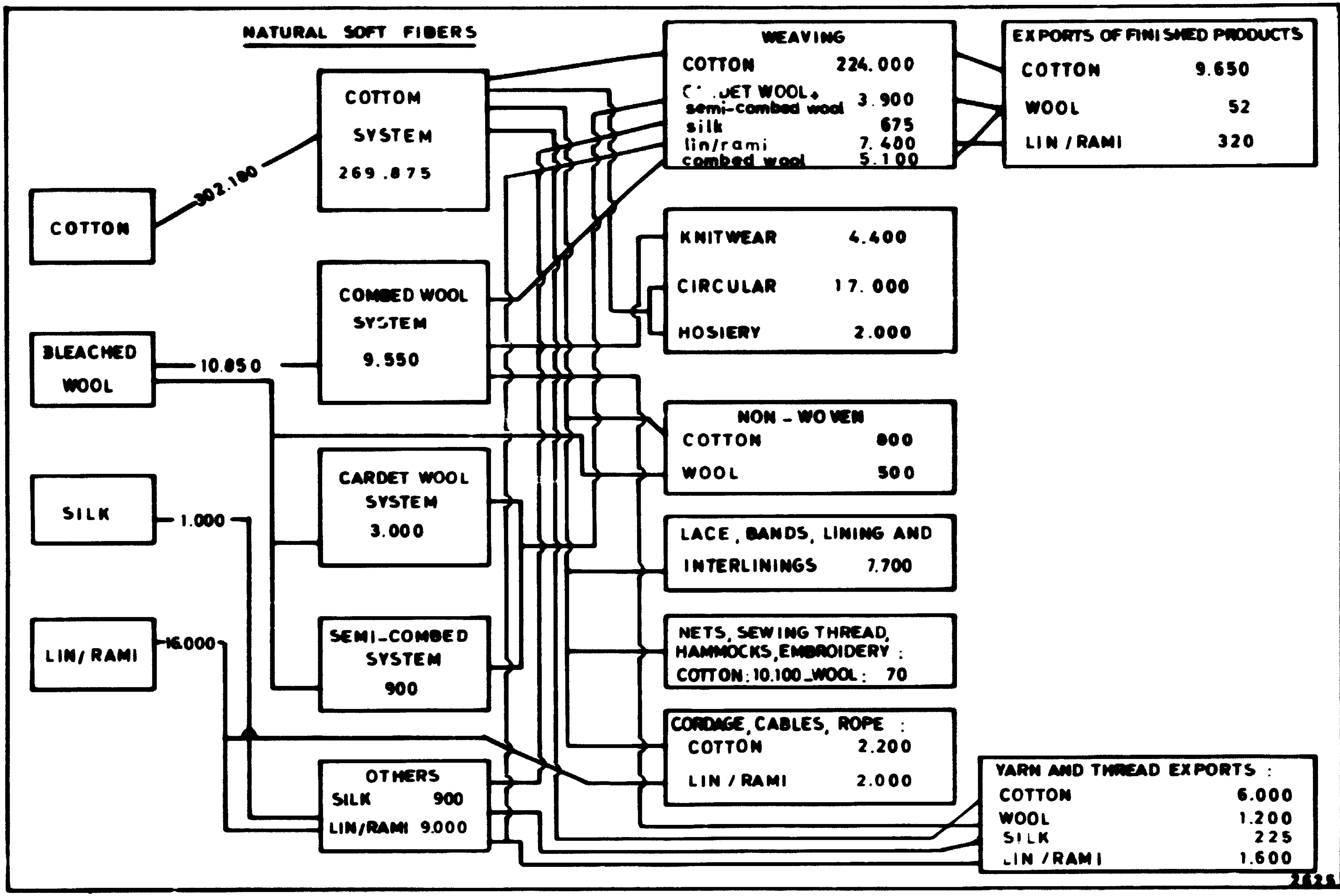


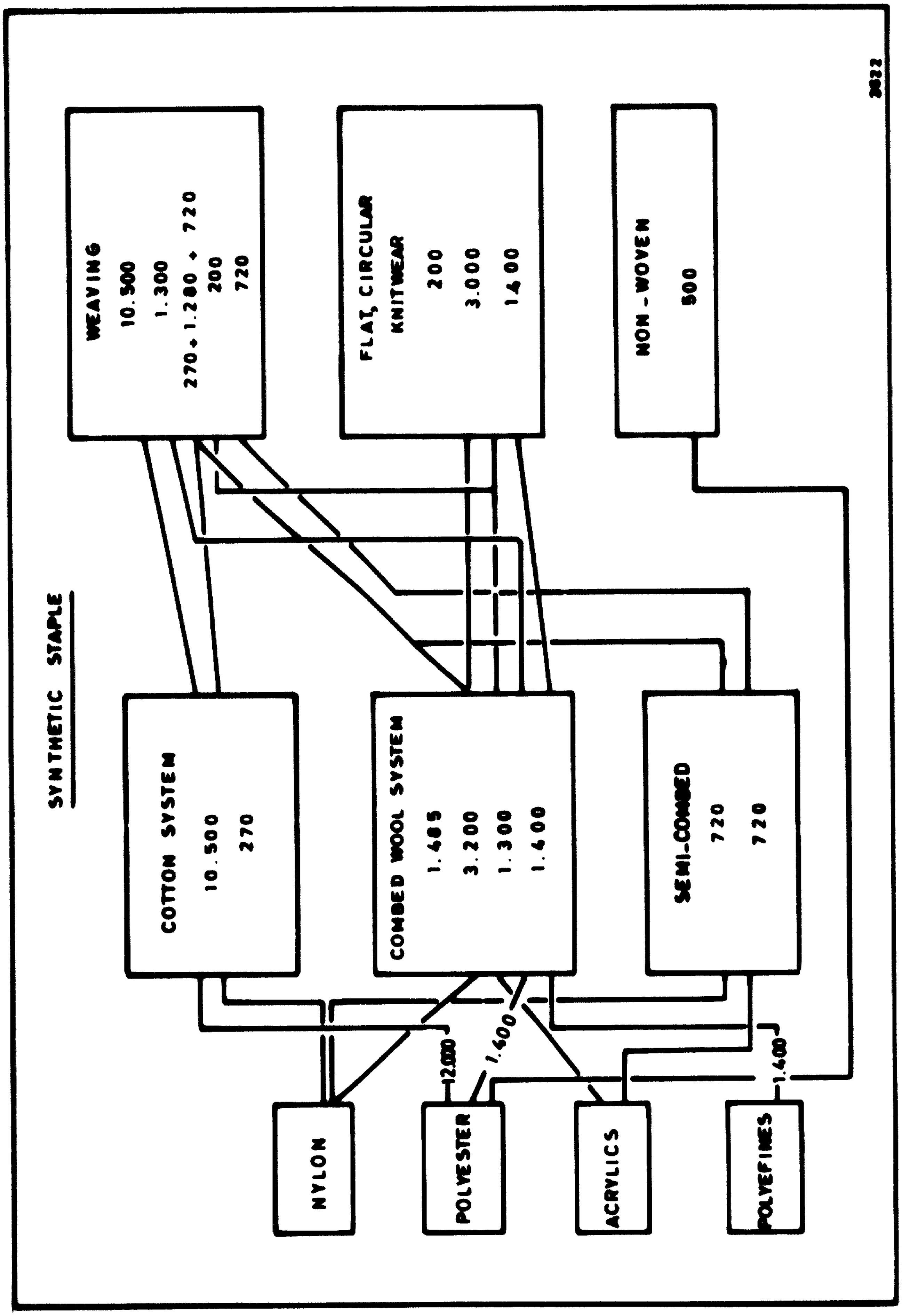

2623

ARTIFICIAL STAPLE




2624


NATURAL SOFT FIBERS
COTTON
302.100
BLEACHED WOOL
10.850
SILK
1.000
LIN/RAMI
16.000
COTTON SYSTEM 269.875
COMBED WOOL SYSTEM 9.550
CARDET WOOL SYSTEM 3.000
SEMI-COMBED SYSTEM 900
OTHERS
SILK 900
LIN/RAMI 9.000
WEAVING
COTTON 224.000
semi-combed wool 3.900
silk 675
lin/rami 7.400
combed wool 5.100
KNITWEAR 4.400
CIRCULAR 17.000
HOSIERY 2.000
NON - WOVEN
COTTON 800
WOOL 500
LACE, BANDS, LINING AND INTERLININGS 7.700
NETS, SEWING THREAD, HAMMOCKS, EMBROIDERY :
COTTON: 10.100 WOOL: 70
CORDAGE, CABLES, ROPE :
COTTON 2.200
LIN / RAMI 2.000
EXPORTS OF FINISHED PRODUCTS
COTTON 9.650
WOOL 52
LIN / RAMI 320
YARN AND THREAD EXPORTS :
COTTON 6.000
WOOL 1.200
SILK 225
LIN / RAMI 1.600
2628


SYNTHETIC STAPLE
WEAVING
10.500
1.300
270 + 1.280 + 720
200
720
FLAT, CIRCULAR KNITWEAR
200
3.000
1.400
NON-WOVEN
500
COTTON SYSTEM
10.500
270
COMBED WOOL SYSTEM
1.485
3.200
1.300
1.400
SEMI-COMBED
720
720
12.000
1.400
1.400
NYLON
POLYESTER
ACRYLICS
2822

## 1.1.3. Production and consumption of textiles in 1970 broken-down by end-uses.

### 1.1.3.1. End-uses.

End-uses have been divided into 5 major categories, namely :

- apparel
- home furnishings
- industrial uses
- various
- yard goods

Apparel includes ready-made clothes for men, women and children.

Home covers such items as sheets, blankets, curtains, rugs and carpets, table- and kitchen-cloths, towels, furniture, etc...

Industrial uses include tyres, sacks, cordage, rope, cigarette filters, tarpaulins, etc...

The end-use entitled "various" includes narrow fabrics, linings and interlinings, medical and surgical uses, sewing thread, lace, etc...

All items sold as yard goods have been classified in the last title, without distinction, whether the actual end-use is tailored cloths, home furnishings or others.

The following table gives the break-down by end-uses and by raw materials for the production of 1970.

END USES 1970 (1,000 Tons)

| End uses / Raw materials | Apparel | Home | Indus-trial | Various | Yard | Total |
|---|---|---|---|---|---|---|
| Cotton | 80.3 | 44.1 | 60.8 | 24.4 | 78.2 | 287.8 |
| Wool (in the yolk)* | 4.3 | 3.5 | 0.2 | 6.3 | 4.7 | 19.0 |
| Synthetics | 17.3 | 8.1 | 13.0 | 3.0 | 9.0 | 50.4 |
| Man-made | 20.5 | 10.5 | 10.1 | 11.5 | 3.0 | 55.6 |
| Linen-rami | 2.3 | 6.0 | 7.0 | - | 1.2 | 16.5 |
| Jute-malva | - | 5.6 | 50.8 | - | - | 56.4 |
| Sisal | - | - | 40.0 | 5.0 | - | 45.0 |
| Others | - | - | 11.8 | - | - | 11.8 |
| Total | 124.7 | 77.8 | 193.7 | 50.2 | 96.1 | 542.5 |
| Bleached wool* | 2.4 | 2.0 | 0.1 | 3.3 | 2.6 | 10.5 |

## 1.1.3.2. Apparel.

With more than 91,000 Tons, menswear account for approximately 73 % of all apparel. For women's ready-made clothes, this proportion is 23 % and for children's 4 %.

The most important items from the viewpoint of total tonnage of ready-made clothes consumed are sports shirts and dungarees. The latter item is remarkable inasmuch as although it belongs to the menswear sector, it is also worn by women.

Final uses

| I. Apparel | 1000 T<br>1970 |
|---|---|
| 1. Men | |
| 1.1. Outerwear | |
| 1.1.1. Dresses | 587 |
| 1.1.2. Separate jackets | 2.195 |
| 1.1.3. Shorts | 964 |
| 1.1.4. Shirts (Dress) | 5.078 |
| (sport) | 26.271 |
| 1.1.5. Dungarees | 26.176 |
| 1.1.6. Slacks | 3.472 |
| 1.1.7. Knitwear (estim.) | 5.981 |
| 1.1.8. Rainwear & umbrella's | 1.256 |
| 1.1.9. Work clothes | 4.176 |
| 1.1.10. Military uniforms | 2.817 |
| 1.2. Underwear | |
| 1.2.1. Underpants | 3.187 |
| 1.2.2. Undershirts | 1.913 |
| 1.3. Pyjamas | 1.186 |
| 1.4. Hosiery | 2.221 |
| 1.5. Interlinings, linings, packetings | 3.540 |
| TOTAL : | 91.020 |

| | 1000 T 1970 |
|---|---|
| 2. Women | |
| 2.1. Outerwear | |
| 2.1.1. Dresses | 2.342 |
| 2.1.2. Shirts | 2.215 |
| 2.1.3. Suits | 1.509 |
| 2.1.4. Slacks, shorts | 1.707 |
| 2.1.5. Blouse | 1.231 |
| 2.2. Underwear | |
| 2.2.1. | 9.538 |
| 2.3. Hosiery | 1.268 |
| 2.4. Knitted outerwear | 7.964 |
| 2.5. Others outerwear | 1.149 |
| TOTAL : | 28.923 |
| 3. Infant & Junior | |
| 3.1. Knitwear | 2.450 |
| 3.2. Junior garments | 2.367 |
| TOTAL : | 4.817 |

## 1.1.3.3. Home furnishing.

More than 50 % consumption for home furnishing is sheets, blankets and bed-spreads; table- and kitchen-wear and towels account for a little less than 25 %. The balance is shared by curtains, hangings, carpets, rugs, etc...

| II. Home furnishings | |
|---|---|
| 1. Curtain, drapery | 4.239 |
| 2. Bedding | 15.747 |
| 3. Bedspreads | 7.000 |
| 4. Blankets | 16.824 |
| 5. Carpets and rugs | 8.883 |
| 6. Table and kitchenwear | 11.164 |
| 7. Towels and terrycloth | 8.075 |
| 8. Filled products | 1.078 |
| 9. Bags etc... | 1.074 |
| 10. Upholstery | 2.692 |
| 11. Tucking | 1.074 |
| TOTAL : | 77.840 |

### 1.1.3.4. Industrial uses.

A clear-cut break-down of industrial uses is not possible due to the miscellaneousness of the sector.

It can be asserted however that the most consequent item is the manufacture of cotton and jute-malva bagging which account respectively for 20 and 25 % of overall industrial consumption.

| III. Industrial uses | |
|---|---|
| 1. Tire coard | 14,0 |
| 2. Cigarette filters | 3,9 |
| 3. Coated PVC backing | 4,5 |
| 4. Others - bagging cotton | 40,0 |
| jute malva | 50,8 |
| - rope | 12,5 |
| - non surveyed uses | 68,5 |
| TOTAL : | 193,7 |

1.1.3.5. Various.

The main enlistments are sewing threads and knitting (wool) (22 %) linings and interlinings (12 %), medical and surgical uses (11 %) and narrow fabrics (6 %)

| IV. Other censed products for consumers | |
|---|---|
| 1. Narrow fabrics | 3,0 |
| 2. Linings, interlinings | 6,3 |
| 3. Medical, surgical | 5,5 |
| 4. Lace | 0,5 |
| 5. Knitting (women) | 1,5 |
| 6. Embroidery | 2,0 |
| 7. Thread | 11,0 |
| 8. Other uses | 20,3 |
| TOTAL : | 50,2 |

1.1.3.6. Yard goods.

The consumption of yard goods still represents a major portion of overall textile consumption. The end-uses of yard goods are naturally hard to check. A rough estimate makes for 70 % to apparel, 22 % to home furnishing and the balance to various goods.

| V. Transformed yards | |
|---|---|
| 1. To apparel | 68,1 |
| 2. To home | 22,0 |
| 3. Other final uses | 6,0 |
| TOTAL : | 96,1 |

## 1.2. MARKETING PROCEDURES

### 1.2.1. Distribution methods

#### 1.2.1.1. Previous Situation

Until some ten years ago, the structure of distribution of textile products was characterized by the near-absolute domination of the market by wholesalers.

Their activities were not restricted to the bulk purchase of textiles. They also played the part of financiers and speculators. The volume of textile products bought by them was such that they were in a position to guide and finance the production of the textile industries and speculated on enormous stocks thereby giving rise to substantial virtual consumption. The monetary policy of the time was, indeed, favorable to the storage of goods and their subsequent liquidation at the most favorable time. It seems that major wholesalers had stocks ranging from 10 to 12 months of normal sale.

Actually, the wholesaler earned more by financing the industry and speculating on textile stocks than by selling cloth by the yard. The clearance of wholesalers' stocks during the country's period of inflationary crisis entailed a crisis in the textile industry itself.

Several important factors have intervened in the last few years, to the effect of radically modifying the distribution structure. They are :

- the government policy aimed at stifling inflation
- the advent of ready-made garments
- the general trend towards the short-circuiting of intermediaries
- the decline of sales by the yard
- the subsidization of industrial concerns by banks.

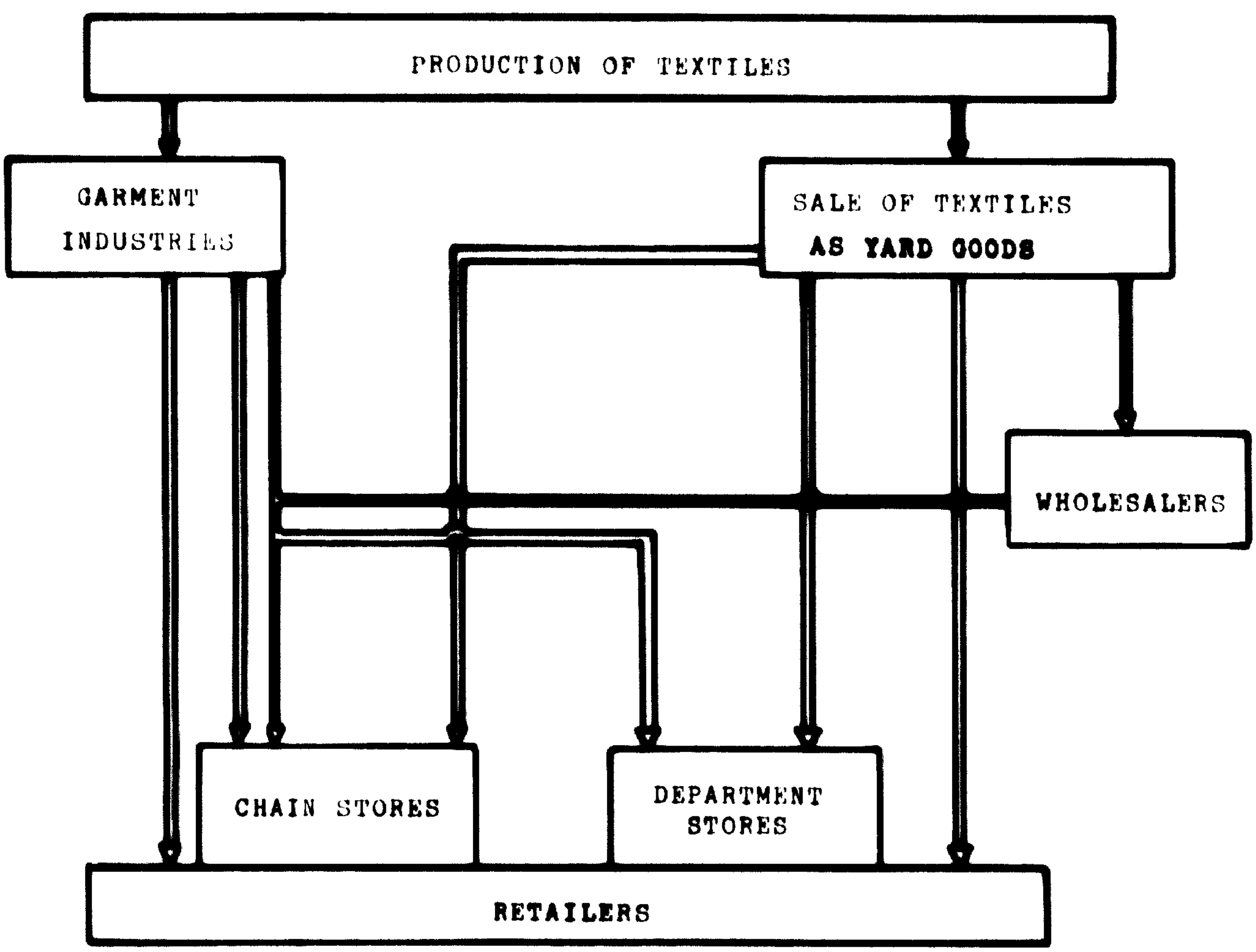
These miscellaneous conditions have brought about a relatively sharp fall in the number of wholesalers. There appears to have been a 60 % decrease in 5 years.

The government's anti-inflationary policy somewhat dampened the speculators' interest in storing large stocks of textiles. The remarkable development of the garment manufacturing industry is hi-jacking a constantly increasing proportion of textiles intially designed to be sold by the yard. On the other hand, the general trend calling for the by-passing of intermediaries means that the retail shops get their supplies more and more direct from the factory.

Finally, the textile industries have given up appealing to the wholesalers to finance their production and turned to the bankers instead.

1.2.1.2. Current Situation.

1.2.1.2.1. General structure of distribution.



This table provides the broad outline of the distribution channels of textile items (garments, cloth by the yard, home products). The following comments are called for :

1.2.1.2.2. Garment Industry.

The incidence of the garment industry on overall textile consumption has become such that it is entitled to a special chapter (Cfr. below). Suffice it to say at this stage that the garment industry currently absorbs 40 % of the production of textile fabrics designed for end-use as clothing and that this proportion is steadily increasing from year to year. Distribution of market items mostly is direct, i.e. most garment manufacturers have their own chain of stores while the other retailers get their supplies direct from the factory, generally by way of an agent. A much smaller proportion of the garment manufacturers' produce is marketed through chain stores formerly specialized in the sale of fabrics by the yard, through department stores or via wholesalers.

1.2.1.2.3. Chain-stores.

In the past chain-stores engaged exclusively in the sale of textile fabrics by the yard. At present, there are 3 major chains, one of which is composed of 900 stores and the other two of approximately 100 each. In addition there are a large number of minor regional chains each composed of between 10 and 20 stores.

These chain-stores are slowly veering towards the sale of ready-made clothes. In fact some stores are already specialized in garments while others are dedicated to furnishing fabrics.

The number of chain-stores seems to be slowly increasing. The obvious advantage of this marketing organization is the centralization of stocks purchased at bulk prices and their sale at retail price by way of the various outlets.

A deliberate policy which is being adopted by various chain-stores calls for the evacuation of rural areas where population densities have become insufficient and the concentration of stores in the more densely populated areas, leaving a free market to the independent retailers.

A methodical research of strategic outlet locations is operated and stores are implanted in favorable neighborhoods. In addition, the policy provides for the possibility of making some stores into semi-wholersaler untowards the independent retailers of the area.

1.2.1.2.4. Department Stores.

It should be noted that there are few department stores and that the existing ones are usually of medium capacity.

The urban consumer has not as yet acquired the habit of concentrating his purchases in a single market unit. However, current trends seem to indicate that it will reach this stage in the near future. Also, the department stores, for their part, endeavor to diversify their stocks as much as possible so as to encourage such a habit.

Some remarkable efforts have been made in Sao Paulo and the first results are encouraging.

As regards the sale of textile products, the department stores are mainly specialized in garments, although these do not account as yet for a very consequent proportion of this sector. The furniture department is also undergoing considerable development.

The sale of cloth by the yard is practically negligible and everything seems to indicate that this sector will be left entirely to the specialized dealers.

1.2.1.2.5. Wholesalers.

In paragraph 1.1., dedicated to the "previous situation", we have discussed the role of wholesalers in the past. Under current conditions, their importance and number is decreasing from year to year and if the current trend continues, they will have been completely resorbed in a few years' time.

However, at present they are still a major distribution channel. For reasons of facility and tradition, many manufacturers still market large quantities of their products through wholesalers.

Most wholesalers are aware of the fact that the current trend is precisely for the by-passing of intermediaries and are consequently changing their business outlook. For instance by contemplating :

- the installation of garment factories
- the creation of their own chain-stores
- the installation of a transportation network acting as wholesaler-distributor in the hinterland.

These new orientations envisaged by the wholesalers are evidently in support of the current up-ward trend of the industry.

We shall see, in the chapter dedicated to garment manufacturing industries, that this sector fails to meet current consumer demand.

Chain-stores, even regional ones, and small at that, are still to play an important part in the sector of textile distribution. Indeed, this formula enables the wholesaler to maintain his initial role and provides him with his own private channels into the retail market.

The wholesaler distributor meets the requirements of the small independent retailers established in the interior of the country, the latter being often forced to provide for transportation over long distances in order to re-stock their shops, and their financial resources are not up to the purchase of large quantities at once.

The wholesaler-distributor roves the hinterland with his goods and in a way establishes his own chain of small independent retail shops.

1.2.1.2.6. The autonomous agents.

Most textile factories market their produce through sales agents.

It is also noteworthy that many textile factories have agents throughout the country, from Manaus to Porto Alegre. This actually constitutes an excessive dispersion of their market and therefore a very inadequate penetration of same.

This system of autonomous agents, paid solely on commission, and working for several different makes at the same time is most undesirable.

Indubitably, it offers the advantage of simplicity for the manufacturer who thereby unburdens himself of a major part of the problems bearing on the marketing and commercialization of his produce. Besides, it allows him to cover a vast market geographically speaking.

The major draw-back of the system is the lack of agressiveness of sales methods, the agent being primarily a buyer rather than a true salesman.

Another problem is the distance separating the manufacturer from his market and, consequently, the lack of reliable information.

The more dynamic factories of the country have become aware of the shortcomings of the system and now have their own agents.

Contrarily to the opinion of many manufacturers, this last system is less expensive in the long run than the traditional one.

It goes without saying that the aggressiveness of the salesmen and their results are increased many fold by the utilization of a well-trained team, selling a single make and applying a marketing policy elaborated by the central sales office.

1.2.1.2.7. Garment-shops

The fashion-shop or "boutique" style is steadily gaining popularity. This type of shop usually sells sophisticated items and promotes fashion. Its clientele is found mainly among the upper-classes which can afford costly items and luxuries.

Fashion-shops are found mostly in the major shopping centers. Their significance as market outlet is quantitatively small although they play a major part in promoting newly designed clothes and exert a favorable influence on the quality and presentation of the goods.

1.2.1.3. Marketing problems

1.2.1.3.1. In thirty years' time, the population of Brazil will have doubled ; this remarkable demographic growth demands drastic changes and adaptations in distribution methods and means.

The current distribution process, although it is very dispersed and un-coordinated, and probably because of this, will not be capable of meeting future demands.

A concentration of sales units, to begin with in the major towns will prove to be mandatory.

The first steps have already been taken to this effect in Sao Paulo.

The food sector naturally forestalled the textile sector in this domain, and the number of self-services and supermarkets serving the food industry is substantially increasing every year.

The textile market will have to be partly geared to the food market's example.

1.2.1.3.2. The textile market is burdened with a marginal distribution system. This marginal sector ranges from the small retail shops to the travelling salesmen and regional markets.

It goes without saying that this sector is mainly engaged in the marketing of low quality products. In fact it survives principally by tax evasion, a practice which allows prices to be substantially reduced. Besides, as this sector is characterized by an enormous geographical dispersion, its control is very difficult.

It is also noteworthy that by and large the number of small and really large independent shops remains relatively stable, while the average-sized ones disappear.

This can be easily explained : the "small" ones survive by hanging on to their tax evasion and fiscal fraud, the "average-sized" disappear because they are controlled, because their capacity and management are inadequate and because they cannot meet their administrative expenses and problems. The larger stores remain because they have attained the required dimension and have a sound administrative infrastructure.

1.2.1.3.3. An important problem of distribution is posed by delays of payment.

We have been allowed to consult the statistical data of many industrials in this respect. The delays of payment allowed usually range from an average of 90 days up to 120 days. The resulting gap is enormous. Here is the example of payment delays sustained by a garment factory :

- 5 % payment on maturity
- 10 % payment with 10 days'delay
- 50 % payment with 10 to 30 days' delay
- 30 % payment with 30 to 60 days' delay
- 5 % payment with more than 60 days' delay.

Distances partly account for this situation. Other contingencies also provide explanations : the deficient operation of postal services, difficulties in obtaining telephone conversation ; imperfections in the banking system.

Many manufacturers are much more concerned with their banking problems than with the actual running of their businesses. It would appear that payment delays are further extended because of the banks' delays in forwarding their balance statements.

The problem of payment delays actually stands as a barrier for the direct sale from manufacturer to retailer, the former being more inclined to show preference for a small number of important clients than a large number of small ones for he thereby reduces the number of his creditors and consequently his payment problems.

1.2.1.3.4. The euphoria currently afflicting the Stock Exchange worries the industrial and business circles considerably. They feel that the excessive freedom of Exchange mechanisms brings enormous capitals in the hands of speculators.

The capitals, which are needed by industry and trade to foster their development, are laid away and become improductive. Some measure of balance in this respect is desirable.

1.2.1.3.5. The distribution in the garment sector is beginning to suffer from the imperfect structure of the garment industry (Cfr. below). This industry is having difficulties in meeting increasing demand and delays of delivery have been extending in the last few months.

1.2.1.3.6. The lack of information and education of the consumer inhibits the general improvement of quality standards.

Many industrials still believe that whatever is turned out can be sold. As a result we find on the market items of the same price having enormous differences of quality. The consumer is currently too ill-informed to assess the quality of an article and thus fails to create competition on a quality basis.

1.2.1.3.7. The display of items in retail shops and the care taken in arranging display stalls is usually not up to standards.

We do not refer to the sophisticated boutiques, but to the middle-class-oriented shops. The part played by display and presentation effects has not apparently been fully grasped by retailers.

1.2.1.4. Prospective situation

1.2.1.4.1. Lines of induction.

The determining factors liable to change the current distribution pattern are numerous and diverse. We shall endeavor to establish the lines of induction which are likely to induce the future distribution structure, before previewing the retail sale structure of coming years.

- The high rate of population growth (between 2.5 and 2.7 % of net annual increase).
- The development of the youth market.
- The phenomenon of increasing urbanization, in spite of improved communications.
- The improvement of standard of living, taking into account the differences between social classes.
- The development of the ready-made garment industry with the associated change of consumption patterns, amplification of fashion phenomena.
- Resorption of wholesalers, who formerly constituted the principal distribution channel, and general trend towards the elimination of intermediaries.
- Decline of yard sales as a result of the development of the garment industry and of the increase in the number of women working out of home.
- Change of consumer habits towards a concentration of purchases.
- Education and information of the consumer who will become increasingly aware of quality and presentation standards and will make more knowledgeable discrimination.

1.2.1.4.2. Future structure.

The future distribution structure will be characterized by an adaptation to specific regional requirements, i.e. distribution channels will be selected primarily as a function of population density criteria.

Thereafter that distribution would be engaged in a process of rationalization.

We give below an organization chart showing the specialization of future distribution.

This chart is based on the induction lines reviewed in paragraph 1.4.1.

## SPECIALIZATION IN FUTURE DISTRIBUTION

| A. MAJOR URBAN CENTERS | | B. MEDIUM-SIZE TOWNS | | C. RURAL AREAS | |
|---|---|---|---|---|---|
| Centralized sales units : | | Major chain-stores | G.H. | Small independent stores | C.G.H. |
| - Shopping Centers | G.H. | | | | |
| - Department stores | G.H. | | | | |
| - Supermarkets | G. | | | | |
| Major chain-stores | G.H. | Small centralized sales units | | Minor regional chain-stores | C.G. |
| | | - Department stores | G.H. | | |
| | | - Supermarkets | G. | | |
| Independent and specialized shops | G.C.H. | Regional chain-stores | G.C. | Periodic markets<br>Travelling salesmen | C.G. |
| Sophisticated fashion-shops | G. | Independent stores | C.G.H. | | |

G. Garments
H. Home
C. Cloth by the yard

A. Major Urban Centers.

A significant number of centralized sales units will have sprung up in major urban centers to meet the considerably increase demand for ready-made clothes and home textiles.

The giant chain-stores currently in opperation will maintain their importance but will tend to shed the traditional sale of cloth by the yard in favor of ready-made clothes. Some chains or stores of a given chain will also specialize in the sale of furniture textiles.

The sufficiently large independent stores, disposing of an adquate administrative infrastructure will continue to operate in one of the sectors of apparel, home textiles or yard.

The sophisticated shops or boutiques will continue to play the role of fashion pioneers for apparel.

B. Average-sized towns.

The major chain-stores installed in the urban centers will continue to play a major part in average-sized towns. Their stores will act both as retailers for the sale of garments and furniture textiles and as wholesalers of intermediary wholesalers for the independent retailers of the hinterland.

Minor specialized sales units.

Some department stores or supermarkets of medium size will be installed in medium-sized towns, to meet the consumers demands for grouped purchases, a practice which is likely to become a rule in the major towns.

The minor regional chain-stores enjoying an adequate penetration of their markets within a specific geographic boundary will continue to enjoy this prerogative and will sell ready-made and cloth by the yard.

The small independent stores will continue to operate in the medium-sized towns for the reasons mentioned above (Cfr. 1.3.2.).

C. Rural Regions.

The small independent stores, selling a wide variety of goods will remain in operation and will be supplied by wholesale distributors and chain-stores of neighboring towns. The minor regional chain-stores referred to under this heading are, in fact, those installed in the medium-sized towns.

The periodic markets and travelling salesmen will always meet the requirements of marginal populations having very limited purchasing power.

1.2.1.4.3. Axis of development.

The axis of this overall development is most definitely the major sales units : shopping centers, departments stores, super-markets and hyper-markets.

The promotion and development of this formula will lead to the specialization and rationalization of future distribution and will remedy the current dispersion of sales efforts by creating competition in the urban centers and, by way of corollary, in the medium-sized towns and rural areas.

1.2.2. Market locations and consumer grouping

1.2.2.1. Demographic situation.

The last population census of Brazil was carried out by the I.B.G.E. in 1970.

The complete final results of this census have not been published yet and the data used herein are actually preliminary results or, rather, estimates.

We also relied on the detailed data of the previous census, carried out in 1960.

## POPULATION CENSUS

Population of the various departments as of 17/12/7[illegible]

| DEPARTMENTS | POPULATION | | | | |
|---|---|---|---|---|---|
| | TOTAL | | Controlled increase | | |
| | 1960 | 1970 | Net increase | Overall % | Geometric rate of average annual increase |
| Rondônia (1) | 70,783 | 95,311 | 24,528 | 34.65 | - |
| Acre (1) | 160,208 | 203,900 | 43,692 | 27.27 | - |
| Amazonas (1) | 721,215 | 714,803 | 6,412 | 0.88 | - |
| Roraima | 29,489 | 40,855 | 11,366 | 38.64 | - |
| Para (1) | 1,550,935 | 1,984,745 | 433,810 | 27.97 | - |
| Amapa | 68,889 | 116,481 | 47,592 | 69.08 | 5.4 |
| Maranhão (1) | 2,492,139 | 2,883,211 | 391,072 | 15.69 | 1.5 |
| Piauī | 1,263,368 | 1,735,568 | 472,200 | 37.37 | 3.2 |
| Ceara | 3,337,856 | 4,440,286 | 1,102,430 | 33.02 | 2.9 |
| Rio Grande do Norte | 1,157,258 | 1,603,094 | 445,836 | 38.53 | 3.3 |
| Paraiba | 2,018,023 | 2,383,518 | 365,495 | 18.11 | 1.7 |
| Pernambuco | 4,136,900 | 5,208,011 | 1,071,111 | 25.89 | 2.6 |
| Fernando de Noronha | 1,389 | 1,239 | 150 | 10.79 | 1.1 |
| Alagoas | 1,271,062 | 1,606,165 | 335,103 | 26.36 | 2.4 |
| Sergipe | 760,273 | 900,119 | 139,846 | 18.39 | 1.7 |
| Bahia | 5,990,605 | 7,420,906 | 1,430,301 | 23.87 | 2.2 |
| Minas Gerais | 9,798,880 | 11,279,872 | 1,480,992 | 15.11 | 1.4 |
| Espirito Santo | 1,188,665 | 1,597,389 | 408,724 | 34.38 | 3.0 |
| Rio de Janeiro | 3,402,728 | 4,694,089 | 1,291,361 | 37.95 | 3.3 |
| Guanabara | 3,307,163 | 4,296,782 | 989,619 | 29.92 | 2.7 |
| São Paulo | 12,974,699 | 17,716,186 | 4,741,487 | 36.54 | 3.2 |
| Parana | 4,277,763 | 6,741,520 | 2,463,757 | 57.59 | 4.7 |
| Santa Catarina | 2,146,909 | 2,911,479 | 764,570 | 35.61 | 3.1 |
| Rio Grande do Sul | 5,448,823 | 6,652,618 | 1,203,795 | 22.09 | 2.0 |
| Mato Grosso (1) | 910,262 | 1,475,117 | 564,855 | 62.05 | - |
| Goias | 1,954,862 | 2,989,414 | 1,034,552 | 52.92 | 4.3 |
| Distrito Federal | 141,742 | 5[illegible],862 | 403,120 | [illegible] | [illegible] |
| BRASIL | 70,967,185 (2) | 92,237,540 | 21,270,385 | 29.97 | 2.7 |

(1) Data in the process of collection.

(2) This includes 384,297 people in Serra dos Aimorés (a region disputed by both the state of Minas Gerais and the state of Espirito Santo).

Thus it appears that the current rate of population growth lies in the vicinity of 2.7 %.

The estimates call for 107,182.6 inhabitants in 1975 and, 122,392.0 inhabitants in 1980. This would bring the rate of increase down to approximately 2.5 % per annum.

1.2.2.2. Geographic break-down.

In order to obtain a more synthetic view of the situation, both from the demographic as from the market standpoints, the MIC - BNDE has suggested that we make the following geographic break-down of Brazil :

A - Northern region.

B - North-Eastern region.

C - West-Central region.

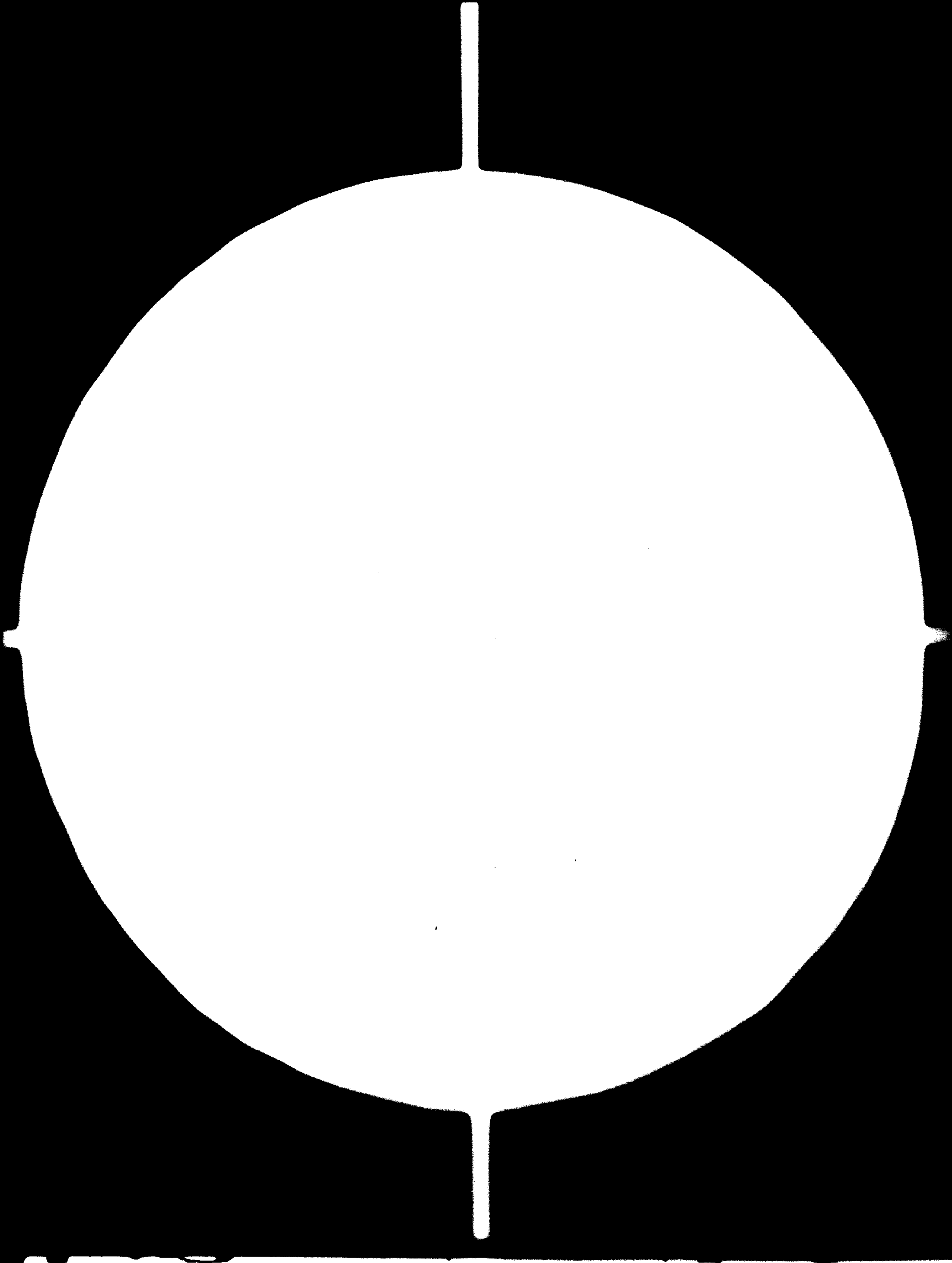
D - Southern region.

In view of the enormous distances in Brazil, this somewhat radical break-down should be viewed with some reserve.

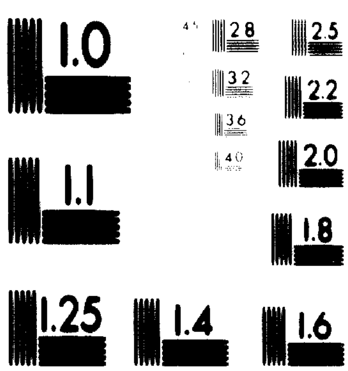
However, it reflects the main socio-economic differences of the country and has the advantage of being clear.

J-583

84.12.13
AD.86.07
ILL5.5+10



2 OF 5




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

24 x
F

## BREAK-DOWN OF BRAZIL IN TO GEOGRAPHICAL REGIONS

**REGION A** (North) - Amazonas - Acre - Rere - Rondonia - Roraima - Amapà.

Population : 3,156,000 inhabitants.

**REGION B** (North-East) - Maranhao - Piaui - Ceara - Rio Grande do Norte - Paraiba - Pernanbuco - Serpipe - Alagoas - Bahia - Fernando de Noronha.

Population : 25,548,000 inhabitants.

**REGION C** (West-Central) - Espirito Santo - Rio de Janeiro - Guanabara - São Paulo - Mato Grosso - Goias - Minas Gerais - Distrito Federal.

Population : 44,988,000 inhabitants.

**REGION D** (South) - Paraná - Santa Catarina - Rio Grande do Sul.

Population : 17,390,000 inhabitants.

1.2.2.3. Per capita income.

1.2.2.3.1. Income breakdown by regions

There are no recent national statistics providing data as to the overall break-down of the population by income classes.

However, several surveys have been carried out, both at national and regional levels, mostly by the Fundaçao IBGE and the Banco Nordeste do Brasil S.A.

In view of the essential importance of the data provided by a break-down of the population according to regions and income bracket for the purposes of the present study, we have confronted the partial information provided by these various sources and synthesized them in an overall estimates table.

The data concerning the population exhibit slight discrepancies with respect to the 1970 census (See paragraph 2.1.). This is due to the fact that the surveys on which our estimates are based have been extrapolated from the estimative demographic data available at the time of the surveys.

## BREAK-DOWN OF THE POPULATION BY REGION AND INCOME BRACKETS

| Total popu-lation (x 1000) | Chil-dren 0-14 years | Adults 15 + | Women | Men | Low-income class (0 to 279 $) | SOLVENT POPULATION | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 250 to 649 $ | 650 to 1499 $ | 1500 to 2999 $ | 3000 to 5000 $ | 5000 $ and + | Total solvent popu-lation | |
| REGION A | | | | | | | | | | | | |
| 3,156 | 1,357 | 1,799 | 971 | 828 | 1,475 | 246 | 49 | 20 | 6 | 3 | 324 | 3 % |
| REGION B | | | | | | | | | | | | |
| 26,548 | 11,506 | 15,042 | 8,032 | 7,010 | 12,112 | 2,219 | 445 | 177 | 51 | 38 | 2,930 | 19 % |
| REGION C | | | | | | | | | | | | |
| 44,988 | 16,998 | 27,990 | 14,313 | 13,677 | 18,790 | 5,095 | 2,600 | 931 | 342 | 232 | 9,200 | 60 % |
| REGION D | | | | | | | | | | | | |
| 17,390 | 7,166 | 10,224 | 5,139 | 5,085 | 7,493 | 1,670 | 653 | 268 | 78 | 62 | 2,731 | 18 % |
| TOTAL BRAZIL | | | | | | | | | | | | |
| 92,082 | 37,027 | 55,055 | 28,455 | 26,600 | 39,870 | 9,230 | 3,747 | 1,396 | 477 | 335 | 15,185 | 100 % |

On the basis of the table being the break-down of the population by region and income bracket, we have computed to the total available revenues by region, it being the product of average income by the population in each income bracket.
This gives the table of available revenues per region.

## TOTAL AVAILABLE REVENUES PER REGION

| 000 $ | Low-income class 175 $ | Average income 450 $ | Average income 1,075 $ | Average income 2,250 $ | Average income 4,000 $ | Average income 15,000 $ | TOTAL | |
|---|---|---|---|---|---|---|---|---|
| REGION A | 258,125 $ | 110,700 $ | 52,675 $ | 45,000 $ | 24,000 $ | 45,000 $ | 535,500 $ | 3 % |
| REGION B | 2,119,600 $ | 998,550 $ | 478,375 $ | 398,250 $ | 204,000 $ | 570,000 $ | 4,768,775 $ | 20 % |
| REGION C | 3,288,250 $ | 2,292,750 $ | 2,795,000 $ | 2,094,750 $ | 1,368,000 $ | 3,480,000 $ | 15,318,750 $ | 59 % |
| REGION D | 1,311,275 $ | 751,500 $ | 701,975 $ | 603,000 $ | 312,000 $ | 930,000 $ | 4,609,750 $ | 18 % |
| | 6,977,250 $ | 4,153,500 $ | 4,028,025 $ | 3,141,000 $ | 1,908,000 $ | 5,025,000 $ | 25,232,775 $ | 100 % |
| | 27.7 % | 16.5 % | 15.9 % | 12.5 % | 7.5 % | 19.9 % | | |

## 1.2.2.3.2. Proportion of income assigned to textile consumption per region

Once these average available revenues were estimated there remained to make an evaluation of percentages dedicated to textile purchases.

A detailed inquiry of family budget structures would have been of great assistance in this evaluation. However, such an inquiry obviously was not included in the scope of the present study. We therefore based our evaluation on the inquiry carried out by the Fundaçao Getulio Vargas in 1961-1962 (Pequisa sôbre Orçamentos Familiares).

This budget composition inquiry was conducted on a national scale. It gives the distribution of family budgets by income bracket classes.

The following synthetic table gives the percentages dedicated to clothing, by region and income class.

PERCENTAGE DISTRIBUTION OF CURRENT FAMILY EXPENDITURES BY INCOME BRACKET CLASS (1) (2)

| REGIONS | | TOT. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | BELEM - PARA | 7.0 | 2.5 | 3.3 | 4.9 | 5.1 | 6.8 | 7.4 | 7.7 | 10.6 | 10.5 |
| | SUB-TOTAL | 7.0 | 2.5 | 3.3 | 4.9 | 5.1 | 6.8 | 7.4 | 7.7 | 10.6 | 10.5 |
| B | FORTALEZA - CEARA | 10.8 | 5.9 | 6.7 | 8.4 | 10.3 | 11.2 | 10.8 | 14.5 | 13.1 | 11.5 |
| | RECIFE - PERNAMBUCO | 8.0 | 3.5 | 5.0 | 5.7 | 5.9 | 7.0 | 8.7 | 9.9 | 12.0 | 9.8 |
| | SALVADOR - BAHIA | 8.6 | 4.9 | 5.6 | 5.7 | 7.5 | 7.8 | 8.2 | 9.8 | 11.0 | 15.2 |
| | SUB-TOTAL | 9.1 | 4.7 | 5.7 | 6.5 | 7.8 | 8.6 | 9.1 | 11.3 | 11.9 | 12.0 |
| C | RIO - GUANABARA | 9.8 | 7.5 | 6.3 | 6.0 | 7.2 | 8.6 | 9.5 | 10.5 | 12.2 | 10.0 |
| | SAO PAULO - SAO PAULO | 8.7 | 1.7 | 4.9 | 4.7 | 6.6 | 7.7 | 8.5 | 9.6 | 9.7 | 10.2 |
| | BELO HORIZONTE-M- GERAIS | 12.3 | 6.3 | 6.7 | 8.5 | 11.3 | 11.4 | 13.9 | 12.5 | 14.0 | 11.4 |
| | SUB-TOTAL | 10.3 | 5.1 | 6.0 | 6.4 | 8.4 | 9.2 | 10.6 | 10.9 | 12.0 | 10.6 |
| D | CURITIBA - PARANA | 12.9 | 5.3 | 7.9 | 9.4 | 10.9 | 13.3 | 13.2 | 14.6 | 13.8 | 12.4 |
| | SUB-TOTAL | 12.9 | 5.3 | 7.9 | 9.4 | 10.9 | 13.3 | 13.2 | 14.6 | 13.8 | 12.4 |
| | TOTAL | 9.8 | 4.4 | 5.7 | 6.8 | 8.0 | 9.5 | 10.0 | 11.1 | 12.0 | 11.4 |

(1) Source : Fundaçao Getulio Vargas : Inquiry on family expenditures.

Income brackets : → 99 100-149 150-249 250-349 350-499 500-799 800-1199 1200-2499 2500 →

(2) Ready-made clothes and textile fabrics.

1.2.2.4. Features of the market.

The principal features of the textile market of Brazil is probably the lack of rationalization in the choice of internal markets. The situation could be summarized by saying that most producers want to market their produce throughout the country. The immediate consequence of such a policy is a drastic waste of means available for the penetration of the market.

This is also concurrent with the results of the study regarding the policy of sales by agents (Cfr. below). Many manufacturers have agents distributed throughout the country in the hope of thereby expanding and developing their markets but losing sight of the fact that they usually fail to achieve the sales aggressiveness which is an indispensable attribute for the sustained penetration of a market. Indeed, it is not necessarily by increasing the area of a market that one increasesits magnitude or importance.

Another feature, which in a way stems from the first, is the distance covered by the stocks before reaching the end-user. This is understandable in such a vast country. However, there are many instances of irrationalities, such as the "importation" by factories installed in the North-Eastern region of raw or semi-manufactured products from Sao Paulo, their finishing in the factory and subsequent re-export to Sao Paulo which obviously remains the most interesting market.

1.2.3. <u>**Suitability of products for existing markets and quality standards.**</u>

The protection which the domestic textile market enjoys naturally has its share of benefits and disadvantages; foremost among the latter is the absence of that most market-stimulating factor which is international competition. The immediate consequence of this lacking is the incompatibility of quality and price brackets. This state of fact which prevails in various degrees throughout Brazil, could be illustrated as follows : let Ql, QII and QIII be three quality brackets designed to meet the requirements of three social classes : H(high), M(middle) and L (low).

The following chain reactions are observed :

QI production is quantitatively inadequate to meet the requirements of class H; so prices could be allowed to go up until a balance of output/demand was achieved; this means that a large proportion of H-class consumers had to make do with QII products. However, QII producers can often afford to raise their prices close to QI level which means that uninformed or undiscriminating consumers often identify QI and QII. QII producers find this "quality promotion" easy to achieve by just selling through QI channels such as fashion shops and other H-class outlets.

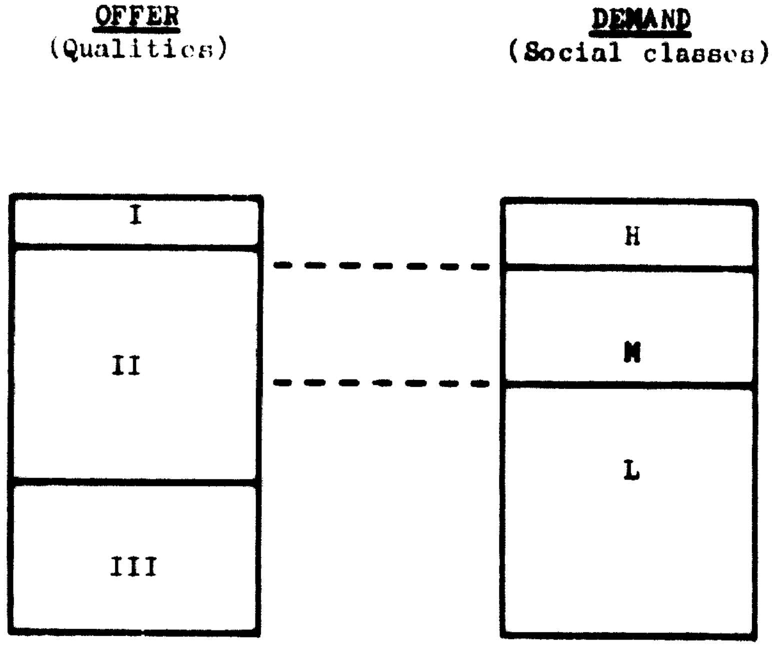
M-class requirements should normally be totally satisfied, at quantitative level that is, considering that QII products which are designed for these consumers is in ample supply; however, the price escalation entailed by the shortage of Q I goods cannot be limited to H-class consumers which means that middle class consumers are forced to buy QIII goods.

L-class which is by far the largest is under-supplied in QIII garments. This is the last reaction of the chain; manufacturers naturally find it more profitable to produce QIIitems which, in view of the escalation phenomenon leave a much more substantial profit at the end of the month.

Yard goods do not enter into the chain-reaction because they are marketed trough major chain-stores which do find it profitable to sell low-cost yard.

However the shortage of QIII goods, which cannot be sold at QII prices, compells L-class to meet part of its requirements with QII articles; in view of the price-gap between QII and QIII this is quite a toll on the lower classes.

The following diagram illustrates the unbalance as between the quality and class brackets :




This is an excellent case in point to examplify the effects of government protectionism which, to quote several industrialists "warrants the sale of any qualities at high-quality prices in the domestic market".

Actually it is quite usual to find a same commodity sold at very different prices as well as different qualities at the same price.

The phenomena of lack of correlation between qualities and prices should of course be viewed as transitory; balance will be restablished once the blood transfusion of a wholesome export-import policy has been implemented and once the progressive education and information of the end-user has channeled producers back to a more wholesome and competitive marketing approach.

### 1.2.4. Composition of consumer prices

#### 1.2.4.1. Distribution costs.

It is usually asserted that the more developed a country is, the higher will be the cost of distribution. Distribution costs include : transportation, storage, forwarding, direct and indirect sale expenses, advertising, discount margins, taxes.

In the US it is estimated that, on the average 60 % of the retail price of consumer products is accounted for by distribution costs. This percentage varies from one sector to another. For instance : foodstuffs 50 %, home appliances 70 %. We believe that for apparel, the distribution costs in Brazil must account for 45 % of retail prices.

Road and air transports appear to be satisfactory for current requirements ; on first sight, the rail network appears to be inadequate.

#### 1.2.4.2. Taxation.

The scope of the present study does not include a complete study of taxation to determine the incidence of fiscality on retail prices.

However, a first approach indicates that this incidence is relatively high as regards textile products. Indeed, there are three different taxes on textile items, namely : the tax on industrial production (IPI), the tax on freight movements (ICM) and the income tax.

The rates imposed on these taxes depend on the type of item and the regions of production. For thread the I.P.I. is 5 % while for fabrics it is 12 %. The I.C.M. varies from 16.5 % in some regions to 17.5 % in others. The income tax is 2 to 3 %.

The complexity and especially the heterogeneity of applied rates makes for discontent among industrials who fail to comprehend why the I.P.I. of, say, Bahia, should be higher than that of Sao Paulo.

The same criticism is made as regards minimal salaries which also vary from one region to another.

A uniformization of the various rates is desirable.

#### 1.2.4.3. Retail prices.

The diversity of retail prices for a same item is quite remarkable. Indeed, it not only varies from one region to another, but also from one retailer to another in the same town.



The usual procedure of retail price determination is as follows :

let - 100 be the factory price.

- 143 : the retailer's purchasing price (43 = taxes, freight, etc...).

and - 210 : the retailer price.

As it happens the retail price ranges from 190 to 250 or more depending mostly on the type of store. Chain-stores will have drastically lower prices than, say, the fashion-shops.

Another wide-spread feature is the common practice of discount when and if the customer asks for it.
Pre-imposed price policies are very seldom encountered.

A national survey of retail prices, carried out in February 1971 by the Fundaçao IBGE, reveals the variety of prices applied in several major towns. We have selected the data relating to two items of clothing in nine towns.

## RETAIL PRICES

| | ITEMS | |
|---|---|---|
| TOWNS | WHITE COTTON SHIRT | TERGAL SUIT |
| Manaus | 15.50 | 130.00 |
| Natal | 11.00 | 163.50 |
| Récife | 12.50 | 157.50 |
| Salvador | 12.09 | 138.00 |
| Belo Horizonte | 9.80 | 189.50 |
| Rio de Janeiro | 17.40 | 176.00 |
| Sao Paulo | - | 172.60 |
| Porto Alegre | - | 241.66 |
| Brasilia | - | 126.00 |

Source : Fundaçao IBGE - Inquerito Nacional de Precos (National Prices Survey) - Generos Alimenticios e Artigos do vestuario - Fevreiro de 1971 (Foodstuffs and Garments - February 1971).

Broadly speaking, it can be estimated that the average retail prices of these items are relatively high.

Low quality items are relatively inexpensive, but as soon as quality improves, prices increase more than proportionately.

1.2.4.4. Credit sales.

The system of sales on credit has remarkably progressed. It seems that for about 5 years now, most of the salesmen dealing in textile articles have been obliged to adopt the system. It goes so far that it is not unusual to see goods advertised at prices given in a certain number of monthly payments without any mertion of the total or cash price.

1.2.4.5. Cost of living indexes.

The following table gives the increase in cost of living indexes since 1955.

These indexes do not provide for devaluation, a fact which accounts for their sharp increase.

In order to counter this draw-back, we have converted the indexes to their dollar equivalents.

To this effect, we have taken the average exchange rate of the dollar in 1965-66-67, which are the basic years of the indexes. This average rate of 2.33 was divided by each of the annual rates for the last five years.

Multiplying this series of coefficients by their respective indexes, we get a new series of cost of living indexes which is unaffected by devaluation.

## COST OF LIVING INDEXES

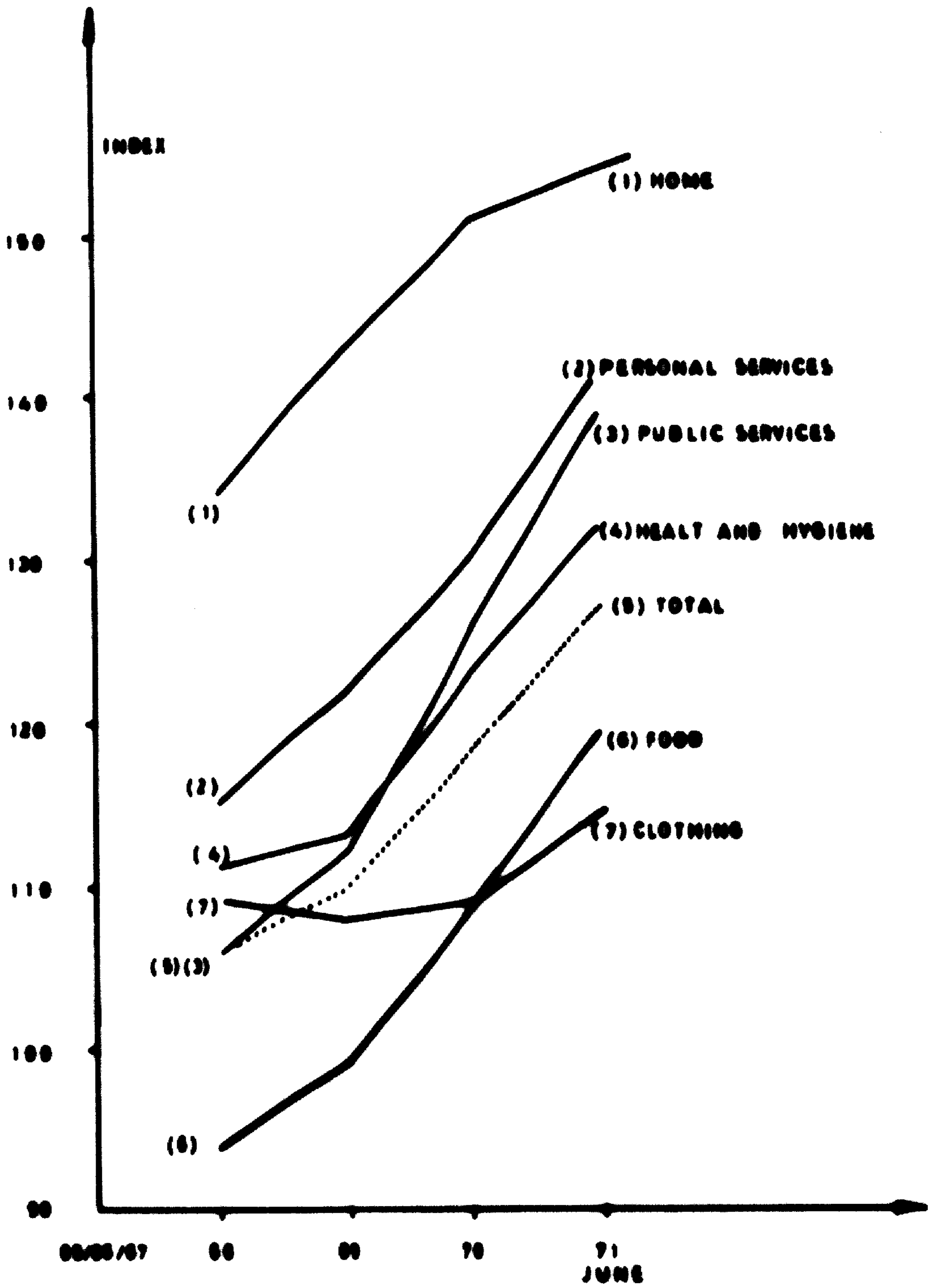
**Base** : 1965-66-67 = 100    **Source** : Fundaçao Getulio Vargas

| Years | Total | Food | Clo-thing | Home | Health & Hygiene | Per-sonal | Public Ser-vices |
|---|---|---|---|---|---|---|---|
| 1955 | 2.22 | 2.28 | 2.28 | 3.27 | - | 1.48 | 1.21 |
| 1956 | 2.68 | 2.83 | 2.65 | 3.82 | - | 1.72 | 1.57 |
| 1957 | 3.12 | 3.25 | 3.08 | 4.54 | 3.28 | 2.21 | 1.98 |
| 1958 | 3.58 | 3.73 | 3.44 | 5.31 | 3.54 | 2.37 | 2.41 |
| 1959 | 4.98 | 5.41 | 4.73 | 6.36 | 5.29 | 3.75 | 3.26 |
| 1960 | 6.44 | 7.05 | 6.14 | 7.56 | 7.38 | 4.98 | 4.27 |
| 1961 | 8.58 | 9.50 | 8.91 | 8.87 | 9.75 | 7.38 | 5.65 |
| 1962 | 13.01 | 15.37 | 13.43 | 12.14 | 13.11 | 10.87 | 8.02 |
| 1963 | 22.20 | 25.50 | 24.30 | 18.50 | 23.20 | 18.70 | 15.30 |
| 1964 | 42.50 | 50.00 | 44.90 | 27.90 | 40.70 | 38.40 | 32.50 |
| 1965 | 70.50 | 73.50 | 74.30 | 55.20 | 73.80 | 70.70 | 66.10 |
| 1966 | 99.60 | 101.90 | 97.10 | 96.60 | 96.70 | 96.50 | 100.60 |
| 1967 | 129.90 | 124.60 | 128.60 | 148.20 | 129.50 | 132.80 | 133.30 |
| 1968 | 158.50 | 140.60 | 163.00 | 201.00 | 166.30 | 171.80 | 159.30 |
| 1969 | 194.40 | 173.80 | 190.80 | 251.90 | 199.40 | 214.60 | 196.80 |
| 1970 | 237.90 | 218.20 | 219.90 | 303.20 | 247.10 | 260.40 | 253.90 |
| 1971 | 283.70 | 265.10 | 257.40 | 346.10 | 295.30 | 315.10 | 309.70 |

TABLE OF INDEXES ADJUSTED TO ACCOUNT FOR DEVALUATION

| Years | Total | Food | Clo-thing | Home | Health & Hygiene | Per-sonal | Public Ser-vices |
|---|---|---|---|---|---|---|---|
| 1965 | 100.00 | - | - | - | - | - | - |
| 1966 | 100.00 | - | - | - | - | - | - |
| 1967 | 100.00 | - | - | - | - | - | - |
| 1968 | 106.10 | 94.20 | 109.20 | 134.60 | 111.40 | 115.10 | 106.70 |
| 1969 | 110.80 | 99.00 | 108.70 | 143.50 | 113.60 | 122.30 | 112.10 |
| 1970 | 118.90 | 109.10 | 109.90 | 151.60 | 123.50 | 130.20 | 126.90 |
| june 1971 | 127.60 | 119.20 | 115.80 | 155.70 | 132.80 | 141.70 | 139.30 |

CONSUMER PRICE INDEX IN US $ EQUIVALENTS



# 1.3. ROLE OF GARMENT INDUSTRY AS CONSUMER OF TEXTILE MATERIALS

## 1.3.1. Previous situation

Until some ten years ago, the ready-made clothes industry in Brazil was practically non-existant. The consumer habits were for the purchase of cloth by the yard.

Clothes were either made by tailors or seampstresses in the upper and middle classes and by housewives in the lower classes.

It can be estimated that, at the time, the ready-made clothes industry accounted for not more than 10 to 20 % of the country's overall textile turnover. Actually, it would be more accurate to speak of tailoring workshops than of clothes industries as such. In fact there were no manufacturing units to speak of. Instead you found a variety of shops of miscellaneous types and sizes, which generally engaged in the cutting of the cloths, the actual assembly or tailoring being entrusted to seampstresses operating at home.

The appearance of actual clothes industries with the associated proliferation of minor workshops, was promoted by various factors and favorable circumstances. Whatever the case may be, it is a fact that the demand for ready-made clothing underwent a spectacular boom.

The factors which brought about such a sharp reversal of consumer habits were, among others :

- the population boom ; the increase of life expectancy ; urban development ;
- the advent of fashion phenomena with its standardization effects, an import from the US of A ;

  Example : blue-jean-type pants for both sexes alike.
- the comparative ease of clothes manufacturing coupled with the relatively low initial investment required for equipment and machinery ;
- the growing percentage of women working out of home ;
- the instoration of sales on credit ;
- the time-saving pleasure and vogue of buying clothes without having to undergo several fittings.

## 1.3.2. Current situation.

### 1.3.2.1. Production-wise.

The interplay of the various factors which can be held responsible for the development of the ready-made clothes industry is also responsible for the lack of co-ordination and the randomness of this development.

The structural framework of the current ready-made clothes industry can, indeed, be characterized by the basic incompatibility and lack of balance which exists between, on the one hand, a limited number of actual factories and, on the other, a plethora of small shops, half of which, it seems, are not even legally registered.

From a first cursory survey, it can be estimated that some 10 % of the production units account for 50 % of overall garment production.

This unbalanced situation is not problematic in itself because the major industrial units enjoy the benefits of large-scale production, which their smaller competitors do not. As a matter of fact, the latter's survival can be attributed to their clandestinity. Their work is most often carried out by workers in their own homes, at very low salary and, obviously, without social charges to the owner. Furthermore, like the small retail shops, they manage to buy most of their clothes without making an invoice.

This state of affairs is highly detrimental to the industry because the products of both sectors are inevitably confronted on the market. Price and quality distortions appear and the lack of knowledge, ability and education of the consumer does not allow him to use quality as the basis for his discrimination. As a result, honest competition is inhibited.

1.3.2.2. Consumption wise

The primary importance of ready-made clothes as consumers of textile products cannot be over-emphasized. By and large, it can be estimated that, at present, 40 % of textile products find their way to the market in the form of ready-made clothes. The increase of this overall percentage is constant and sharp, although it varies strongly according to sex, age and geographical regions.

Unquestionably, ready-made clothes for men account for the major proportion of the market, mostly as pants, shirts and underwear, which are always sold ready-made.

As far as the ready-made suit is concerned, two salient facts must be made clear :

The traditional habit of wearing a ready-made suit on Sundays is losing some of its vogue, notably

1) because of climatic factors, which encourage sportswear but also

2) because the upper classes have always showed a preference for tailor-made suits and will probably continue to do so.

These two factors somewhat inhibit the sustained expansion of the ready-made suit industry. Mention should however be made of the remarkable effort of a group of some ten producers who, by pooling their resources, merged into a single unified make of masculine fashion, the success of which among the middle classes is indubitable.

Women's ready-made clothes are much less in demand ; a fact which is explainable considering that women have always, traditionally, had their clothes fashioned at home, seampstresses being readily available.

However, the market for ready-made women's clothes is steadily expanding. This is mainly so in urban areas, where it can be estimated that about 50 % of the female population buys ready-made clothing. In the hinterland, this percentage probably does not exceed 5 or 10 per cent.

As regards underwear, the proportions of ready-made items are obviously higher.

Children's ready-made clothes probably constitute the least developed outlet at present although it appears to have engaged in an upward trend in the past few years.

The relative unpopularity of children's ready-made clothes is accounted for by the fact that there are more children in the lower classes than in the middle and upper classes. Besides, at production level, the demands of standardization pose certain problems, in view of the wide variety of sizes which have to be provided for.

From the standpoint of regional differences in textile consumer habits, it goes without saying that the main market for ready-made clothes is situated in Zone C and, broadly speaking, in the major urban zones.

## SUPPLY OF GARMENT IN BRAZIL

## BY BROAD END USE GROUPS 1970

(thousand tons)

| | Ready-made | Home and cottage industry | TOTAL |
|---|---|---|---|
| Women's and children's garments | 30.1 | 61.7 | 91.8 |
| Men's and Boy's garments | 63.8 | 28.0 | 91.8 |
| TOTAL | 93.9 | 89.7 | 183.6 |

Source : INDI ESTIMATES

### 1.3.3. Problems facing the garment industry.

The main problem facing the garment industry as a whole stem from the very structure of the industry itself. Small numbers of actual factories against large numbers of minor handicraft shops. (Cfr. 1.2.).

A variety of other specific problems also afflict this sector of the industry.

The garment industry is a relatively budding one in this country and textile producers are not as yet adapted to the potentialities of this new outlet for their produce.

Besides, the garment manufacturer is, perforce, much more demanding than the traditional wholesaler, namely as regards :

- delays of delivery
- uniformity of shade
- constant quality and absence of flaws or defects
- sanforization and shrink-proofing
- length of rolls (the wholesaler required 25-metre rolls whereas the manufacturer needs 50 to 100-metre rolls).

These various problems all have a major incidence on the overall efficiency and profitability of the garment industry and it would appear at present there are not enough textile producers capable of meeting the requirements of such an exacting clientele.

This state of fact brings some export-oriented garment manufacturers to import their textiles in order to meet the quality-standard demands of the world market.

As things stand, consumer demand in the country appears to exceed garment production, a situation which should encourage the creation of additional garment-making factories. On the other hand, garment manufacturers consider that the disembodied structure of the current marketing system creates, paradoxically, a bottle-neck stifling the normal distribution of their products. They quite justly wish for a concentration of their outlets as well as for specialization in garment manufacture. It is, in fact, remarkable to note that there are practically no stores specialized in the sale of garments. It is undisputable that such sale units would considerably promote the development of the industry.

The comptetition of tailors and seampstresses is not of as much moment as it might appear on first analysis. The number of tailors and seampstresses is decreasing under the pressure of the garment industry, although it is also effecting a natural selection, the best remaining in business. Certain types of consumers will, in any case, always give their preference to tailored clothes.

At present, the retail prices of ready-made and tailored clothes are approximately the same. However, on-credit sale practices play a predominant role in favor of the garment industry. The independent tailors just cannot afford to spread their payments over periods of several months as the stores do. A ready-made man's suit would be displayed with the label : "4 installments of 80 Crs each". As it happens, the largest consumer of men's suits is the middle class of the population for which the installments system has much appeal. So much so that these consumers think in terms of monthly installments as well as overall costs.

## 1.3.4. Prospects.

### 1.3.4.1. Structure of the garment industry.

The problems facing the major manufacturers of ready-made clothes, namely the lack of order and co-ordination of the industry and the random, somewhat anarchic proliferation of garment workshops, will have to be faced and solved within the coming decade.

Some control of the minor shops is mandatory, although there are several alternatives for improving the situation. Mergers between several small manufacturers operating in the same region is one way of attaining industrial-level production.

Another procedure currently applied is that of sub-contracting specific tasks to specialized workers. The major manufacturers thereby hire the services of a number of minor shops to which they entrust the performance of specific tasks.

We therefore believe that the future orientation of the garment industry will be towards a pooling of resources and mergers into large-capacity production units.

The major factors which are liable to implement such a change are :

- the simplification of juridical, administrative and financial procedures to encourage mergers ;
- a centralized, co-ordinated sales organization making for minimum supply requirements (Cfr. 1.4.2.) ;
- improved publicity of fashion phenomena coupled with their standardization and uniformization, a development which paves the way for mass-production methods ;
- stricter control of small garment manufacturing shops.

Thus attuned, the garment industry will be in a position to :

- enjoy mass production benefits and cut its prices, thereby appealing to a greater proportion of the population ;
- improve the average quality of production by implementing uniform, centralized quality-control ;
- facilitate distribution through the concentration of marketing outlets.

### 1.3.4.2. Marketing.

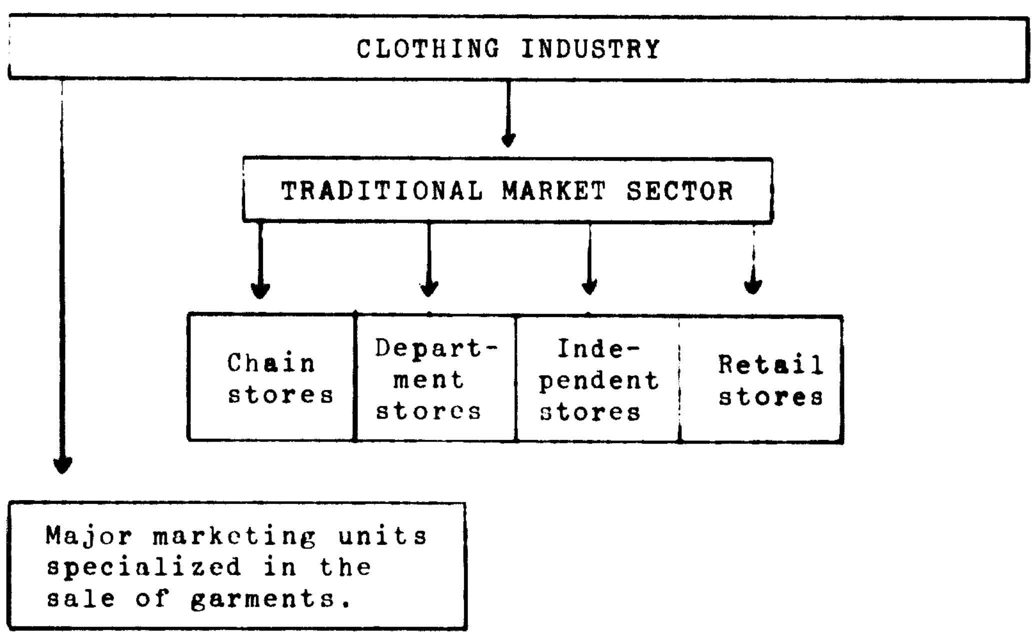
It will probably be in the marketing sector of the garment industry that structural changes will be most striking.

The traditional sector of sales by the yard is being forced to implement a quick reversal of its traditional sales methods in order to keep up with the change of consumer habits which increasingly call for the purchase of ready-made clothes. The industrial sector, for its part, is somewhat sceptical as to the effectiveness of the current disembodiment and dissemnation of the market "system" and feels the need for specialized garment marketing units.

The traditional marketing system will not be capable of keeping up with consumer demands and the attendant increase of production output. This necessarily implies the creation of major sales units. However, for a time, both the traditional and the up-dated marketing sectors will be complementary rather than conflicting.

Thus, the co-existence of both sectors will be possible although, in the long run, the sector composed of major integrated marketing units will progressively supplant the other.

Structural framework of the prospective garment market :



For evident reasons, this prospective marketing structure and, more specifically, the emergence of major integrated sales units, will develop primarily in the dense urban areas. The traditional markets (chain-stores, department stores and independents shops) maintain all their importance in the regions of lower population density.

1.3.4.3. Consumption.

The increase in the percentage of textiles consumed by the end-user in the form of ready-made clothes is a proven fact. It is interesting to note the picture of the situation obtained by projecting current trends. Undoubtedly as shown in the following table, the sharpest increase of this percentage will be felt in the fields of ladies' clothes :

PREVISION OF GARMENT DEMANDS FROM 1970 TO 1985

(Thousand tons)

| Years | Men | Women | Total |
|---|---|---|---|
| 1970 | 63.8 | 30.1 | 93.9 |
| 1975 | 88.7 | 60.1 | 148.8 |
| 1980 | 118.7 | 96.1 | 214.8 |
| 1985 | 155.1 | 137.4 | 292.5 |

Source : INDI estimates.

These previsions apply globally to the entire country. It goes without saying that there will be sharp difference of rates of increase from one region to another.

# 1.4. PROJECTION OF DEMAND

## 1.4.1. Introduction.

The general outline of the forecasting approach has been given in appendix 3. This chapter shows the sequence of operations followed to obtain the results which appear in the tables. The tables are inserted in the text to help the reader ; as a matter of fact, the sequence of operations corresponds essentially to the jump from one table to the next. This is the reason why a few tables concerning the 1970 situation appear at the beginning, even though they can also be found in the general appendix to the report.

In general, no confidence intervals or uncertainly margins are explicitly given ; however the forecasts are in a way "maximum likelihood estimates" constructed to the best of the knowledge of the study group. However, the hypotheses made are carefully indicated, especially when they depend upon exogeneous decisions which can affect the future evolution, in such a way that, an adequate parameterization would be capable of bringing the forecasts back to the correct expansion path.

## 1.4.2. The basic tables.

1.4.2.1. We consider first table I. giving the estimates of total income distribution among four regions and six income classes, where the class-medians of per capita income appear as heads of the columns. This is our first starting point.

1.4.2.2. The second step is the estimation of consumption in value, per region and class of revenue, in order to obtain the total private textile consumption. Remember that this number does not appear in the national accounts, and this is our main concern. Fortunately, there is a reliable survey (x), though somewhat outdated (1962), giving the percentage of textile expenditures per region and class of income in Brazil. This survey has been widely accepted as of good reliability ; it has been updated as follows : first : the income brackets have been translated to fit those given in table 5.1., so that the percentages appear as corresponding to the new case ; second, some of these figures have been compared with the partial results of a survey conducted by the study group ; third, abnormal figures (region c, classes 5 and 6) have been averaged to avoid obvious bias, fourth, the marginal totals have been checked by means of international standards. These marginal totals, by column, are weighted averages based on table 1 in order to take into account the relative importance of the regions. The result is given in table 5.2.

---

(x) Fundacâo G. Vargas - Pesquisa de Orcamentos familians (1962)

TABLE I.

TOTAL INCOME PER REGION/PER MEDIAN OF CLASS PER CAPITA

| Class median of revenue per capita / Regions | Lower Class R.X.=175$ | R.X.=450$ | R.X.=1,075$ | R.X.=2,250$ | R.X.=4,000$ | R.X.=15000$ | Total | Weight |
|---|---|---|---|---|---|---|---|---|
| REGION A | 258,125 $ | 110,700 $ | 52,675 $ | 45,000 $ | 24,000 $ | 45,000 $ | 535,500 $ | 3 % |
| REGION B | 2,119,600 $ | 998,550 $ | 478,375 $ | 398,250 $ | 204,000 $ | 570,000 $ | 4,768,775 $ | 20 % |
| REGION C | 3,288,250 $ | 2,292,750 $ | 2,795,000 $ | 2,094,750 $ | 1,368,000 $ | 3,480,000 $ | 15,318,750 $ | 59 % |
| REGION D | 1,311,275 $ | 751,500 $ | 701,975 $ | 603,000 $ | 312,000 $ | 930,000 $ | 4,609,750 $ | 18 % |
| TOTAL | 6,977,250 $ | 4,153,500 $ | 4,028,025 $ | 3,141,000 $ | 1,908,000 $ | 5,025,000 $ | 25,232,775 $ | |
| Weighted Averages | 27.0 % | 16.1 % | 16.9 % | 13.0 % | 8.0 % | 20.0 % | 100 % | 100 % |
| Percentage of population | 72.5 % | 16.8 % | 6.8 % | 2.5 % | 0.8 % | 0.6 % | 100 % | 100 % |

TABLE II.

PERCENTAGE OF DISPOSABLE INCOME AFFECTED TO APPAREL 1970 AND REGIONAL WEIGHTS

| REGIONS | Income Classes $ 175 | | Income Classes $ 450 | | Income Classes $ 1,075 | | Income Classes $ 2,250 | | Income Classes $ 4,000 | | Income Classes $ 15,000 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weights | % | Weights | % | Weights | % | Weights | % | Weights | % | Weights | % |
| A. | 3.6 | 2.50 | 2.7 | 4.50 | 1.3 | 6.90 | 1.4 | 7.70 | 1.3 | 10.60 | 0.9 | 10.50 |
| B. | 30.2 | 4.70 | 24.0 | 6.70 | 11.8 | 8.80 | 12.6 | 11.30 | 10.7 | 11.90 | 11.3 | 12.00 |
| C. | 46.9 | 5.10 | 55.2 | 7.00 | 69.4 | 9.90 | 66.7 | 12.00 | 71.7 | 12.00 | 69.0 | 12.20 |
| D. | 19.4 | 5.30 | 18.0 | 9.40 | 17.4 | 13.30 | 19.3 | 14.60 | 16.3 | 13.80 | 18.8 | 12.40 |
| Weight. | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |
| means | | 4.93 | | 7.30 | | 10.31 | | 12.40 | | 12.40 | | 12.20 |

1.4.2.3. With the aid of these two tables, it is easy to obtain table III., which gives the total 1970 expenditure in thousand dollars for apparel per income bracket and per region ; table IV. gives the corresponding figures for the home expenditures. This is therefore an original construction. Other sources have been used to check the results, especially for the home, where the formerly quoted survey is much less explicit. The large survey of the study group concerning the production of the firms gives a guess of the total production designed for apparel end-use and home end-use ; this gives thus a rough estimate of the global proportions. On the other hand, other sources give estimates of the number of items bought in 1969 (x), so that, with the help of the observed prices, it has been possible to compute the expenditures per category of goods (and to aggregate them) in order to have both a global check and the break-down at our disposal.

It is worth noting that the resulting market break-down has the following structure (for apparel) :

| | Expenditures | Population |
|---|---|---|
| Region A | : 0.9 % | 3.0 % |
| Region B | : 15.0 % | 19.0 % |
| Region C | : 62.0 % | 60.0 % |
| Region D | : 22.0 % | 18.0 % |

This can help to prepare decisions concerning new plants or distribution. As has been said above, the home break-down is much less reliable. The other categories of consumption have been considered in tons, not in expenditure ; we shall therefore return to this point later on. The corresponding global expenditure gives a 9.20 % (weighted) of disposable income.

---

(x) updated to match the total number of tons consumed in 1970, estimated by the study group.

TABLE III.

TEXTILE EXPENDITURES (APPAREL) IN 1,000 $, 1970

| Income classes / Regions | MEDIANS OF INCOME CLASSES | | | | | | |
|---|---|---|---|---|---|---|---|
| | j = 1<br>$ 175 | j = 2<br>$ 450 | j = 3<br>$ 1,075 | j = 4<br>$ 2,250 | j = 5<br>$ 4,000 | j = 6<br>$ 15,000 | TOTAL |
| A. | 6,663 $ | 5,570 $ | 4,339 $ | 4,065 $ | 304 $ | 522 $ | 4,353 $ |
| B. | 104,621 $ | 68,904 $ | 43,297 $ | 46,200 $ | 24,905 $ | 71,400 $ | 359,327 $ |
| C. | 170,700 $ | 161,200 $ | 279,705 $ | 254,400 $ | 167,160 $ | 429,560 $ | 1,462,725 $ |
| D. | 71,497 $ | 72,641 $ | 95,362 $ | 90,538 $ | 45,798 $ | 119,320 $ | 495,156 $ |
| TOTAL | 353,371 $ | 308,315 $ | 422,703 $ | 395,203 $ | 238,167 $ | 620,802 $ | 2,338,561 $ |

TABLE IV.

TEXTILE EXPENDITURES (HOME) IN 1,000 $, 1970

| Classes / Regions | 1 | 2 | 3 | 4 | 5 | 6 | TOTAL |
|---|---|---|---|---|---|---|---|
| A. | 7,640 $ | 3,277 $ | 1,559 $ | 1,330 $ | 710 $ | 1,330 $ | 15,846 $ |
| B. | 62,740 $ | 29,555 $ | 14,157 $ | 11,787 $ | 6,038 $ | 16,872 $ | 141,149 $ |
| C. | 97,330 $ | 67,864 $ | 82,732 $ | 62,003 $ | 40,492 $ | 103,008 $ | 453,429 $ |
| D. | 38,811 $ | 22,244 $ | 20,779 $ | 17,848 $ | 9,235 $ | 27,528 $ | 136,445 $ |
| TOTAL | 206,521 $ | 122,940 $ | 119,229 $ | 92,968 $ | 56,475 $ | 148,738 $ | 746,869 $ |

1.4.3. The forecasting operation for 1975.

1.4.3.1. Basic hypothesis.

Hyp. 1 : As explained in section 2.1.1. our basic hypothesis of global growth is 6.5 % per year per capital, until 1975. This is simply a given parameter, which does not affect the methodology.
This leads to a global income of :

$(25,233)\ (1 + 0.065)^5 = 34,520$ thousand dollars in 1975, the population growth not yet included.

Hyp. 2 : The income growth is identical in all regions, which is perhaps a restrictive hypothesis. However, it is the closest to the objectives of the public power, to the best of our knowledge. Anyway, it is just a matter of parameterization ; no problem would arise if, considering another public policy, one would introduce specific parameters of regional expansion.
The income distribution hypothesis has been carefully selected. Remember that forecasting a simplified income distribution like this one corresponds to asserting a set of values to the growth parameter of each income class, except that the aggregate growth is given. These parameters too can be changed if one feels that other economic charges will influence the proposed differential growth of income.

Hyp. 3 : The given constraint is a 6.5 % growth per year ; considering that the growth of income is rather a progressive translation from lower-class workers to the activities giving a higher earning power, the income growth relies more on the middle and upper classes than on the lowest class alone. There can be a long line of reasoning behind such an assertion ; however it is hard to believe that a spectacular growth of income can be experienced by the lowest class, the traditional activity of which is not money generating ; on the other hand, the five other classes are able to make a shift towards the new activities of the present development, which allow better returns.

Giving a 1 % growth per capita to the lowest class, with a weight of 7.0 (the 6,977 read on table 5.1), and if x is the growth of the other class, x is derived from the equation.

$$25.2\ (1{,}065) = 7(1.01) + 18.2\ x$$

or x = 8.8 % for the five other classes, the weight of which is 18.2. It suffices now to make the adequate projections by class of income to obtain table V.

1.4.3.2. Forecasts for apparel, 1975.

On the basis of table 5.5. we now elaborate the forecasts of apparel expenditures (services included).

Hyp. 4 : It is assumed that the following elasticities are stable per region ; this means that the present relative behavior is not liable to entail drastic interregional changes. An argument against this hypothesis would be the occurrence of new distribution changes improving the availability of supplies ; another argument would be the implementation of now developing regional plans, which would affect consumer behavior. It is thought, however, that these possible events would not show their effects before 1975.

Hyp. 5 : A survey of results obtained in other countries confronted with the survey and analysis of the study group has lead to the conclusions that the static elasticities are to vary according to income class. Remember that, since no information allows us to compute dynamic elasticities by econometric methods, our operations here are based on static elasticities applied to evolutive classes of income.

TABLE V.

**FORECAST INCOME PER REGION AND CLASS, 1975, IN THOUSANDS $, NOT INCLUDING POPULATION GROWTH**

| Regions / 000 $ classes 1970 | CLASSES | | | | | | |
|---|---|---|---|---|---|---|---|
| | 175 $ | 450 $ | 1,075 $ | 2,250 $ | 4,000 $ | 15,000 $ | TOTAL |
| REGION A | 272 | 172 | 81 | 70 | 37 | 69 | 701 |
| REGION B | 2,245 | 1,519 | 725 | 603 | 310 | 864 | 6,266 |
| REGION C | 3,471 | 3,492 | 4,259 | 3,191 | 2,084 | 5,280 | 21,777 |
| REGION D | 1,440 | 1,139 | 1,069 | 924 | 474 | 1,439 | 6,485 |
| TOTAL | 7,428 | 6,324 | 6,134 | 4,782 | 2,906 | 7,653 | 35,228 |

The resulting estimations are the following :

| | | |
|---|---|---|
| for income class 1 | : | 0.6 |
| for income class 2, 3, 4 | : | 0.8 |
| for income class 5, 6 | : | 1.0. |

As has been said, no specific regional behavior has been ascertained.

The percentages of growth for apparel expenditures are therefore as follows (5 years) :

| | | |
|---|---|---|
| income class 1 | : | $(1,006)^5 = 1,033$ |
| income class 2, 3, 4 | : | $(1,070)^5 = 1,403$ |
| income class 5, 6 | : | $(1,088)^5 = 1,523$. |

The resulting forecasts are summarized in table VI.

### 1.4.3.3. Forecasts for the home.

The same work has been done for the home ; as depicted in section 2.1.1. the estimates for the home are less reliable, given that arguments can be raised against Hyp. 5 an homogeneous behavior amongst region, concerning home equipment, probably leading to different elasticities. The numerical results are shown in table 5.7.

TABLE VI.

FORECASTS OF APPAREL EXPENDITURES, PER CLASS AND REGION, 1975

(POPULATION GROWTH EXCLUDED) - IN THOUSANDS DOLLARS

| Income classes / Regions | j = 1 | j = 2 | j = 3 | j = 4 | j = 5 | j = 6 | TOTAL |
|---|---|---|---|---|---|---|---|
| A. | 6,769 | 7,814 | 6,087 | 5,703 | 462 | 795 | 27,630 |
| B. | 108,073 | 96,672 | 60,740 | 56,400 | 37,930 | 108,742 | 468,557 |
| C. | 176,333 | 226,160 | 392,426 | 356,923 | 254,584 | 654,219 | 2,060,645 |
| D. | 73,856 | 101,915 | 133,792 | 127,024 | 69,750 | 181,724 | 688,061 |
| TOTAL | 365,031 | 432,561 | 593,045 | 546,050 | 362,726 | 945,481 | 3,244,893 |

TABLE VII.

FORECASTS OF HOME EXPENDITURES, 1975, THOUSANDS DOLLARS

| Income classes / Regions | 1 | 2 | 3 | 4 | 5 | 6 | TOTAL |
|---|---|---|---|---|---|---|---|
| A. | 7,892 | 4,597 | 2,187 | 1,868 | 1,081 | 2,025 | 19,647 |
| B. | 64,810 | 41,465 | 19,862 | 16,537 | 9,196 | 25,696 | 177,566 |
| C. | 100,542 | 95,213 | 116,073 | 86,990 | 61,670 | 156,991 | 617,479 |
| D. | 40,092 | 31,208 | 29,152 | 25,041 | 14,065 | 41,925 | 181,483 |
| TOTAL | 213,336 | 172,483 | 167,274 | 130,436 | 86,012 | 226,637 | 996,175 |

**Hyp. 6** : To account for the population growth, the official 2.7 % coefficient has been used, and applied uniformly to all regions. If an explicit demographic policy comes into stay, then an adequate parameterization would have to be introduced. These parameters would also reflect important shifts in population : migrations from one region to another. Under our hypothesis 6, we obtain Table VIII.,giving the total expenditures in 1975.

1.4.3.4. Forecasts in quantities.

Let us now consider the quantitative forecasts, i.e. the tonnages. Remember section 2.1.1., where it has been explained that Slutzky's equation helps to provide us with a rational way to transform values in quantities. This way of reasoning has a sufficient appeal to remain a sound basis for the numerical results proposed here. The global expenditures would reach, under the given hypotheses, a 59 % higher amount as compared with 1970.

**Hyp. 7** : On the base of the estimation of fiber substitutions, commented later in this text, the increase measured in tons would be much lower than the increase in expenditures.

The conversion coefficients are the following : (1)

| | | |
|---|---|---|
| 1 kg wool | $\simeq$ | 0.55 kg cotton |
| 1 kg artificials | $\simeq$ | 1.51 kg cotton |
| 1 kg synthetic discont. | $\simeq$ | 1.37 kg cotton |
| 1 kg synthetic contin. | $\simeq$ | 1.74 kg cotton. |

Taking this into account, the increase in tons would be only 46 % instead of 59.5 %.

(1) J. DE BANDT : "L'industrie textile de la C.E.E." Report to the E.E.C., 1969, page 81.

## TABLE VIII.

**TOTAL EXPENDITURES, APPAREL AND HOME 1975, IN THOUSANDS DOLLARS, POPULATION GROWTH INCLUDED**

| Income classes / Regions | 1 | 2 | 3 | 4 | 5 | 6 | TOTAL |
|---|---|---|---|---|---|---|---|
| A. | 7,784 | 8,986 | 7,000 | 6,558 | 531 | 914 | 31,773 |
| B. | 124,284 | 111,172 | 69,851 | 64,860 | 43,620 | 125,053 | 538,840 |
| C. | 202,783 | 260,084 | 451,289 | 410,461 | 292,772 | 752,352 | 2,369,741 |
| D. | 84,934 | 117,202 | 153,860 | 146,077 | 80,212 | 208,983 | 791,270 |
| TOTAL | 419,785 | 497,445 | 682,001 | 627,957 | 417,135 | 1,087,302 | 3,731,624 |

The price-quality effect, described in section 2.1.1. would lead to an approximate 14 % difference in growth, between tons and expenditure. The increase in tons would then be brought back to 32 % in five years.

This figure applied to the quantities consumed gives the results of Table IX. ; where use has been made of hypothesis 8.

<u>Hyp. 8</u> : There is no change in revealed preferences in sub-categories. This is understandable : on what basis could marginal rates of substitution be computed ? Without chronies available, a scientific approach of this problem is hard to elaborate ; a large and detailed market study could probably help for doing it. However, the shifts in relative importance of detailed items is not a necessary support for a global orientation; except for women of unusual tastes, poets and some tourists, it is not expected that the general structure of people's clothing would exhibit drastic changes in the 5 next years. We can estimate that table IX., ignoring these phenomena, would still remain a sound basis for our work, otherwise, a stepwise adaptation of supply can be expected. This is conditional, of course, to the reliability of the 1970 estimate of consumption.

<u>Hyp. 9</u> : We recall that, under the label "other uses", we find complementary products to the other censed private uses, so that the same rate of growth can be reasonably expected. It is just hoped that this hypothesis is true. There is not evidence enough to invalidate this assertion at the present stage.

As concerns the industrial uses, some censed items have deserved specific attention, such as tire-cord (+ 8 % per year), cigarette filters (+ 3.5 % per year), bagging (- 2 % per year), coated PVC (+ 10 % per year).

**Hyp. 10** : The other industrial uses are expected to grow at a 6.5 % rate, which is somewhat less than the leading Brazilian industries. The confidence interval is large because of the lack of information about the different categories of final usages.

On the other hand, there is strong evidence in favor of the development of manufactured apparel as compared to the yard. The consensus amongst different sources and the survey of the study group support the consideration of this phenomenon. As a consequence, the yard elasticity is lower ; moreover, the elasticity is of course no higher for the high-income classes than for the lower ones ; the survey led to an estimated 0.4 elasticity, of which the results in tons given in table IX. are derived.

Table IX. is designed to help the reader : the first numerical column gives the estimated detailed consumption in tons for 1970, the second one gives the corresponding numbers for 1975, and covers all categories under review - that means, it is exhaustive - but not homogeneously detailed, as can been easily checked.

**TABLE IX.**

**APPARENT CONSUMPTION IN QUANTITIES**

**FINAL USES 1970 AND 1975**

| | 1,000 T 1970 | 1,000 T 1975 | |
|---|---|---|---|
| I. **APPAREL** | | | |
| 1. MEN | | | |
| 1.1. Outerwear | | | |
| 1.1.1. Dresses | 587 | 774 | |
| 1.1.2. Separate jackets | 2,195 | 2,897 | |
| 1.1.3. Schorts | 964 | 1,272 | |
| 1.1.4. Shirts (Dress) | 5,078 | 6,703 | |
| (Sport) | 26,271 | 34,677 | |
| 1.1.5. Dungarees | 26,176 | 34,552 | |
| 1.1.6. Slacks | 3,472 | 4,583 | |
| 1.1.7. Knitwear (estim.) | 5,981 | 7,895 | |
| 1.1.8. Rainwear & umbrella's | 1,256 | 1,658 | |
| 1.1.9. Work clothes | 4,176 | 5,512 | |
| 1.1.10 Military uniforms | 2,817 | 3,718 | |
| 1.2. Underwear | | | |
| 1.2.1. Underpants | 3,187 | 4,207 | |
| 1.2.2. Undershirts | 1,913 | 2,525 | |
| 1.3. Pyjamas | 1,186 | 1,565 | |
| 1.4. Hosiery | 2,221 | 2,932 | |
| 1.5. Interlinings, linings, pocketings | 3,540 | 4,673 | Total Men 120 - 143 in 1975 |

TABLE X.

APPARENT CONSUMPTION IN QUANTITIES

FINAL USES 1970 AND 1975

| | 1,000 T 1970 | 1,000 T 1975 | |
|---|---|---|---|
| 2. WOMEN | | | |
| 2.1. Outerwear | | | |
| 2.1.1. Dresses | 2,342 | 3,091 | |
| 2.1.2. Shirts | 2,215 | 2,924 | |
| 2.1.3. Skirts | 1,509 | 1,992 | |
| 2.1.4. Shorts | 1,707 | 2,253 | |
| 2.1.5. Blouses | 1,231 | 1,625 | |
| 2.2. Underwear | | | |
| 2.2.1. Lingerie, garments, etc... | 9,538 | 12,590 | |
| 2.3. Hosiery | 1,268 | 1,674 | |
| 2.4. Knitted outerwear | 7,964 | 10,512 | |
| 2.5. Other outerwear | 1,149 | 1,516 | Subtotal Women 38,177 |
| 3. Infant and Junior | | | |
| Knitwear | 2,450 | 3,234 | |
| Junior garments | 2,367 | 3,124 | Total 6,358<br>Total apparel 1975 = 164,678 |

TABLE XI.

APPARENT CONSUMPTION IN QUANTITIES

FINAL USES 1970 AND 1975

| | 1,000 T 1970 | 1,000 T 1975 | |
|---|---|---|---|
| II. HOME | | | |
| 1. Curtain, drapery | 4,239 | 5,595 | |
| 2. Bedding | 15,747 | 20,786 | |
| 3. Bedspreads | 7,000 | 9,240 | |
| 4. Blankets | 16,824 | 22,207 | |
| 5. Carpets and rugs | 8,883 | 11,726 | |
| 6. Table and kitchenwear | 11,164 | 14,737 | |
| 7. Towels and terry clothes | 8,075 | 10,659 | |
| 8. Filled products | 1,070 | 1,412 | |
| 9. Bags, etc... | 1,074 | 1,412 | |
| 10. Upholstery | 2,692 | 3,553 | |
| 11. Tucking | 1,074 | 1,412 | Total 102,739 in 1975 |
| III. OTHER CENSED PRODUCTS FOR CONSUMERS (estim.) | | | |
| 1. Narrow fabrics | 3,000 | 4,000 | |
| 2. Linings, interlinings | 6,300 | 8,300 | |
| 3. Medical - surgical | 5,500 | 7,200 | |
| 4. Lace | 0,500 | 0,700 | |
| 5. Knitting (women) | 1,500 | 2,000 | |
| 6. Embroidery | 2,000 | 2,600 | |
| 7. Serving thread (wool included) | 11,000 | 14,500 | |
| 8. Other uses | 20,300 | 26,800 | Total III. 66,100 in 1975 |

TABLE XII.

**APPARENT CONSUMPTION IN QUANTITIES**

**FINAL USES 1970 AND 1975**

| | 1,000 T | 1,000 T | |
|---|---|---|---|
| **IV. TRANSFORMED YARDS** | | | |
| 1. To apparel | 68,100 | 70,000 | |
| 2. To home | 22,000 | 25,000 | |
| 3. Other end-uses | 6,000 | 7,800 | Total IV. 102,800 in 1975 |
| **V. INDUSTRIAL USES** | | | |
| Tire cord | 14,000 | 21,000 | |
| Cigarette filters | 3,900 | 4,600 | |
| Coated PVC backing | 4,500 | 10,000 | |
| Others (estimated break-down) | | | |
| - bagging cotton | 40,000 | 81,900 | |
| jute malva | 50,800 | | |
| - rope<br>- industrial serving thread<br>- canvas | 12,500 | 12,500 | |
| Other end-uses | 68,500 | 93,800 | Total V. 223,800 in 1975 |

## 1.4.4. Forecasts per type of fiber.

Given the preceding results, we have at our disposal a basis to make a consistent forecast of fiber evolution. The problem is indeed the following : if one makes independent projections of the components of an aggregate, nothing guarantees that the sum of the projected components will be consistent with the global projection of the aggregate ; this is generally the case when these projections are made by econometric methods, such as an adjustment of a mathematical function. Except when the adjustment functions are polynomials, which are adolitive, the results are not supposed to be consistent with an autonomous projection of the total.

Our projections by type of fiber are, in view of this, heuristically constructed to be consistent with total expenditures. Biases can, however, arise from the fact that miscellaneous (not surveyed) and industrial uses are the least known. Most interesting is the fact that sufficient chronics are available to analyse the evolution per fiber in Brazil ; moreover sufficient evidence enough is given by other countries, and this can help in anticipating ; finally, a former, but recent, forecast has been made by the study group, concerning fiber evolution in the world. These material, together with the present survey of the study group, is the information basis leading to the elaboration of table XIV., showing the cross-classification of forecasts by final use and type of fiber. To help the reader, we join table XIII., as a basis of comparison for 1970. Few comments are needed. The main phenomenon is the steady growth of synthetics, and a relative stagnation of natural fibers, especially hard fibers.

TABLE XIII.

END-USES, IN 1,000 T, 1970

| | Apparel | Home | Industr. | Others | Yard | Totals |
|---|---|---|---|---|---|---|
| Cotton | 80.3 | 44.1 | 60.8 | 24.4 | 78.2 | 287.8 |
| Wool (x) | 4.3 | 3.5 | 0.2 | 6.3 | 4.7 | 19.0 |
| Synth. | 17.3 | 8.1 | 13.0 | 3.0 | 9.0 | 50.4 |
| Artif. | 20.5 | 10.5 | 10.1 | 11.5 | 3.0 | 55.6 |
| Linen / Rami | 2.3 | 6.0 | 7.0 | | 1.2 | 16.5 |
| Jute + malva | | 5.6 | 50.8 | | | 56.4 |
| Sisal | | | 40.0 | 5.0 | | 45.0 |
| Others | | | 11.8 | | | 11.8 |
| TOTALS | 124.7 | 77.8 | 193.7 | 50.2 | 96.1 | 542.5 |
| (x) scoured wool | 2.4 | 2.0 | 0.1 | 3.3 | 2.6 | 10.5 |

## TABLE XIV.

**FORECASTED APPARENT CONSUMPTION PER FIBER AND END-USE, 1975, 1,000 TONS**

| | Apparel | Home | Industr. | Others | Yard | Totals |
|---|---|---|---|---|---|---|
| Cotton | 85.0 | 49.2 | 77.3 | 28.5 | 80.0 | 320.0 |
| Wool (x) | 5.0 | 4.0 | 0.2 | 6.8 | 5.0 | 21.0 |
| Synth. | 47.6 | 28.3 | 30.3 | 10.4 | 12.4 | 129.0 |
| Artif. | 25.0 | 13.2 | 20.0 | 16.4 | 4.4 | 79.0 |
| Linen / Rami | 2.0 | 5.0 | 4.0 | | 1.0 | 12.0 |
| Jute + malva | | 3.0 | 46.0 | | | 49.0 |
| Sisal | | | 34.0 | 4.0 | | 38.0 |
| Others | | | 12.0 | | | 12.0 |
| TOTALS | 164.6 | 102.7 | 223.8 | 66.1 | 102.8 | 660.0 |
| (x) scoured wool | 2.8 | 2.3 | 0.2 | 3.6 | 2.7 | 11.6 |

As a basis of comparison for synthetics, let us recall the take-off of these fibres in Europe :

| Year | 1,000 tons | Percentage of growth |
|---|---|---|
| 1955 | 70 | |
| : | : | 300 % |
| 1960 | 210 | |
| : | : | 362 % |
| 1965 | 550 | |
| : | : | 147 % |
| 1968 | 810 | |

It should be borne in mind, however, that Europe is not an autonomous supplier of cotton.

In contradiction to the other sources, a decrease in hard fibers is forecast by the study group. This is not surprising. The new estimates of apparent consumption of hard fibers made by the study group lead to new series of observations, given and justified in this report, the main feature of which is a decrease in recent years ; the future evolution in this sense is confirmed by the field survey. The slowest positive growth is cotton, and, by the way, a stagnation is expected after 1975.

Table XV. helps the reader to conceptualise the forecast changes, under the hypothesis of a 6.5 % growth of real income per capita.

## TABLE XV.

**FORECAST LEVELS PER FIBRE AND FINAL USE ; RATIO OF THE 1975 LEVEL TO THE 1970 LEVEL IN TONS (x)**

| | APPAREL | HOME | INDUSTR. | OTHER USES | YARD | TOTAL |
|---|---|---|---|---|---|---|
| Cotton | 105 | 111 | 127 | 117 | 102 | 111 |
| Wool | 116 | 114 | 100 | 107 | 106 | 110 |
| Synthetics | 275 | 349 | 233 | 347 | 138 | 255 |
| Artificials | 121 | 125 | 198 | 142 | 147 | 142 |
| Linen + Rami | 86 | 83 | 57 | - | 83 | 72 |
| Jute + Malva | - | 53 | 90 | - | - | 86 |
| Sisal | - | - | 85 | 80 | - | 84 |
| Others | - | - | 101 | - | - | 101 |
| TOTALS | 131 % | 132 % | 115 % | 131 % | 106 % | 121 % |



(x) Under the hypothesis of a per capita growth of income of 6.5 per year in real terms.

1.4.5. __The 1980 forecasts__.

1.4.5.1. As explained in Appendix 3. . the 1980 forecasts are elaborated in a much less formalized way, and the general approach has also been checked in that section ; thus, it does not need a new exposition. Let us, however pin-point what we call our hypothesis 11, which asserts that there is a fair probability that the economic policy would have to deal more drastically with the inflationary gap. In this case, a 6.5 % growth of income per capita in real terms is hard to sustain over such a long period. Under hypothesis 11, the anticipated growth could stick around 1.5 %.

The results of the 1980 forecasts appear in table XVI. and seq., and are briefly commented below.

**TABLE XVI.**

**GENERAL OUTLOOK OF FIBRE FORECASTS 1975 ; 1980**

| | 1970 | y. growth in 5 years | 1975 | y. growth in 5 years | 1980 |
|---|---|---|---|---|---|
| Cotton | 287.8 | 111 % | 320.0 | 104 % | 334.2 |
| Wool | 19.0 | 110 % | 21.0 | 103 % | 21.6 |
| Synthetics | 50.4 | 255 % | 129.0 | 150 % | 193.5 |
| Artificials | 55.6 | 142 % | 79.0 | 125 % | 98.7 |
| Linen + Rami | 16.5 | 72 % | 12.0 | - | 10.0 |
| Jute + Malva | 56.4 | 86 % | 49.0 | - | 40.0 |
| Sisal | 45.0 | 84 % | 38.0 | - | 32.0 |
| Others | 11.8 | 101 % | 12.0 | - | 12.0 |
| TOTAL | 542.5 | | 660.0 | | 742.0 |

1.4.5.2. 1980 Projections according to fiber types.

1) Cotton.

The current trend in world demand for cotton indicates that it will remain at its 1975 level. This state of stagnation of cotton at a given level is characteristic and is the same everywhere. We therefore foresee a consumption of 320,000 tons of cotton.

2) Wool.

The same stabilization of consumer demand is found in the wool products sector. The consumption for 1980 should lie in the vicinity of 21,000 tons.

3) Synthetic fibers.

It will indubitably be in this sector that the most drastic increase will take place.
We have taken as model the evolution of synthetic fibre consumption in Europe. A similar situation as that of some 15 years ago can be found in Brazil. An increase of 150 % is forecast for the period 1975 to 1980, bringing the total consumption to 193,500 tons.

4) Artificial fibers.

The increase of artificial fiber consumption will be less pronounced than that of synthetic fibers. Relying on the European experience, an increase of approximately 125 % can be foreseen, bringing total consumption in Brazil to 98,700 tons.

5) Flax.

This sector should continue to decline slightly until its stabilization around 10,000 tons in 1980.

6) Jute - Malva - Sisal and others.

The consumption of these fibers should also fall. We believe it will be around 40 thousand tons for jute and malva, 32 thousand for sisal and 12 thousand for the others, in 1980.

1.4.5.3. 1980 Projections according to end-use.

1) Clothing (ready-made clothes for men, women and children).

The estimated rate of increase between 1970 and 1975 is 131 % for the five-year period. According to INDI estimates, this would be 159 %. (Cfr. 1.4.3.).

Between 1975 and 1980 the increase in consumption is estimated by INDI at 144 % for the five-year period ; our estimate is for 140 % for the same period. This brings total consumption of ready-made clothes in 1980 to 246,000 tons.

2) Home.

The phenomenon usually observed in home consumption trends is as follows : the rate of increase grows out of proportion with the increases in expenditures allowed by the consumer for its essentials, including clothes, when the cost of living increases.

In other words, the % of family budget dedicated to the home environment increases more than that dedicated to clothing as the latter is progressively saturated.

Also taking into account the government policy on matters of special housing, we believe that, on the basis of the 1975 estimate, the rate of increase of home expenditures will be around 140 % in the five-year period from 1975 to 1980. This leads us to a sub-total of 143,000 tons.

3) Industry.

It is practically impossible to determine with any accuracy the rate of increase in this sector because a multitude of unforeseeable factors can affect it.

We therefore assume it will follow a parallel course to that industry as a whole. The rate of 6.5 % strikes us as unlikely for the period of 1975 to 1980, especially if it is accompanied by a fall in the rate of inflation. We feel it would be reasonable to count on an increase of 1,045 per year. This gives an increment coefficient for the entire five-year period of : $(1{,}045)^5 = 1.24355$, i.e. a consumption of 1,980,000 tons.

4) Various.

As in the industrial sector, we are at pains to make a forecast of long-term rates of increase for this sector. We believe it a reliable assumption to assimilate it to that of industry, i.e. : 1.24355, making for a consumption of 82,100 tons.

5) Yard.

Our projections for cloth consumption by the yard allow for around 100,000 tons, of which some 25 % would go to the home and 75 % for clothing.

If we take the rate of increase of ready-made clothing from 75 to 80, i.e. 150 % as basis of calculation, we see that the tonnage yard of dedicated to clothing hardly increases at all as of 1975, remaining stable at around 75,000 tons.

This is due to the fact that an increasing proportion of the population will buy ready-made. As to the yard dedicated to home consumption, it is reasonable to assume that it will increase slightly to attain 110 %, i.e. 27,500 tons for home and 75,000 for clothes making for a total of 102,500 tons.

We synthesize these results in table XVIII., and figure 5.1., the interpretation of which is obvious. As a comparison point, we show the fibre evolution and forecast for Europe, in figure 5.2.

1.4.6. Concluding remark.

These results are conditional to the 11 quoted hypotheses. As has been said, these are maximum likelihood estimates based on the present state of knowledge. Let us, however, never forget the uncertainty factor : it is the main reason for developing an ability for adaptation.

The procedure depicted herein is, of course, still valid if other hypotheses of the same kind are introduced. If, for example, one has sound reasons to believe that the 6.5 % growth rate as self-imposed national objective, cannot be sustained, it suffices to change the corresponding parameter. Likewise, if a specific income or regional policy appears to have short-term forthcoming effects, the distribution parameters,too, have to be revised. The given results give, anyway, an enlightening information for orientation.

# TABLE XVII.

## APPARENT CONSUMPTION FORECASTS, 1980, IN QUANTITIES

| Final Uses | Thousands Tons | Percent growth 1975 - 1980 |
|---|---|---|
| Apparel | 230.4 | 140 % |
| Home | 143.7 | 140 % |
| Industrial | 277.5 | 124 % |
| Other uses | 81.9 | 124 % |
| Yard | 85.0 | 85 % |
| TOTAL | 742.0 | |

| Fibres | Thousands Tons | Percent growth 1975 - 1980 |
|---|---|---|
| Cotton | 334.2 | 104 % |
| Wool | 21.6 | 103 % |
| Synthetics | 193.5 | 150 % |
| Artificials | 98.7 | 125 % |
| Linen + Rami | 10.0 | - |
| Jute + Malva | 40.0 | - |
| Sisal | 32.0 | - |
| Others | 12.0 | 100 % |
| TOTAL | 742.0 | |

Figure 5.1. FUTURE EVOLUTION PER FIBRE, THOUSANDS TONS, BRAZIL

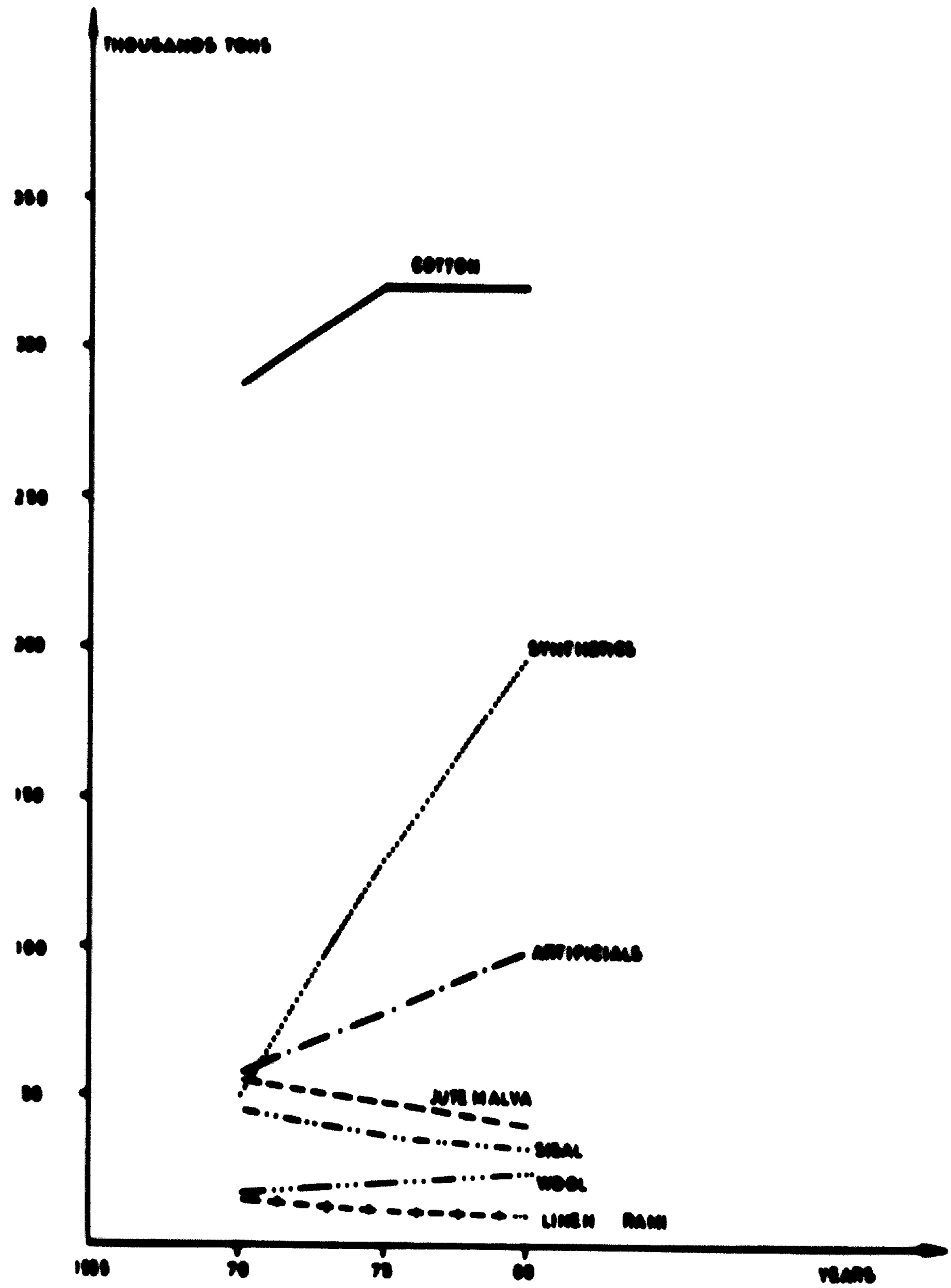
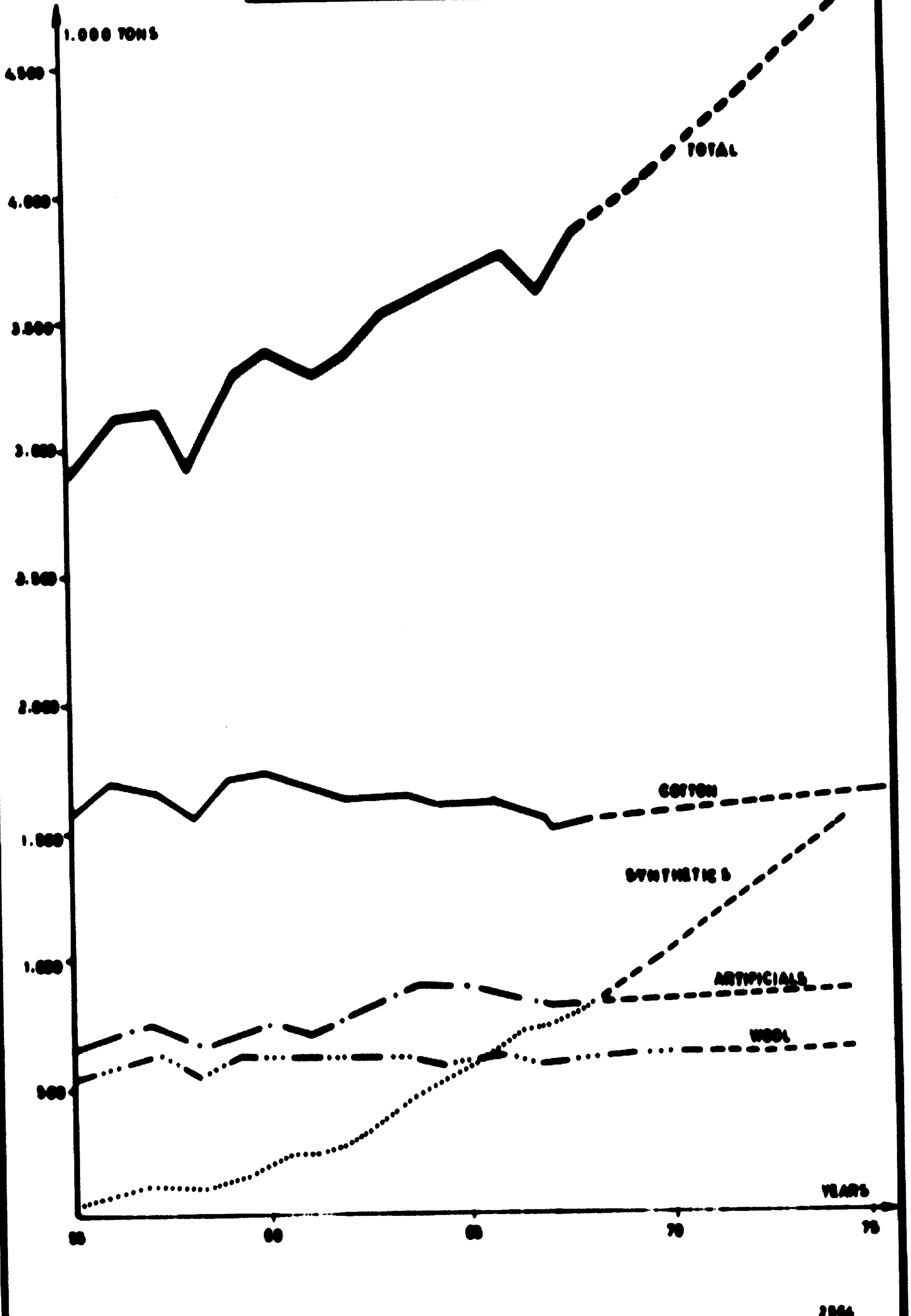


Figure 5.2. CONSUMPTION OF TEXTILE FIBRES IN WESTERN EUROPE



## 1.5. GENERAL APPRAISAL OF THE POTENTIAL FOR THE EXPORT OF TEXTILES

### 1.5.1. Current situation

#### 1.5.1.1. National situation

Brazil has always been an exporter of raw materials; now, as a side-effect of its industrial development, it becomes increasingly oriented towards the export of textile manufactured goods. This fundamental reversal of its policies requires tremendous efforts of adaptation.

For raw materials, demand is there; for manufactured products demand is also great but offer is even greater, for all countries wish to export.

The primary motivation of Brazil's exports policy is that the increase of industrial output resulting among other things, from the fact that productivity, is growing faster than demand on the domestic market.
The efforts currently made by Brazil for the promotion of its exports are titanic. Tax exemptions afforded to exporters rank among the highest in the world.

However, exporters in general and exporters of textile products in particular are still much too scarce in the eyes of the Government.

This state of fact can be accounted for by the following four major inhibitors :

1. A problem at the level of information : industrialists are often unaware of the incentives and advantages offered to exporters.
2. A lack of self-motivation. The industrialists do not as yet feel the compulsion to export. The protection of the domestic market is such that there is just no need to look further afield.
3. The administrative problems pertaining to an export organization usually daunt the export-oriented manufacturer.

4. The existence of an excessive number of export agencies, usually dealing in a wide range of products instead of specializing, which is highly detrimental to the effectiveness of these agencies.

1.5.1.2. International situation

Several major trends are being defined in the field of international trade of textile products. We find, among other features :

1. Exceedingly harsh international competition due to the fact that naturally most countries want to export textile surplus.
2. A world tendency to self-sufficiency; a pro-exports policy is often coupled with an anti-imports policy : for industrialized countries as a protection of their national industry and for developing countries because of their lack of foreign exchange.
3. A general trend towards the monopoly of major corporations.
4. Growing demand for wide fabrics, to meet the requirements of the garment and home furnishing sectors.

On the international textile market, Brazil is not very well known (neither in the United States , Europe or Africa). Importers are not usually acquainted with Brazil's textile products, and on first analysis they are skeptical as to their quality or the constancy of their quality and consequently stun from importing them. Brazil certainly does not enjoy what we could term an image of prestige as do the English tweed or the Italian and Japanese

As regards the prices applied by Brazil on the international market, they are fairly competitive due to the tax exemptions and the low cost of domestic manpower. However, the last comparative advantage is strongly offset by the low level of productivity.

### 1.5.2. Prospective situation of Brasil

In spite of the tremendous difficulties encoutered by Brazil on the international market, we believe that it could strongly benefit from two tendencies which are currently becoming apparent in most industrialized countries.

a) a certain lack of interest in the production of ordinary fabrics. A sharp fall of investments in this sector has been recorded.

b) a general trend towards the widening of weaving looms, mainly under the pressure of garment and home furnishing which require widths of up to 250 and 300 cm. Already at this early stage, there is some shortage of wide fabrics. Many Asian countries are at present highly specialized in textile products and it seems unlikely that they will enter the market of wide fabrics.

In addition to the oppotunities offered by ordinary wide fabrics, which will indubitably find a place in the international markets, a specially designed product for exports could be evolved.

We refer among other things to the Brazilian fancy shirt and the sports pants which are in a way the flag-bearers of Brazils textile industry.

### 1.5.3. Means of achieving export targets

The main prerequisite for successful entry into the international trade market is the achievement of a balance between the three major economic criteria of quality, quantity and selling prices. This is why Brazil must achieve standard and guaranteed quality of export goods, while keeping within competitive price brackets. It is the only way of reinforcing and asserting its position in the market.

To this effect we advocate the creation of a central agency for textile exports to issue one or several quality labels. They must not necessarily be highest-quality labels but rather one for each previously established quality standard. The advantages to exporters could be subjected to the holding of such official certificates.

This would bar the export of lower-quality goods which would inevitably mar the image of Brazilian textile goods abroad.

The overriding means of promoting textile exports in a medium-run perspective is therefore the creation of a central agency for textile exports. The principles of operation and attributions of such a government organization would be :

a) delivery of quality labels

b) information of industrialists on the benefits and incentives granted to exporters by the government

c) motivation of industrialists by way of explanatory campaigns

d) supply of administrative and logistic support to exporters so as to minimize their difficulties and simplify formalities and procedures

e) prospection of foreign markets.

In addition to the creation of this agency, we advise the participation of Brazil to various international quality campaigns such as Woolmark for wool and Incati for cotton.

Furthermore it is clear that Brazil could considerably improve its competitiveness on the international market if it could lower its selling prices by cutting production costs. The improvement of productivity will bring about this a reduction of production costs and thus act on selling prices abroad.

This, added to the exportation incentives, will doubtless finally place Brazil in a sound position on the international market.

Another initiative would be the organization of Brazilian Weeks and such commercial fairs abroad. This has already been done in a tentative way and should be encouraged as an excellent means of publicizing textile products which fit particularly well in such settings.

# CHAPTER II

## STRUCTURE OF THE TEXTILE INDUSTRY AND ITS PRODUCTION FACILITIES

## 2.1. GENERAL AND REGIONAL STRUCTURE

The following general table reviews those textile factories which employed more than 9 workers in 1969.
Consequently, most of the spontaneous and craft sector is not represented.
The table is based on I.B.G.E. records ; this means that a number of recently implanted factories are not surveyed.
Only the state of Sao Paulo includes representatives of all textile sectors, followed by Rio Guanabara and Santa Catarina to a lesser extent.

If we try to evaluate the average size of firms by measuring it in terms of the number of workers, we find :

| States | Average number of employed personnel. |
|---|---|
| Para - Matto Grosso Goias | 250 |
| North-East | 290 |
| Minas Gerais | 161 |
| Rio Guanabara | 225 |
| Rio Grande do Sul | 227 |
| Sao Paulo | 90 |
| Santa Catarina - Parana | 131 |

Knitwear and Hosiery have the effect of drastically lowering the average.

| | E.P. | V.P. | N°F. | E.P. | V.P. | N°F. | E.P. | V.P. | N°F. | E.P. | V.. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Spinning Coton | 784 | 10.150 | 2 | 1.162 | 11.802 | 14 | 525 | 7.630 | 7 | 1.500 | [illegible] |
| Synth.-Man-made | - | - | - | 15 | 150 | 1 | - | - | - | 200 | 4.[illegible] |
| Linen/Rami | - | - | - | - | - | - | - | - | - | - | [illegible] |
| Wool | - | - | - | - | - | - | - | - | - | 75 | [illegible] |
| Weaving Coton | 210 | 1.850 | 2 | 15.170 | 137.788 | 37 | 13.224 | 212.496 | 57 | 9.509 | 12[illegible] |
| Synth.-Man-made | - | - | - | - | - | - | 225 | 4.500 | 3 | 1.080 | [illegible] |
| Linen/Rami | - | - | - | 375 | 3.500 | 1 | - | - | - | 17[illegible] | [illegible] |
| Wool | - | - | - | - | - | - | - | - | - | 1.276 | 21[illegible] |
| Jersays | - | - | - | 50 | 500 | 2 | 1[illegible]5 | 2.550 | 5 | 268 | [illegible] |
| Stockinet | - | - | - | 51 | 1.050 | 3 | 720 | 16.180 | 20 | 136 | [illegible] |
| TOTAL | 994 | 12.000 | 4 | 16.823 | 154.790 | 58 | 14.819 | 243.356 | 92 | 219 | 20[illegible] |

| ..P. | N°F. | E.P. | V.P. | N°F. | E.P. | V.P. | N°F. | E.P. | V.P. | N°F. | E.P. | V.O. | N°F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .630 | 7 | 1.500 | 32.500 | 4 | - | - | - | 9.089 | 179.340 | 61 | 1.095 | 30.000 | 5 |
| - | - | 200 | 4.000 | 2 | - | - | - | 840 | 30.000 | 6 | - | - | - |
| - | - | - | - | - | - | - | - | 210 | 2.250 | 2 | 200 | 2.000 | 2 |
| - | - | 75 | 1.500 | 1 | 350 | 7.000 | 2 | 3.150 | 68.400 | 9 | - | - | - |
| | | | | | | | | | | | | | |
| .496 | 57 | 9.509 | 124.098 | 37 | 1.075 | 9.500 | 5 | 11.920 | 240.337 | 149 | 3.060 | 42.500 | 17 |
| 4.500 | 3 | 1.080 | 9.600 | 6 | 480 | 24.000 | 6 | 12.810 | 136.500 | 183 | 175 | 3.500 | 1 |
| - | - | 175 | 3.500 | 1 | - | - | - | 1.127 | 10.052 | 7 | - | - | - |
| - | - | 1.276 | 21.400 | 4 | 1.500 | 20.000 | 2 | 1.360 | 47.120 | 16 | - | - | - |
| | | | | | | | | | | | | | |
| 2.550 | 5 | 268 | 5.000 | 4 | - | - | - | 2.100 | 50.575 | 35 | 855 | 7.590 | 15 |
| 6.180 | 20 | 136 | 2.660 | 4 | - | - | - | 2.812 | 84.930 | 38 | 190 | 3.850 | 2 |
| 3.356 | 92 | 14.219 | 204.258 | 63 | 3.405 | 60.500 | 15 | 45.418 | 849.484 | 506 | 5.515 | 89.440 | 42 |

## 2.1.1. Cotton Industry.

### A. Break-down according to input.

The cotton industry absorbs 70 % of the overall soft fiber consumption of Brazilian textile industry. Of this percentage, 66 % is cotton and 4 % synthetic and man-made fibers.

REGIONAL COTTON CONSUMPTION IN 1,000 T/yr

| States | 1967 | 1968 | 1970 | % 1970 |
|---|---|---|---|---|
| Nord East | 48.7 | 45.5 | 40.0 | 13.3 |
| Minas Gerais | 42.0 | 48.0 | 45.0 | 15.0 |
| Rio Guanabara | 45.0 | 27.0 | 25.0 | 8.3 |
| Sao Paulo | 114.0 | 129.3 | 136.5 | 48.5 |
| Santa Catarina | 12.0 | 18.7 | 32.0 | 10.6 |
| Others | 2.0 | 1.5 | 3.0 | 0.01 |

It can be seen that in actual fact, the State of Minas Gerais and Nord East account for 30 % of national cotton consumption, the remaining 70 % being distributed among the industries of the Central and Southern regions of the country.

The consumption of the states of Nord East and Rio Guanabara has fallen in the last three years.

### B. Distribution of production equipment.

The cotton industry represents 87 % of the national stock of spindles for soft open-yarn fiber and 74 % of the national stock of looms.

GEOGRAPHICAL DISTRIBUTION OF COTTON SPINDLES AND LOOMS

| States | Spindles | Looms | % Spindles | % Looms |
|---|---|---|---|---|
| North East | 450,000 | 11,500 | 15.8 | 13.5 |
| Minas Gerais | 400,000 | 13,720 | 14.0 | 16.6 |
| Rio Guanabara | 350,000 | 12,980 | 12.7 | 15.8 |
| Sao Paulo | 1,401,850 | 40,700 | 49.2 | 49.3 |
| Santa Catarina | 228,000 | 3,350 | 8.0 | 4.15 |
| Others | 10,000 | 460 | 0.3 | 0.65 |

In practice, 50 % of cotton-type production capacity is concentrated in the state of Sao Paulo.

C. Evolution of weaving capacity.

EVOLUTION OF THE NUMBER OF COTTON-TYPE LOOMS FROM 1960 TO 1970.

| States | N° spindles 1960 | N° spindles 1970 | Change |
|---|---|---|---|
| North East | 642,300 | 450,000 | - 30 % |
| Minas Gerais | 531,490 | 400,000 | - 24 % |
| Rio Guanabara | 830,430 | 350,000 | - 58 % |
| Sao Paulo | 1,485,530 | 1,401,850 | - 0,05 % |
| Santa Catarina | 101,990 | 228,000 | +123,0 % |
| Others | 18,750 | 10,000 | - 48 % |

It can be seen that only the state of Santa Catarina exhibits a major growth in the number of cotton spindles since 1960. This is due to the concentration in this state of a highly aggressive nucleus of manufacturers specialized in the sector.

In the State of Sao Paulo, the stock of spindles has remained practically unchanged since 1960. This situation is somewhat paradoxical especially if we consider that the number of hours of work per spindle and per year has risen steadily from 1960 to 1970.

EVOLUTION OF THE NUMBER OF COTTON SPINDLES AND WORK HOURS IN SAO PAULO

| Year | Number of spindles in operation | Hours of work |
|---|---|---|
| 1960 | 1,485,529 | 17.45 |
| 1961 | 1,495,878 | 18.03 |
| 1962 | 1,566,015 | 18.12 |
| 1963 | 1,549,378 | 17.53 |
| 1964 | 1,480,455 | 17.12 |
| 1965 | 1,442,652 | 16.22 |
| 1966 | 1,373,822 | 17.03 |
| 1967 | 1,286,227 | 17.40 |
| 1968 | 1,365,159 | 19.07 |
| 1969 | 1,362,317 | 19.06 |
| 1970 (x) | 1,352,954 | 19.05 |

(x) first semester of 1970.

Source : Report from the Market of Commodities in Sao Paulo.

This table does not include idle installed capacity.

Thus, in 1969 should be added 71,293 and in the first semester of 1970, 48,887 inactive spindles. Sao Paulo therefore appears to have remained at its 1960 level of production capacity in spite of the disappearance of marginal enterprises and the modernization of spinning mills which should have resulted in a decline in the number of cotton spindles. This state of affairs is in keeping with the input increase of Sao Paulo and appears to be related to the considerable development of the knit-wear sector of Sao Paulo in the past few years.

The non-integrated spinning mills have expanded their stocks of equipment. The fact that a large number of non-integrated weaving mills still remain in Sao Paulo also accounts for this situation to some extent although these houses are primarilly focused on man-made fiber weaving.

The position of the Nordeste is accounted for by the existence in that state of a modernization and new implantation program and by the elimination of a large number of spindles on marginal enterprises.

SITUATION OF THE STOCK OF SPINDLES IN THE NORTH EAST IN 1960

| Age of spindles | Number of spindles | % |
|---|---|---|
| Less than 15 | 245,390 | 38.3 |
| 15 t 30 | 48,500 | 7.5 |
| more than 30 | 347,876 | 54.2 |

Source : CEPAL 1960.

SITUATION OF THE STOCK OF COTTON-SPINDLES IN THE NORTH EAST IN 1969.

| Age of spindles | Number of spindles | % |
|---|---|---|
| Less than 10 | 168,330 | 38.8 |
| 10 to 19 | 106,896 | 24.7 |
| 20 to 30 | 75,400 | 17.4 |
| More than 30 | 82,565 | 19.1 |

Source : SUDENE Survey

The North East has thus considerably renewed its stock of cotton spindles. The number of spindles of more than 30 years of age fell from 54.2 % in 1960 to 19.1 % in 1969.

Recent machines, i.e. those implanted after 1960 (average age of less than ten years), represented 38.8 % of the total in 1969. The overall reduction in the number of spindles does not necessarily mean a reduction in production capacity, considering there has been an improvement of output per unit. Cotton consumption in the North East industries from 1967 to 1969 does however appear to be engaged in a sharp fall.

From 1967 to 1969 the cotton consumption of the North East factories fell from 100 to 75. It can therefore be assumed that there has been some marginal elimination as the increase in productivity has failed to offset the diminution of installed capacity.
The North East is only now beginning to go into cotton-polyester blends in cotton-type spinning.

In the State of Minas Gerais, the present stock of spindles is only 75 % of that operating in 1960. This is due primarily to the elimination of marginal enterprises, although certain plants have modernized their spinning equipment, usually in the form of modifications to the stretching lines. This State still has a number of plants of less than 5,000 spindles and the average for its entire stock is 8,000 spindles, the smallest has 2,800 and the largest 28,000 spindles.
There are only six mills not engaged in pure cotton spinning. Thus the state of Minas Gerais remains largely focused on low-cost all-cotton items and the quote of synthetic fibers is not significant; this is due both to traditionalism and difficulties in getting supplies.

The situation of Rio Ganabara is the most surprising at first blush : over the ten-year span, more than half the stock of cotton spindles have been eliminated. Moreover considering the fact that this state has several fast-growing and fast-restructuring enterprises of some size, which have boldly engaged in policies of intensive modernization, it has to be concluded that the renovation of the stock of spinning equipment has resulted in a spectacular decrease in the number of spindles.

The gain in popularity of synthetic fibers is considerable and the Rio Guanabara state has specialized in very low counts of yarn.
It should also be taken into account that the larger houses have taken over smaller units faster than they should, and that some absorbed units are located without the state and have therefore not been counted in the distribution of spindles by region.

D. Position of cotton and man-made fiber weaving mills

GEOGRAPHIC DISTRIBUTION OF THE INSTALLED WEAVING MILL CAPACITY

| State | Cotton Looms | M.M.F. Mills | % Cotton | % M.M.F. |
|---|---|---|---|---|
| North East | 11,500 | - | - 51 % | - |
| Minas Gerais | 13,730 | - | - 18 % | - |
| Rio Guanabara | 12,980 | 4,800 | - 40 % | + 507 % |
| Sao Paulo | 40,700 | 18,200 | + 31 % | + 38 % |
| Santa Catarina | 3,350 | 200 | + 37 % | + 100 % |
| Others | 460 | - | - | - |

The stock of weaving mills, for man-made fiber as well as cotton, in the State of Sao Paulo, has grown by more than 30 % since 1960.
We remind that the evaluation of weaving capacity in terms of the number of mills is not strictly reliable and that it is not representative of qualitative production potential. Indeed, the introduction of wide looms with high speeds of insertion is liable to impair results.

In the state of Rio Guanabara the installed weaving capacity has sharply diminished in terms of the number of looms in operation; however the introduction of many wide looms is partly responsible. The decrease of installed cotton weaving capacity is offset by a sharp rise in the number of man-made fiber looms and also accompanied by a proportional decrease in cotton spinning capacity.

In the states of Santa Catarina and Paraiba, the number of cotton looms has sharply risen, although in proportion with the growth of cotton spindles.

The trend is for regional specialization of both regions in printed cotton fabrics and low-cost popularized items designed mostly for the yard sector. In the North East a fairly large amount of blended cloths are already being produced.

2.1.2. Woollen and worsted system

EVOLUTION OF INSTALLED WEAVING AND SPINNING CAPACITY

| | 1960 | 1970 | % 1970 - 1960 |
|---|---|---|---|
| Number of spindles | 302,000 | 275,000 | 91 % |
| Number of looms | 5,500 | 4,925 | 89 % |

This type of industry is concentrated in the states of Sao Paulo and Rio Grande Do Sul.

GEOGRAPHIC DISTRIBUTION OF INSTALLED CAPACITY

| States | Number of spindles | Number of looms |
|---|---|---|
| Sao Paulo | 200,000 | 3,800 |
| Rio Grande do Sul | 62,000 | 700 |
| Others | 13,000 | 426 |

There are still a large number of very obsolete production units operating with equipment which has practically remained unchanged since 1960. In carded wool yarn, self-acting spindles are still wide-spread and by and large it can be said that this type of industry has remained highly traditional.

2.1.3. Knitting system

This sector, which was practically non-existant in 1960 has developed considerably in the past ten years. This spontaneous industry is highly disseminated and consists in a few industrial-type concerns plus a very large number of small houses working on a custom basis.

A. Warp and circular knitwear

There are still a large number of manually-operated either in the homes of custom-workers or even in industrial plants.

STOCK OF WARP-KNIT AND CIRCULAR KNIT MACHINES

| Type of machines | Number of machines |
|---|---|
| Manually-operated warp-knit machines | 8,000 |
| Authomatic warp knit machin. | 3,500 |
| Fully-fashioned spindles | 300 |
| Circular knitting machine | 3,600 |

The warp-knitting machines are mostly utilized in the smaller organizations, specialized in high-cost and high standing "fashion" goods. Such enterprises mostly concentrated in the State of Rio Grande Do Sul (Caxias do Sul, Estaio ...), in the states of Santa Catarina (Blumeau for instance) Rio Guanavara (Petropolis) and Sao Paulo.

The fully-fashioned machines are practically all located in Sao Paulo and Minas Gerais (Juiz de Fora). The stock of circular knit machines is distributed throughout Sao Paulo, Rio Guana ara and Santa Catarina.

It is very difficult to evaluate this sector which is in constant change.
It is estimated that the input in 1970 was around 36,500 T/year broken down by fiber as follows :

| Type of yarn | Output Tons/yr |
|---|---|
| Cotton | 19,000 |
| Wool | 4,400 |
| Synthetics | 12,000 |
| Man-made | 1,300 |

Most knitwear is produced with dyed yarn although there is a trend towards unbleached knitwear. The lack of custom-dyers capable of producing uniform coloring and stretch-proofing is liable to decelerate or offset this trend in the future. It can be estimated that this sector operates for 9 months in a year when it concentrates on fashion-type items.

DISTRIBUTION OF YARN TYPES USED IN WARP-KNIT OR CIRCULAR-KNIT

| Type of yarn | Output Tons/yr |
|---|---|
| Discontinuous fibers | |
| cotton | 19,000 |
| wool | 4,400 |
| acrylics | 3,500 |
| Continuous filaments | |
| acetates | 820 |
| acetate-nylon blend | 1,500 |
| nylon | 8,500 |
| polyester | 1,100 |
| TOTAL : | 38,820 T |

The circular-knit sector is highly disseminated throughout the country, except for three or four larger houses in Sao Paulo and Santa Catarina. Of the 650 enterprises counted in 1970, 20 % operate on the average 10 circular machines of some size. The remainder is found in family concerns which usually account for 1 to 5 machines each.

## REGIONAL DISTRIBUTION

| States | Number of mills |
|---|---|
| Sao Paulo | 320 |
| Minas Gerais | 110 |
| Rio de Janeiro | 25 |
| Guanabara | 50 |
| Santa Catarina | 70 |
| Rio Grande do Sul | 50 |
| Others | 25 |
| Total : | 650 |

There are currently few integrated mills although there is a trend towards integration especially among spinners, who would extend their scope towards the weaving sector, the upper reaches of production being usually integrated already. Relationships and common interests are also appearing between spinners and some knitters.

B. Chain-knitting

This sector has greatly evolved in the past 3 or 4 years. There are currently 1,800 machines in operation, 1,050 of which are warp -type and 750 Raschel-type.
The warp knitting types machines are usually 100"-wide although there has been a trend in the past 2 years for 168"-wide machines. Raschel-machines are 1964, mainly 75"-wide, while the current trend makes for 125" widths.
This sector includes some 90 firms of which 90 % are located in Sao Paulo. 16 Houses occupy 20 % of installed capacity; the remainder are small concerns less than 5 machines each. Only five houses are integrated.

The industry is a good deal more concentrated than the knit-wear business. There are around 100 warp knitters in Brazil, 90 of which in Sao Paulo. The largest, with their total number of tricot and Raschel machines, appears in Table 2.17. Thus six operators have over 20 % of installed capacity and numerous small operators are running less than five machines; these are fast going out of business specially now that the switch has had to be made to high-volume, low-profit items.

| Main industries | Number of machines |
|---|---|
| A | 150 |
| B | 80 |
| C | 65 |
| D | 50 |
| E | 40 |
| F | 30 |
| G | 30 |

The other manufacturers have only 5 to 20 machines and are very spread of but concentrated in Sao Paulo.

2.1.4. <u>Dyeing - Printing and Finishing</u>

**DYED AND PRINTED FIBERS : 1969 (T.)**

| Fiber | Dyed | Printed | Total |
|---|---|---|---|
| Cotton | 80,000 | 77,000 | 150,000 |
| Acetate | 3,600 | 3,740 | 7,340 |
| Polyester-cellulosic blends | 13,600 | 200 | 13,800 |
| Viscose (100%) | 16,640 | 11,200 | 27,840 |
| Wool | 5,530 | - | 5,530 |
| Nylon | 7,840 | 3,560 | 11,400 |
| Acrylics | 3,590 | - | 3,590 |
| Polyester (100 %) | 550 | negl. | 550 |
| Polyester - wool blends | 6,570 | - | 6,570 |
| Total : | 137,920 | 88,700 | 226,620 |

It can thus be seen that less than 10 % of all prints are non-cellulosics, compared with 30 % for dyed cloth. As mentionned above, the figures are actually the sums of many heterogeneous categories.

A different source estimates the yardage of printed cloth at 400,000,000 m/yr. This would correspond to a weight of 220 g/m, which is on the heavy side. The true figure is thus probably closer to 45 million m/month, even if allowances on the total tonnage are made for the small proportion of heavier goods that go into home furnishings. It should be noted that 1969 was a particulary good year for prints; in 1970 the balance should shift towards dyed goods.

In genera , the larger houses have a strong position in the polyester field on account of the high investment requirements. The smaller houses, however, have 50 % to 60 % of the knitted goods finishing market, which also happens to be the faster-growing sector. Small houses are more flexible as to minimum quantities; the large operators require minimum orders of 500 m for yard goods, or 36 kg for open yarn-dyeing and 150 kg for dyeing under pressure. Such quantity requirements exclude most of the knit-wear factories and warp knitters. The larger houses, on the other hand, are being threatened by the gradual switch of the large cotton mills to polyester cotton blends. This points to a growth of in-house finishing at the expense of the custom finishers. Even so, custom finishers will continue to handle peakshaving work even for the large polyester-cotton weavers, aside from the output of the smaller mills. This overall impression is confirmed by the opinion of the larger houses, who complain that their position has been eroded by the smaller dyers. We would hazard the guess that this process will continue because of the "fashion" nature of this industry, there should be an increasing proliferation of small dyers. The only obstacle to this development is the shortage of trained colorists.

Of the large finishers, they are 2 or 3 who have other textile connections.

As to printing, the toll-work is spread among a much larger number of small operators and thus more difficult to evaluate. There are around 10 large custom-printers, doing between them some 1.0 million m/month.
This is probably around 60 % of the total, which is thus estimated at 1.5 million m/month.

One question which is currently of great interest is the role the converters play at present and how this will evolve.

There are at present around 50 operators in Brazil who "convert" on a regular basis, that is, who have been doing business with the custom dyers on a regular basis for some years. Few of them, however, are "pure" converters; they are usually unintegrated mills who have managed to gain control of other small weavers by having yarn woven for them at an established price per pick that works out to some U.S. $. 10/meter.
Some of these arrangements are also entered into by integrated mills; this portion has escaped our survey entirely, since we only tried to identify the part going through the custom dye-houses.

It is estimated that "converting", or, more properly, weaving on a toll-basis, occupies 10,000 looms, mostly in Americana where there is a large concentration of weaving mills having less than 100 looms who have gone over almost entirely to this form of operation in order to stay in business at all. This would represent some 8 % of total cotton weaving capacity, which is in reasonable agreement with the United Nations Survey, according to which in 1960 around 11 % of cotton weaving capacity was in mills of less than 100 looms.

The percentage of goods that are custom-finished varies enormously with the kind of goods.This can be seen from the table below :

**TOLL-WORK VS. CAPTIVE FINISHING**

| Goods | % finished on toll-basis |
|---|---|
| Polyester blends | 60 |
| Other woven goods (mainly cotton) | 8 |
| Warp-knit fabrics | 80 |
| Weft-knit fabrics | 75 |

There are roughly 50 independent dye-houses in operation, of which five or ten are integrated mills that also do toll-work. They can be grouped into 3 categories : large, medium and small :

THE CUSTOM-DYEING INDUSTRY

| Category | N° | Average quantity of fabric dyed/month, MM meters | Total MM meters/ month |
|---|---|---|---|
| Large | 7 | 1.0 | 7 |
| Medium | 20 | .4 | 8 |
| Small | 23 | .2 | 5 |
| Total : | | | 20 |

Direct dyes and vat dyes for cheap cotton goods are made in Brazil, as are some acid dyes. Reactives, disperse dyes and cationic dyes (for acrylics) are imported.

The large cotton printers use rollers, and the preferred method is by means of pigments in O/W emulsions. It is estimated that 40 % of all goods are pigment-printed, and the other 60 % with dyes.

## FINISHING TREATMENTS

### Heat-setting (polyester blends)

There are around 50 dry heat-setting ranges in operation in Brazil, of which some 30 do only toll-work and the rest are captive.
The general rule is dry-setting, to the detriment of the small operators; this so because the producers insisted on this more capital-intensive method in the early days of Polyester-worsted blends. In actual fact most operators prefer wet-setting, despite the higher operating cost, because it gives the goods a better hand, and run their "rameuses" at high speeds and low temperatures just to comply with the "Tergal" norms.

The worsted industry, for historical reasons, was the first to equip itself to dye polyester blends. The growth of custom-finishing was thus stronger in the polyester-cotton sector.

This trend is beginning to reverse itself now that several traditional cotton mills have decided to go into blends.

Most polyester-worsted blends are piece-dyed. As to polyester-cellulosics, shirting is also piece-dyed but the contiuous polyester filament used in suitings is usually dyed black. The polyester-cellulose blends are usually dyed after weaving, but some yarn-dyed goods are also produced.

The use of textured polyester is still being held back by lack of finishing facilities. Only one producer is equipped to handle piece-dyeing of knit textured polyester fabrics, so at present almost all textured polyester is yarn-dyed. In the future,however, the market should settle down to 50 % yarn-dyed and 50 % piece-dyed.

The price for heat-setting poyester blends is U.S.$ 1.15/kg, although one producer is able to charge as much as US $ 1.90 because of better quality. This works out to U.S.$ .10 to U.S.$ .16 per meter for shirting, or U.S.$ .23 to U.S.$ .40 per meter for suiting.

Shrinking

There are twelve "Sanforizing"lines in Brazil, of which two are noncaptive. The combined yearly output of these lines is estimated to be 50 million meters. Most of the material processed is cotton shirting and interlinings.

Chemical finishing

Cheap cotton goods in Brazil are still sized with starch (manioc or corn), followed by calendering. This costs only 20 % to 30 % as much as resin finishing.

Sizing with thermoplastic resins (vinyl acetate, non-reactive acrylics) is being applied on a growing scale, alone or in conjunction with natural sizes. Around 3,000 t/yr (45 % solids) of these emulsions are used in Brazil and assuming a pick-up of 8 g/m2 this would amount to 160 million m2 per year thus treated.

The use of thermosetting resins for imparting antishrink properties to cellulosics and other fibers has been growing rapidly. The total use of these resins is 17,000 t/yr, at an average solids content of 40 %.
Of this total, 70 % is made captively and 30 % by the chemical companies; generally the captively-made products are urea-formaldehyde monomeric condensates. The total yardage is around 500 millions m2/yr, which can be broken down as follows :

THERMOSETTING RESINS FOR TEXTILE FINISHING

| Resin | % |
|---|---|
| Monomeric methylolurea | 82 |
| Urea-formaldehyde | 6 |
| Melamine-formaldehyde | 4 |
| Cyclic ethyleneureas | 3 |
| Triazones | 1 |
| Glyoxal-based resins | 3 |
| Silicones and others | 1 |
| Total : | 100 |

SHRINCK-PROOFING : BREAKDOWN BY TYPE OF FABRIC

| Fiber | % |
|---|---|
| Cotton | 45 |
| Viscose | 25 |
| Mixed fabrics | 15 |
| Wool | 3 |
| Synthetics | 12 |
| Total : | 100 |

The best growth prospects in the group are the glyoxal-based resins.

Permanent-press treatments are just beginning to make their appearance.
The Koratron process has been licensed but due to poor promotion its use has not so far reached any sizeable proportions.

The term "finishing" still has a negative connotation in Brazil; there is always the implication that the purpose of finishing is to deceive the client. The market for finishing chemicals is thought by some to be a "sleeper", and that considerable development will take place in this field. Around 250 to 300 million meters/yr are being treated with optical bleaches, a growing market. Other emerging markets are low molecular-weight polyethylene emulsions for shape-retentive finishing without attendant losses in mechanical properties; polyvinyl alcohol, for imparting a better hand to nylon fabrics; quaternary ammonium salts in replacement of the traditional stearic acid-based softeners.

__Waterproofing__

The largest waterproofing operators in Brazil use a continuous process for making tarpaulins. This consists of continuous impregnation in a paraffin emulsion, followed by a second impregnation (after intermediate drying) in an aluminum salt solution with "in situ" formation of an aluminum soap. This continuous technique apparently has the advantage of yielding a much more flexible, and thus crackproof, product which is what gives a competitive edge in the highly demanding road haulage market. The total processed is around 5.0 million m2/yr.
Other canvas manufacturers, as well as producers of rainwear use a one-bath batch immersion process in which the emulsion and the salt solution are applied in a single step.

__Bonding__

There is a growing market for fabric-to-fabric lamination. There are at least three licensees of Coin Internation in Brazil. The laminate is a warp-knit nylon acetate fabric, weighing around 80 g/m2.

The growth of fabric bonding seems to be intimately related to that of textured polyester knitwear. "Coinization" allows the use of light circular-knit fabrics, which upon bonding to the warp-knit substrate can be cut and sewn without the inconvenience of having the fabric turn up at the corners.

The cost of this operation is NCr$ 6.00/m, which seems to indicate that it is only economical at very high prices for knitting yarn (over NCr$ 40.00/kg). This cost will thus undoubtedly come down in future. The present market for "coinized" fabrics is around 2.0 million m2/yr.

Foam lamination is also a rapidly growing business. Its main function is to make winter-weight fabrics out of light cotton. Growth is around 50 % per year, but will undoubtedly soon find an upper limit due to climatic factors. The largest total output is around 2,000,000 m/yr. This same 5 million m/yr are laminated in onze form or other.

## Flax system

There were 22.600 flax spindles in operation in 1960. This capacity is concentrated in the Sorocaba of Sao Paulo.

The only input to this sector is rami, of which 15,000 t/yr are used domestically. Small amounts of polyester and acrylics for blends are also used, but since they amount to less than .1 % of this total they were not considered. The output of this sectof has declined by 20 % since 1960.

## Schappe system

Spinning by the Schappe system is used mainly for making polyester sewing thread.

There has been considerable interest in the possibility of making high-count polyester yarn on Schappe-System spindles, but so far this development has been held back by the increase in price this would involve vis-à-vis polyester-cotton.

Output of polyester sewing thread is 150 t/yr.

## Texturing

It is worth going into the history of the throwing industry in Brazil, since this will cast some light on the present state of its affairs.

In the early days of nylon production one of the cornerstones of producers' policy was to build up and maintain the position of the trhousters.
Since in those days their main outlet was the knitwear industry, with low degree of concentration, the texturing plants had little trouble in maintaining a virtual stranglehold on the supply of textured yarn. The producers strengthened their hand in two ways : first, by only selling texturing yarn to the throusters, thus precluding users from integrating;

second, by intimate collaboration with Heberlein, licencors of the "Helenca" trade-mark, whose local representatives managed for many years to keep "outsiders" from acquiring false-twist machinery. The texturing "club" was limited to some 20 members who for the first few years made enormous profits. The producers later reinforced their position by buying outright the Helenca-trade-mark.

During the last two years, the use of Helenca in knitwear suffered an abrupt decline. Most of the false-twisted nylon yarn now finds its way into the hosiery industry, which is much more concentrated and thus contains several large individual consumers of yarn. The pricing policy followed for years by the throusters encouraged anyone using more than 5 t/month of yarn to buy their own false-twist equipment, either imported or of local manufacture.

It appears that during the last two years these associations lost control of the situation and the market was flooded with false-twist machinery. In addition to the original 20, there are around 30 new throusters whose yarn is in part used captively, but who are also fighting for a share of the merchant market. The result has been chaos and depressed prices; there are now 350 to 400 false-twist machines in Brazil, of which 60 % supplied by local constructors, running at an average of one-third capacity.

In addition to false-twist texturing, there are two other textured nylon yarns on the market : "Ban-lon", and "Agilon", a stuffing-box process.

The situation has been further complicated by the fact that, at a time where demand for textured nylon knitwear has declined, new false-twist machinery has been imported that is not suitable for the growing polyester texturing field. Thus there is even more "localized" overcapacity than would appear at first.

The present output level of the texturing field is around 8,900 t/yr, broken down as follows :

## TEXTURING INDUSTRY : PRODUCTION

| Product | T/yr |
|---|---|
| Nylon : | |
| False-twist | 4,800 |
| "Ban-lon" | 1,000 |
| "Agilon" | 300 |
| Acetate : | |
| 100 % | 300 |
| Acetate-nylon ply | 1,500 |
| Polyester : | 1,000 |
| Total : | 8,900 |

Polyester, however, is the real growth field and nobody is thus very sure of this figure since it changes from month to month. It might be best to say that at present 80t/month the growth will be at a rate of 60 %/yr. How long this will continue can only be a guess; but "Helenca" has lost a knitwear market that is estimated at 1,800 t/yr to which must be added the potential inroads into the men's outerwear market. An eventual limit might be reached of some 5,000 t/yr of textured polyester for the apparel market alone.

## 2.2. INTEGRATION OF PRODUCTION FACILITIES AND ITS DESIRABILITY

### 2.2.1. Degree of concentration of production and integration

Our analysis of the degree of concentration of Brasilian industrial production was based primarily on the I.B.G.E. survey of 1969.

The results of this survey are presented in the form of a chart featuring a classification of textile industrial sectors according to such factors as personnel force, etc. which makes for easy separation into firms with less than ten or ten and more workers. We have not taken the former category into account for we consider that this "spontaneous" or craft sector is by definition impossible to control and therefore unaffected by any efforts of orientation or a coordinated development policy.

Our break-down by type of fiber bears on the cotton and all fiber sectors as well as on the major industrial sub-divisions of spinning and weaving.

We make certain reservations concerning these I.B.G.E. classifications due to the fact that they must be viewed from the angle of relative rather than absolute value.

The following tables give percent distributions determined on the basis of the above criteria and with relation to a total number of 652 enterprises : 380 in the cotton sector and 272 in the sector of other fiber types.

The overall labor force employed throughout this sector of the textile industry is 165,605 units broken down as follows :

Cotton : 115,905 people

Others : 49,700 people

Table n° 1

| Sector | Cotton | | Other fibers | |
|---|---|---|---|---|
| | P.O. % | % of plants | P.O. % | % of plants |
| N.I.Spinners | 10.26 | 9.81 | 4.28 | 3.68 |
| N.I.weavers | 9.27 | 28.23 | 8.82 | 30.82 |
| S.I.factories | 36.90 | 16.73 | 9.50 | 5.06 |
| I. factories | 13.97 | 3.53 | 7.00 | 2.14 |

Table 1 above, which is also based on the chosen set of 652 Enterprises, provides an evaluation of the degree of integration.

Table n° 2

| Employment brackets | Cotton (% of plants) | | Other fibers (% of plants) | |
|---|---|---|---|---|
| | N.I. spinners | N.I. weavers | N.I. spinners | N.I. weavers |
| 10 - 99 | 3.83 | 19.46 | 1.5 | 23.49 |
| 100 - 249 | 2.60 | 8.74 | 0.46 | 7.40 |
| 250 - 999 | 3.22 | - | 1.65 | - |
| + de 1,000 | 0.15 | - | - | - |

% : with relation to the total number of houses, in the sample i.e. 652.

Table 2 classifies the non-integrated units by % of the total number of surveyed units and by personnel force. It will be noted that both for the cotton and for the all-fiber sector, non-integrated weavers are much more numerous than non-integrated spinners but that the latter include a fair proportion of very large concerns.

It can also be inferred that the unbalance between the non-integrated weaving and spinning sectors is mainly found at size level. Indeed, the sector of independent spinners is composed of more than 50 % of small firms, i.e. having an employed force of 10 to 99 workers.

Table n° 3

| Employment brackets | Cotton % of total (spinners+weavers SI and integrated) | Other fibers % of total (spinners+weavers SI and integrated) |
|---|---|---|
| 10 - 99 | 23.31 | 25.00 |
| 100 - 499 | 21.66 | 12.41 |
| 500 - 999 | 9.65 | 3.68 |
| 1,000 and more | 3.68 | 0.61 |

% of the 652 units.

Table 3 classifies the remainder of our 652 units, by major fiber sector; the first column gives the breakdown of the cotton sector by employment bracket including semi-integrated and fully-integrated spinners and weavers. The qualification of semi-integrated applies to those houses which integrate two stages of processing, such as spinning + weaving or fully integrated spinning until finishing, while the integrated sector comprises the factories which incorporate three stages of production.

It can be seen that Brazil has a wide range of non-integrated spinners, both in the cotton and in the all-fiber sectors. As evidenced by table 2, the average size of these units is small (10 to 99 employed).

These tables combine to show that most of the enterprises in our sample are non-integrated although the remaining two sectors account for the larger share of the employment market.

This means that the integrated or semi-integrated units are comparatively large and employ a higher overall labor force whereas the non-integrated units are smaller but in greater number.

It will be borne in mind that the percentages given in the various tables refer to the entire 652-unit sample.

The following conclusions can be drawn regarding the principal quantitative features of the Brazilian textile industry :

| | % of actual employment | % of factories |
|---|---|---|
| Integrated and S.I. | 67.4 | 37.45 |
| Non-integrated | 32.6 | 62.55 |

Conclusion :

Apart from the houses with an employment of 1 through 9, the degree of integration of production facilities in Brazil is great in terms of absolute capacity (67.4 % of actual employment) but the number of non-integrated houses is high (62.55 %). However, the latter are usually small or medium-sized units.

2.2.2. Feasibility of mergers

Merger among textile concerns is, in Brazil, a definitely effective means of achieving the structural integration of a largely "disintegrated" industry and should, given half a chance, lead to the formation of larger and more profitable concerns. One should however be wary of generalizing this fact; mergers, associations or downright absorptions, are acceptable only provided they apply to stalwart and ready-structurized houses, already capable of efficiently running their often highly diseminated production units.

In the cotton industry, for instance, it is mandatory that such groupings be envisaged in the light of a series of principles :

- before envisaging any form of merger or grouping, the units must, separately, develop the production potential necessary to match and complete that of their prospective partner(s) or at least evolve production lines which are likely, when associated, to afford mutual reinforcement instead of redundancy or incompatibility, both at production level as in the fields of marketing, improvement of quality standards and costs of manufacture;
- an association with a unit having an unwholesome financial situation and dwindling capital assets, and which should really be viewed as an absorption, is ill-advised unless it would be a us ful complement and can be easily integrated into the parent enterprise (or reconverted). A high degree of specialization of absorbed units is advisable;
- the more disseminated a group, the sounder have to be its structural and managerial organization; any further integration should therefore be pondered accordingly;
- the best associations are those in which the complementarity and compatibility of the partners is clear; such happy marriages would be between, say a spinner and knitter a cotton ginning mill and an integrated cotton unit or again, major fully-integrated groups and garment manufacturers. These three examples of advisabla mergers would lead to the formation of industrial groups aimed at achieving control over as many stages of production as possible, in order to guarantee the quality of their production and cut marginal and overall costs.

Indeed, in the three cases mentioned in the above paragraph, there is no doubt that the merger or association between :

1. a non-integrated spinning mill and a knit-wear manufacturer would reconcile the demands of high-quality-yarn knit-wear (i.e. the consumer demands for quality) with lower costs of yarn (standardization of counts).
2. a cotton ginning mill and an integrated cotton unit would meet the demands of better quality control of raw cotton, cotton thread and fabric and lower production costs;
3. an integrated weaver and a garment manufacturer would allow to reconcile quality of fabrics and with that of the finished product.

These three cases in point, chosen from a wide variety of possible combinations, are illustrative of the feature which must predominate in such mergers or associations, namely control of the quality of the finished product by integration of the largest possible production lines and overall reduction of unit-costs.

Any grouping which does not exhibit such complementarity is bound to be inefficient and we therefore advise against it, except in the special instance of an bsorption enabling high specialization for the absorbed unit.

2.2.3. Feasibility of common services.

This type of association is aimed primarily at pooling the common interests of several enterprises in such a way as to achieve a higher overall production capacity and joint financing of common or complementary services which, separately, would not be profitable enough or too expensive.

To this effect, it is important for certain enterprises to understand that their business interests are not in opposition (direct competitors) and that their technological interests are complementary.

We believe that this form of collaboration between enterprises is highly profitable to all and to the general progress and development of the trade.

Associations of this type have already been achieved, notably in the state of Santa Catarina where some enterprises are jointly financing and operating such common services as a computer and laboratories. This kind of collaboration and mutual support is even pushed as far as joint research in the field of research for export possibilities and the common utilization of outlets.

To realize these objectives and make such common services mutually profitable, it is practically always necessary to unite non-competitive specialized firms thus avoiding any kind of mistrust.

The crux of the matter therefore consists in bringing together production units which can naturally collaborate without inhibitions or ulterior motives of any kind, which can unite their efforts towards common and mutually profitable goals; in this context, the most favorable conditions are found when such potential associates are not very numerous in a given region : when such is the case, it is usually found that the professional associations are not homogenous enough to implement such poolings of services : interests are usually conflicting to some extent and coordinated initiatives are difficult.

The initiation of preliminary contacts with potential partners becomes delicate and psychologically dangerous because a first choice must be operated among the many possible units, which have equivalent prospects of success; besides, the initiative is discouraged by the fear of creating an "a priori" discrimination which could not fail to be detrimental to subsequent negociations if the first prospect turned out to be unfavorable to the idea.

We have so far only discussed a partnership between complementary production units in the form of a pooling of resources to create common services which would otherwise have been to costly.

Other types of partnerships or associations can also be envisaged, this time between identical or competitive manufacturing concerns; these arrangements, which usually apply best to small or medium-sized factories, consist in agreements for the use of complementary services installed in either unit like finishing, dyeing or garment manufacture. Such cooperatives are more difficult to bring about although they can be highly effective and profitable. To our knowledge there are no such cases in Brazil at the present time.

The success of these undertakings depends on the effectiveness of the previous campaign for the psychological preparation of both parties i.e. their awareness of the existence of such common interests and the achievement of a positive frame of mind.

Such associations will be advocated further in the Chapter on "Recommendations for the manufacturers of social goods" (state of Minas Gerais or North East).

2.2.4. Balance of Production

Cotton sector

We shall restrict our study to the examination of the balance of production in the cotton spinning and weaving sectors, which together account for 80 % of the soft fiber production capacity. In the sector of hard fibers, jute will be surveyed further ahead in this report.

1) Spinning of cotton and blends

Position in 1970

| | |
|---|---|
| Number of spindles | 2,850,000 |
| Coefficient of utilization of time/machines | 85 % = 5,975 H/yr |
| Average count | 23 |

| | |
|---|---|
| Hours available (± 90 %) | 6,500 |
| Output of thread | 278,000 T/yr |
| Cotton + polyester + rayonne viscose | |
| Production weighted by gr/b/year | 18.3 |

1980 prospects

| | |
|---|---|
| Increase of weighted unit output : | + 60 % i.e. 29.3gr/b/h for ≠ 23 |
| Stock of spindles | 2,280,000 i.e. - 20 % of 1970 |
| Gain in the rate of utilisation of machines : | + 5 % = 90 %. |

Between 1960 and 1970, the stock of cotton spindles fell by 24 % . We have assumed that in 1980 the same elimation will have occurred due to the disappearance of marginal units and the modernisation of the still obsolescent existing stock.

Assuming that the weighted unit output becomes 29.3 gr/b/h for an average ≠ of 23 and that the rate of utilization of machine rises from 85 to 90 %, the output of thread from cotton spinning mills will attain 334,600 T/year by 1980, i.e. an increase of 20 % with respect to 1970.

This situation could be brought about through appropriate and well directed capital input and modernization of the spinning sector as well as generalized efforts or organization and infrastructure development.

2) Weaving of cotton and blends

Position in 1970

| | |
|---|---|
| Number of spindles | 82,700 |
| Rate of utilization of Machinery | 75 % |
| Average weight of fabric output | 130gr/m |

Prospects for 1980

| | |
|---|---|
| Change in the number of spindles | + 15 % |
| Raw materials processing machinery | + 40 % |
| Rate of utilization of machinery | 85 % |
| Loom width | + 20 % |

On the basis of these moderate assumptions, the gain in output by 1980 will be 730,000,000 m, i.e., at 130 gr/m : 95,000 Tons/year.

Conclusions :

On the grounds of such moderate premises and even assuming that there will be no new implantations in the interim, the cotton sector output will exceed predicted domestic demands for the spinning sector. The production of fabrics would then be in a position of overcapacity.

Knitwear sector

It must be noted at the outset that this highly spontaneous sector is also in constant change and that its outlook and potentialities are called to develop strongly in the near future.

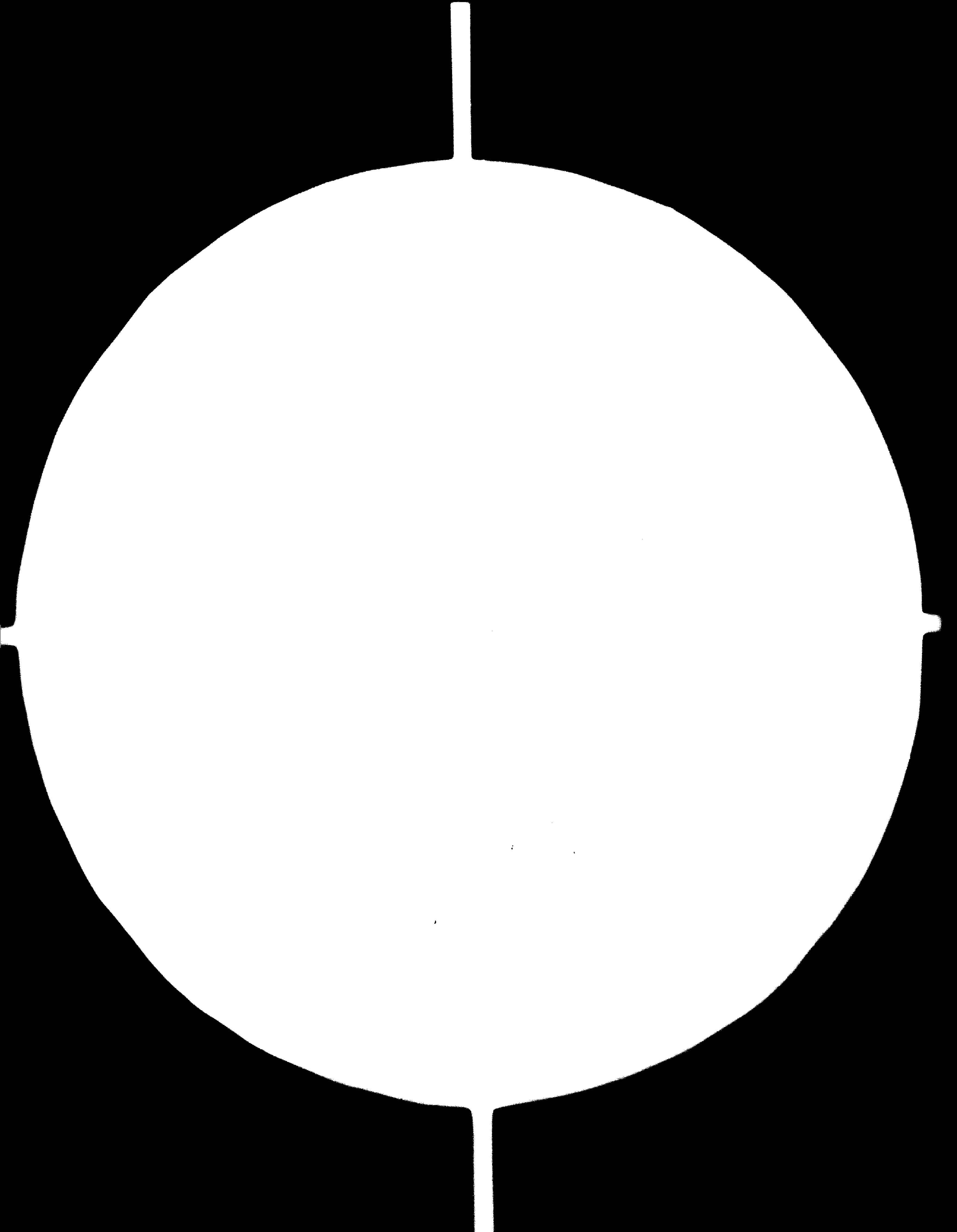
The non-integrated yarn producers are in danger of finding themselves in an unbalanced situation with respect to producers of discontinuous yarn and fibers, especially if the latter integrate towards the knitwear sector as the current trend indicates.

The time distribution of the knitwear sector's demands for discontinuous fiber yarn must therefore be anticipated and predicted as accurately as possible in order to attain a balance between the demands of this sector and the output potential of the yarn manufacturers.

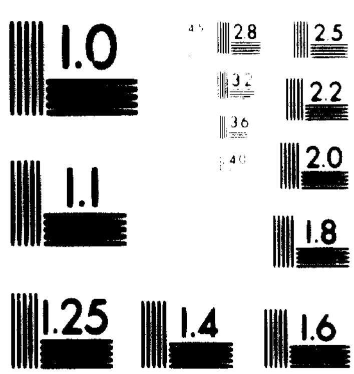
We believe that the input for 1980 of discontinuous fiber yarn in the knitwear sector will increase by 60 % with respect to the 1970 figures, a change which demands an increase in thread output of 65 % with respect to the 1970 figure. The integration of spinning towards knitwear should normally be offset by an increase of non-integrated spinning concerns serving the knitwear sector.

J-583

84.12.13
AD.86.07
ILL 5.5+10



3 OF 5




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

24x
F

On a par with this evolution, the non-integrated "fashion" spinning sector will also need more supplies of yarn to meet the growing requirements for this type of goods.

<u>Jute sector</u>

To repeat what has already been said about this sector, the actual production capacity of jute weaving mills in 1970 is for 85,000 T/yr, i.e. and excess potential of 41 % above demand. It is the other way round for the spinning sector which will probably find new outlets such as carpet frameworks,

## 2.3. MACHINERY IN PLACE, DEGREE OF UTILISATION AND MACHINE-HOURS WORKED IN 1970

The reader is referred to Chapter 4, paragraph 4.1.3., which deals with the evolution of annual capacity from 1960 to 1970.
We shall make a cursory review of its guide-lines in the current chapter so as to broadly outline the 1970 position.

### Cotton and cotton blends sector

The stock of recent spindles in this sector is 425,000 imported units and 560,000 of national manufacture (less than ten years).

In the weaving sector, the number of national looms sold throughout the country between 1960 and 1970 has been 14,000. The number of imported units in the same periode was 8,000.
We were unable to carry out a general and comprehensive study of the degree of utilization of production capacity, for lack of an exhaustive inventory of industrial equipment.
However the data available is sufficient to enable us to evaluate this capacity for more than 60 % of the national stock of spinning equipment.

Evolution of the number of cotton spindles and thread production units in the State of Sao Paulo

| Year | Number of spindles | Number of prod. units/day/ spindle | Cotton input T/yr |
|---|---|---|---|
| 1960 | 1,485,529 | 17.45 | 127,864.6 |
| 1961 | 1,495,878 | 18.03 | 132,215.3 |
| 1962 | 1,566,015 | 18.12 | 135,423.6 |
| 1963 | 1,549,378 | 17.53 | 131,465.2 |
| 1964 | 1,480,455 | 17.12 | 128,729.5 |
| 1965 | 1,442,612 | 16.22 | 117,265.5 |
| 1966 | 1,373,822 | 17.03 | 128,380.1 |
| 1967 | 1,286,227 | 17.40 | 114,640.6 |
| 1968 | 1,365,159 | 19.07 | 129,280.4 |
| 1969 | 1,362,317 | 19.06 | 136,463.2 |
| 1970(°) | 1,352,954 | 19.05 | 67,798.9 |

(°) First semester only

Source : Stock exchange of merchandise of Sao Paulo

Number of working hours and degree of utilization of installed capacity

The cotton industry of Sao Paulo, with an input of 135,000 T/year accounts for practically 50 % of overall national input i.e. half of total domestic production capacity.
In its 1969 survey, Sudene established the rates (coefficients) of utilization of installed production facilities and available production time.

Degree of utilization of available production time and installed capacity in the North East in 1969

| States | Rate of utilization of installed capacity | | Rate of utilization of available prod. time | |
|---|---|---|---|---|
| | spinning | weaving | spinning | weaving |
| Maranhao | 35.4 | 45.2 | 34.8 | 34.8 |
| Ceara | 92.0 | 81.9 | 91.0 | 75.3 |
| Rio Grande do Norte | 91.9 | 75.6 | 78.1 | 95.6 |
| Paraîba | 81.0 | 98.6 | 85.2 | 77.5 |
| Pernambuco | 92.7 | 42.2 | 106.8 | 91.3 |
| Alagoas | 96.3 | 67.3 | 82.3 | 86.4 |
| Sergipe | 75.6 | 69.9 | 99.9 | 92.5 |
| Bahia | 95.4 | 91.6 | 95.8 | 93.3 |
| North-East | 86.2 | 82.7 | 88.4 | 83.9 |

The standard working time is 6,900 H/year, i.e. 300 days of 23 hours of work.
In 1969, the average rate of utilization for the North East was therefore 6,100 hours for spinning and 5,785 hours for weaving.

Rate of utilization of available production time

| States | Number of working hours | Number of spindles |
|---|---|---|
| North-East | 5,785 | 400,000 |
| Sao Paulo | 5,720 | 1,362,317 |
| Santa Catarina | 6,200 | 220,000 |
| Minas Gerais | 5,800 | 400,000 |
| Total | | 2,382,317 |

From this sample of 2,382,317 spindles the number of working hours can safely be inferred for the equipment of the entire country by a simple process of extrapolation : for 1969, the number of working hours of the entire stock of spindles was 5,795 hours, i.e.,in proportion to the standard of 6,900 hours : 84 %.
In 1960, the spindles had been operated 5,485 hours, i.e. there was an increment of 310 hours/year in 1969 with respect to 1960.

Evolution of the number of cotton spindles, by state from 1960 to 1970

| States | Number of spindles in 1960 | Number of spindles in 1960 | Change |
|---|---|---|---|
| North-East | 642,300 | 450,000 | - 30 % |
| Minas Gerais | 531,490 | 400,000 | - 24 % |
| Rio Guanabara | 830,430 | 350,000 | - 58 % |
| Sao Paulo | 1,485,530 | 1,401,850 | - 5.5 % |
| Santa Catarina | 101,990 | 228,000 | + 123 % |
| Others | 18,700 | 10,000 | - 48 % |

Wool-type spinning and weaving sectors

Stock of wool spindles and looms in 1970

| States | Spindles | Looms |
|---|---|---|
| Sao Paulo | 200,000 | 3,800 |
| Rio Grande do Sul | 62,000 | 700 |
| Others | 21,000 | 426 |
| Total : | 283,000 | 4,926 |

Degree of integration

| States | Integrated spindles | Non-integrated spindles |
|---|---|---|
| Sao Paulo | 126,000 | 74,000 |
| Rio Grande do Sul | 37,000 | 25,000 |
| Others | 8,000 | 13,000 |

Comparison between 1960 and 1970

| Equipment | 1960 | 1970 |
|---|---|---|
| Spindles | 241,000 | 283,000 |
| Looms | 4,296 | 4,926 |

Thus in 1970 there is an overall increase of installed capacity with respect to 1960.
This is attributable to the entry of synthetic fibers in this sector and to the advent of a new class of consumers which was practically non-existant in 1960 (average year).

The jute industry

We measure installed capacity in terms of looms because it is much more illustrative and significant in this special case.

Stock of looms of Jute/Malva in 1970

| Type | Number | |
|---|---|---|
| **With shuttle** | 2,590 | |
| Prior to 1940 | | 2,000 |
| 1940 to 1960 | | 490 |
| more recent | | 100 |
| **Shuttle-less** | 1,074 | |
| Prior to 1940 | | - |
| 1940 to 1960 | | 24 |
| more recent | | 2,050 |
| Total : | 3,664 | |

Thus since 1960, 1,050 new shuttle-less looms have been installed against 100 shuttle looms. It can therefore be considered that the updating of the looms stock attains 30 % of present jute production capacity.

## 2.4. EVALUATION OF EXISTING EQUIPMENT

### 2.4.1. Degree of obsolescence of equipment

On the basis of the survey conducted by CEPAL in 1960 and a generally unknown situation, an inventory of production facilities in the Brazilian textile industry was drawn up and its degree of obsolescence was evaluated. For these purposes, installed machinery has been classified by age bracket : less than 10 years, 10 to 30 years and more than 30 years.

This survey has thus provided a general view of the production potential of the Brazilian textile industry.

The situation in 1970 is therefore fixed by the stock already existent in 1960 with a slow program of modernization between 1960 and 1965 which gradually gathered momentum as of 1965 and until the present date.

In our view, it would have been easy and so very useful to have regularly up-dated the 1960 picture thus affording a motion-picture of the evolution of the situation from year to year.

This point will in any case be the subject of a major recommendation.

The present evaluation is not the fruit of an exhaustive survey conducted on a par with the textile trade-unions; the lack of time to organize such a program and the impact of a decision of the industrial sector, are responsible for this lacking; such a survey and the correponding exhaustive evaluation will have to be carried out shortly, to serve as the grounds for subsequent regular up-datings. The industry is in such constant motion and rapid evolution that surveys at ten-year intervals are not at all indicative of trends.

The major questions are : What is the industry's current orientation ? what are its development alternatives ? which is the most rational orientation ? The last question implies the determination of trends which should be reinforced and promoted and trends which should be countered or steered in other directions.

Definition of obsolescence of equipment in terms of age is valid, for the purpose of providing the general outline of an otherwise obscure or intuitively understood situation. We believe that this approach to the 1970 situation would be useless in a longer-run perspective unless a system of constant up-dating and inventorization is set up.

We therefore provide here a global stock-taking of the 1970 situation, by age bracket and sector of equipment.

Position in the North-East

Age of equipment in 1959

| Age bracket | Spindle capacity Number | % | Loom capacity Number | % |
|---|---|---|---|---|
| Less than 15 | 245,930 | 38.3 | 3,016 | 13.4 |
| 15 to 30 | 48,500 | 7.5 | 1,201 | 5.4 |
| More than 30 | 347,876 | 54.2 | 18,259 | 81.2 |
| Total : | 642,306 | 100.0 | 21,476 | 100.0 |

Age of same equipment in 1969

| Age bracket | Spindle capacity Number | % | Loom capacity Number | % |
|---|---|---|---|---|
| Less than 10 | 168,329 | 38.8 | 4,027 | 36.5 |
| 10 to 19 | 106,896 | 24.7 | 3,202 | 29.1 |
| 19 to 30 | 73,400 | 17.4 | 319 | 2.9 |
| More than 30 | 82,565 | 19.1 | 3,468 | 31.5 |
| Total : | 433,184 | 100.0 | 11,016 | 100.0 |

Source : Sudene - Textile study 1969.

It can be seen that the number of spindles dating to more than 30 years and the number of looms in the same age range has dwindled between 1959 and 1969 from 54.2 to 19.1 % (spindles) and from 81.2 to 31.5 % (looms). Equipment of less than 10 year of age, i.e. 38.8 % of spindles and 36.5 of looms were constructed after 1959.

However, a fair proportion of spindles (19.9 %) and looms (31.5 %) are in the age bracket of more than 30.

Overall situation of Brazil's textile equipment

We have stated in Chapter 2.3. that, since 1960, the number of new spindles (less than ten years) operating in the cotton sector was 985,000, broken down into 425,000 of foreign-made and 560,000 of domestic fabrication.

The number of looms dating to less than 10 years is 22,000 of which 14,000 are national and 8,000 foreign.

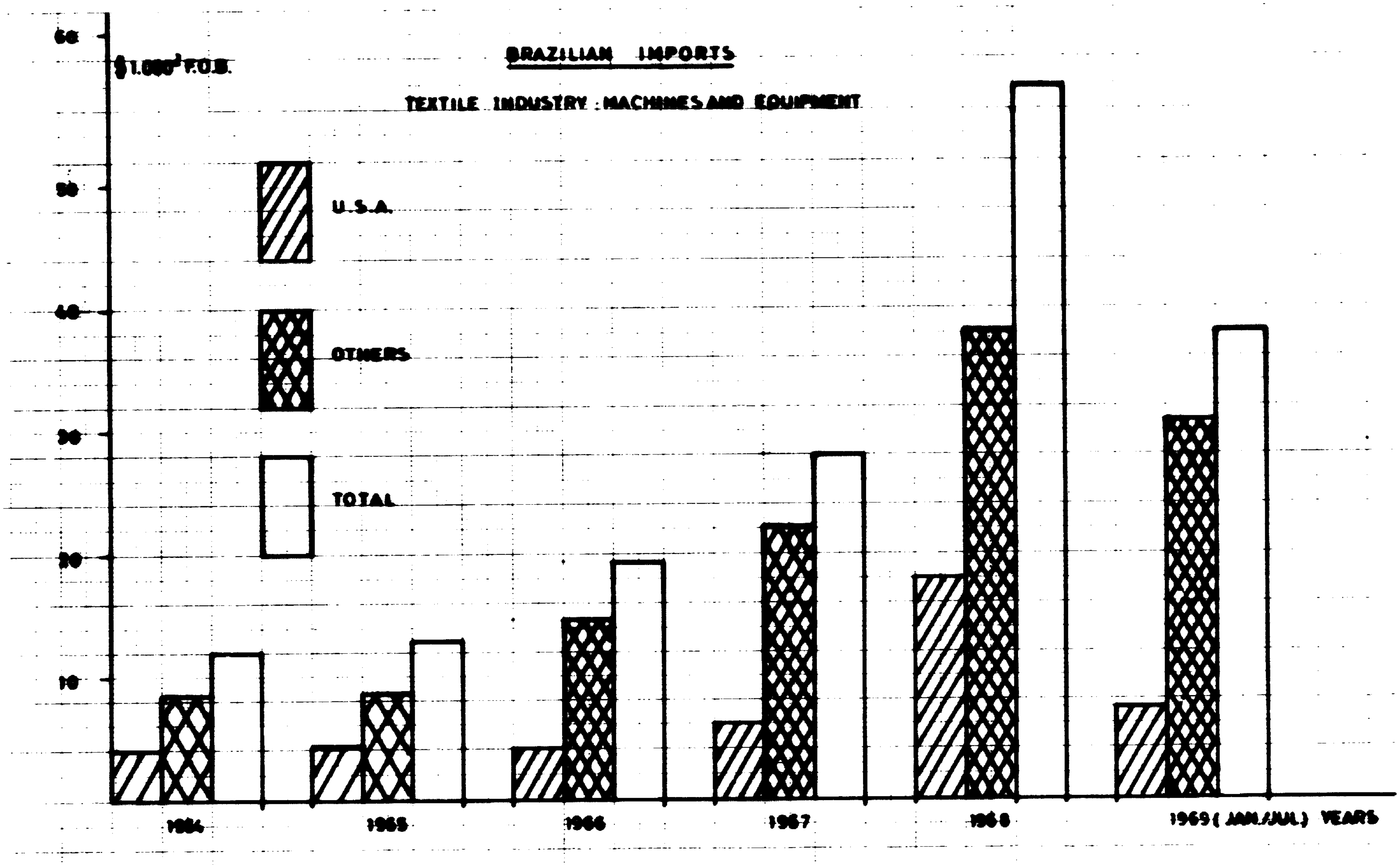
Graph of imports of textile equipment from 1964 through 1969

This graph shows that, the rate of acquisition of foreign-made equipment has grown quite sharply since 1967 while from 1960 to 1966 such imports were of comparatively little consequence.

Construction of national equipment from 1968 to 1970

| Machines | 1968 | 1969 | 1970 |
|---|---|---|---|
| Looms | 2,161 | 1,822 | 1,990 |
| Spindles | 57,200 | 76,000 | 80,000 |
| Twisting mills | 3 | 5 | 15 |
| Flyer Frames | - | 1 | 20 |
| Teasel-frames | 2 | 20 | 20 |
| Warping-frames | 13 | 8 | 13 |

This program of renewals, i.e. the replacement of obsolete equipment with new or recent equipment, was paralleled by a program for the reconversion of spindles, i.e. their equipment with double-casing and reconditioned teasel-frames (set fittings, higher rate of output and large capacity receivers).


BRAZILIAN IMPORTS
TEXTILE INDUSTRY : MACHINES AND EQUIPMENT
$1.000³ F.O.B.
U.S.A.
OTHERS
TOTAL
60
50
40
30
20
10
1964
1965
1966
1967
1968
1969 ( JAN./JUL.) YEARS

2636

Break-down of cotton sector equipment by age bracket and type of machinery

| Machines | Less than 10 years | 10 to 20 years | 20 to 30 years | More than 30 years |
|---|---|---|---|---|
| Scutelers | 15 % | 36 % | 34 % | 14 % |
| Cardes | 19 % | 27 % | 44 % | 10 % |
| Roving frames | 28 % | 42 % | 18 % | 12 % |
| Ring spindles | 34 % | 38 % | 20 % | 8 % |
| Power looms | 6 % | 62 % | 32 % | - |
| Automatic looms | 66 % | 24 % | 10 % | - |

Naturally, the equipment of less than ten years was not listed in the table for 1960.

Apparently, therefore, weaving equipment is far more advanced in terms of modernization than that of other prodution sectors. It should be borne in mind though that the above tables do not incorporate old either overhauled or converted machinery such as cards and continus a fiber ring spinning frame.

Import of automatic looms from Europe from 1960 to 1970

| Builders | Number of looms | Sector |
|---|---|---|
| A | 800 | Cotton |
| B | 160 | Wool |
| C | 403 | Cotton+synthet. |
| D | 1,050 | Jute |
| E | 65 | Carded wool |
| Total : | 2,478 | |

The modernization program from 1960 to 1970 has reached 60 % of its optimum level in the cotton sector and 45 % in the wool sector.

In the hard fiber sector (jute) 38 % of the pre-1960 equipment has been renewed.

2.4.2. Overall productivity of the textile industry.

In chapter 4.1.4. we pointed out that one could view the ratio of state of industrial development to number of people employed as a measure of the "type of economic productivity".

This ratio increases from 1960 to 1970 from 109,400 to 116,280 whereas in 1967-68, it was respectively 73,550 and 95,100.

The figure atained in 1970 does not as yet match that of 1964 (117,980).

This relation being established on the base of the State of Industrial Development of 1955, it constitutes a scale of comparison allowing us to draw the following conclusions ·

- From 1964 to 1968, the relation undergoes a sharp fall reflecting the difficulties of the textile industry subsequent to the economic measures of 1964.

- From 1968 to 1970, the relation constantly increases indicating that the textile industry has succeeded in consolidating itself under the impetus of the measures taken by the Government and the realisation by the industry of the necessity to modernise its machinery equipment.

- However, it should be pointed out that the favourable economic conditions in 1969-1970, despite the renewal of equipment, did not allow to obtain the figure of 1964.

We are now going to study the evolution of industrial productivity, i.e. on the basis of technological rather than economic factors, such as : actual output, the degree of utilisation of existing capacity in relation to the number of operational production units, i.e. spindles and looms, and the personnel engaged in this production.

In 1960, the work of CEPAL was based on a series of norms which we shall maintain as the basis of our assessment of the progress achieved over the ten years span.

It is certain by now that these norms are outdated because modern technology has played an increasing role in the industry which has had to develop in order to remain competitive both on the overseas and on the home markets.

EVOLUTION OF UNIT-OUTPUT IN COTTON SPINNING

| Years | Brazil U.O. unweighted | U.O. weighted | U.O. gross | Sao Paulo U.O. unweighted | Ne | Production in tons x 100 |
|---|---|---|---|---|---|---|
| 1960 | 11.00 | 14.00 | 14.96 | 18.55 | 22.24 | 106.43 |
| 1965 | 11.70 | 12.20 | 15.20 | 17.98 | 21.40 | 100.09 |
| 1969 | 13.30 | 17.29 | 15.13 | 17.02 | 20.25 | 118.12 |
| 1970 | 14.07 | 18.29 | 15.89 x | 20.49 | 23.25 | 58.10 x |

x : The figures for S.P. only cover the 1st. half of 1970.

Introduction and methodology.

For the record we define the parameters which will allow us to evaluate industrial productivity.

In the first part of this chapter, we examine the unit-output of spinning mills, with particular stress on cotton mills, which account for 80 % of the input raw material in the discontinuous spinning industry of Brazil.

This parameter represents the relation of the number of grams of thread per unit of production time and per spindle.

The standard, adopted for Latin America in 1960 for cotton thread and which we have decided to maintain to allow comparisons between the 1960 situation and that of 1970, is based on a unit-output of 22 g/spindle/hour for carded thread of Né 18. This standard requires that the industry work with modern equipment and with a high degree of efficiency, namely 0.9.

For the country as a whole, we will adopt the method which views the entire stock of cotton spindles as one vast unit of production producing a specific proportion of carded thread with the associated proportion of combed thread, corresponding to a given Né.

The number of hours of work considered will be established on the basis of the overall average for the industry.

2.4.2.1. General unit-output of cotton thread.

Table : Evolution of the U.O. in cotton spinning.
The above table indicates that, for this country, U.O. production increased from 14 g/sp./h. in 1960 to 18.29 g/sp./h. in 1970, which represents a gain in productivity of 4.29 g/sp./h., which represents 30 % more than in 1960. On the basis of the unweighted U.O., this gain is 28 %.

The State of Sao Paulo, which accounts for more than 50 % of the total number of cotton spindles in the country, and which we have decided to consider separately because some of the results do not appear to be in agreement with those of the country as a whole. This change is negative from 1960 to 1969, if one refers to the weighted U.O. production, and it is positive if one refers to the unweighted U.O. production.

This particular case is related to the average Né produced in the State of Sao Paulo, and which fell from 22.24 in 1960 to 20.25 in 1969.
The weighing factor is unfavorable to the State of Sao Paulo.

## TYPE OF COTTON THREAD PRODUCED IN THE STATE OF SAO PAULO

| Years | % of carded cotton | % of combed cotton | Number of hours Work/spindle |
|---|---|---|---|
| 1960 | 81.39 | 18.61 | 16.54 |
| 1965 | 83.06 | 16.94 | 16.22 |
| 1969 | 84.16 | 15.84 | 19.06 |
| 1970 x | 85.82 | 14.18 | 19.05 |

x : Figures only cover the first six months of 1970.

In relative value, the State of Sao Paulo produced in 1960 81.39 % of carded thread, whereas in 1969 it produced 84.16 %, and in 1970 (first six months) 85.82 %, while the proportion of combed thread declined from 18 % in 1960 to 14 % in 1970.

The tonnage of thicker thread has thus increased in relative value in Sao Paulo since 1960.

Total production of cotton thread increased by 10.9 % from 1960 to 1969, whereas the number of hours of work/day/spindle increased from 16.54 to 19.05 in the same period ; while the number of spindles declined from 1,544,500 in 1960 to 1,433,619 in 1969.

Table of relevant factors in Sao Paulo - cotton threads.

### EVOLUTION FROM 1960 TO 1969

| | | |
|---|---|---|
| Production of thread | : | + 10.9 % |
| Number of spindles | : | - 7.1 |
| Number of hours/spindle | : | + 15.2 |

It can be seen that the evolution of these three parameters since 1960 means an overall loss in the unweighted productivity of the State of Sao Paulo.

2.4.2.2. General productivity of manpower in cotton mills.

Introduction.

The shortage of statistical data, the impossibility of setting up in the time available a thorough contact with the industry by means of postal survey, do not allow us at the present stage of the study to make global statements about this type of productivity.

However, we do have regional data such as those of the N.E. given in the survey conducted by SUDENE in 1969 and of the State of Sao Paulo.

PRODUCTIVITY OF MANPOWER IN COTTON MILLS

| States | Number of sample spindles | Proportion of total | Production of manpower g/H/h. |
|---|---|---|---|
| S.P. | 184,636 | 13.0 % | 3,276 |
| Rio G. | 44,460 | 12.8 % | 3,420 |
| S.C. | 105,602 | 50.0 % | 3,416 |
| R.G.S. | - | - | - |
| M.G. | - | - | - |
| N.E. (1) | 450,000 | 100.0 % | 3,435 |
| N.E. (2) | 173,840 | 43.0 % | 3,252 |

Note : The double mention of N.E. refers to
(1) all the mills mentioned in the study of 1969, and
(2) the sample of enterprises contacted by our investigators.

SITUATION IN 1960

| Size of the mills in number of spindles | Unweighted labour productivity | Weighted labour productivity |
|---|---|---|
| Less than 1,000 | 1,144 | 748 |
| From 1,000 to 4,999 | 1,558 | 1,349 |
| From 5,000 to 9,999 | 1,574 | 1,605 |
| From 10,000 to 10,999 | 1,505 | 2,048 |
| From 20,000 to 49,999 | 1,590 | 2,169 |
| More than 50,000 | 1,680 | 2,440 |
| TOTAL | 1,575 | 1,996 |

For manpower productivity, and unit output, we have adopted the same definition as those used in the work of CEPAL in 1960, although we are not in agreement with its method of calculation. This approach allows us to compare the present situation with that of 1960.

The increase of this parameter since 1960 is considerable and in 1970, it was evaluated at around 3,300 g/H/s.

In 1960, the average for the country was 1996 g/H/s, that is to say an increase of 1,304 in 10 years, which corresponds to 65 % of the average level of 1960.

2.4.2.3. Unit output and labour productivity by section.

In this paragraph we will examine in more detail the results based on the sample of enterprises surveyed by our team.

The results which were obtained will later be analysed, in the chapter on factors affecting productivity, and we will draw conclusions with regard to the production equipment and the structure of the enterprises, in order to get an idea on the incidence of these two factors of progress on technological results.

## DEFINITION OF THE SAMPLE VISITED

| Number of mills. | Number of spindles | Number of looms | States |
|---|---|---|---|
| 40 | 593,300 | 9,240 | SP - RIO - CB SC - NE |

For each enterprise, we have calculated the parameters of U.O. production, and labour productivity. These have then been weighted by the factor - Average N.E. of enterprise vs. Ne 18.

2.4.2.3.1. Weighted unit-output.

### I. TABLE OF PRODUCTIVITY OF COTTON SPINNING U.O.P.

| Weighted U.O.P. g/H/h | Number of spindles | Average spindles enterprises |
|---|---|---|
| From 10 to 14.9 | 27,300 | 13,600 |
| From 15 to 19.9 | 241,352 | 48,270 |
| From 20 to 21.9 | 51,896 | 17,300 |
| From 22 to 24.9 | 69,400 | 13,900 |
| From 24.9 to 29.9 | 30,940 | 10,310 |
| From 30 to 34.9 | 72,280 | 14,450 |
| From 35 to 40 | 39,000 | 39,000 |
| | 532,168 | |

## II. RELATIONSHIP BETWEEN U.O.P. AND SIZE OF ENTERPRISE

| Number of spindles | Weighted Unit output g/spindle/h. | Global situation in 1960 |
|---|---|---|
| 0 - 4,999 | 18.70 | 14.1 |
| 5,000 - 9,999 | 27.12 | 15.0 |
| 10,000 - 14,999 | 31.75 | 16.0 |
| 15,000 - 19,999 | 25.66 | 16.0 |
| 20,000 - 29,999 | 17.82 | 14.0 |
| 30,000 - 49,999 | 28.12 | 13.0 |
| more than 50,000 | 22.50 | 13.0 |

Among the enterprises visited, we found values of weighted unit-output ranging from 11.4 g/sp/h to 37.5 g/sp/h, i.e. values comparable to the lowest recorded in 1960 and others distinctly above the maximums calculated in 1960.

Comparing these indexes with the size of the enterprise, provides the following information:

- on the basis of table I, i.e., in relation to the average number of spindles of the enterprises whose weighted Unit Output lies in specified class intervals, we note that, with the exception of the last class, the highest or most interesting productivity is found in the enterprises having 10 to 15 thousand spindles ;

- in relation to table II, which shows the average unit output by size of enterprise, the highest class from the standpoint of productivity is that which corresponds to 10 to 15 thousand spindles, followed by that of 30 to 5 and 5 to 10 thousand spindles.

The following remarks should be made :

- we did not contact enough enterprises of 0 to 5 thousand spindles in order to draw reliable conclusions ;

- the mills which were not surveyed are found in the class interval 5,000 to 14,999, i.e. they are those having the highest average weighted U.O. ;

- It would be interesting to delve more deeply into the class of more than 50,000 spindles as it is essentially composed of enterprises grouping several dispersed production units, which, therefore, require a more involved organization to meet the difficulties of controlling several mills with scattered means of technical control. It is in fact, strange to note that this type of production unit in the context of our sample exhibits a relatively low level of spindle unit productivity.

- The differences in productivity between enterprises or size categories are much greater than in 1960. This suggests that there are production units which today have resolutely chosen the road of progress. The high level of modernization of these units, the trend towards modernization in the others, and finally the exceeding tradition-bound industrial structures, are the cause of this greater range in the levels of productivity.

2.4.2.3.2. Manpower productivity.

I. TABLE : MANPOWER PRODUCTIVITY IN COTTON SPINNING

| Weighted manpower productivity g/H/h. | Number of spindles | Average number of spindles by enterprise |
|---|---|---|
| 1,500 to 1,999 | 25,496 | 8,500 |
| 2,000 to 2,199 | 25,126 | 8,400 |
| 2,200 to 2,499 | - | - |
| 2,500 to 2,999 | 36,200 | 12,000 |
| 3,000 to 3,499 | 9,000 | 9,000 |
| 3,500 to 3,999 | 35,460 | 17,700 |
| 4,000 to 4,999 | 80,700 | 13,000 |
| more than 5,000 | 68,020 | 22,600 |

## II. RELATION OF MANPOWER PRODUCTIVITY AND THE SIZE OF ENTERPRISE

| Number of spindles | Manpower productivity | Global situation in 1968 |
|---|---|---|
| 0 - 4,999 | 2,480 | 1,350 |
| 5,000 - 9,999 | 2,915 | 1,605 |
| 10,000 - 14,999 | 3,615 | 2,048 |
| 15,000 - 19,999 | 4,420 | 2,048 |
| 20,000 - 29,999 | 3,647 | 2,169 |
| 30,000 - 49,999 | 8,080 | 2,440 |
| more than 50,000 | - | - |

Still on the basis of the sample contacted directly, we found levels of weighted manpower productivity ranging from 1676 g/H/h to 11854 g/H/h. In 1960, the extreme values were 500 and more than 6000.

In the last study of SUDENE, which dates to 1969, the following are given :

| States | Manpower productivity g/H/h |
|---|---|
| Maranhão | 860 |
| Ceara | 1,952 |
| Rio Grande Norte | 795 |
| Paraiba | 2,633 |
| Pernambuco | 4,270 |
| Alagoas | 3,891 |
| Sergipe | 2,709 |
| Bahia | 3,310 |
| N.E. | 3,435 |

In opposition with the conclusions concerning U.O.P., the relation between the size of the enterprises contacted and their manpower productivity seems to indicate that the latter increases with the number of spindles in the production units.

The global situation in 1960 had already asserted this trend.

As was established by the study of U.O.P. distribution, it was found that the manpower productivity is distributed on a much wider scale than in 1960, which suggests that the majority of Brazilian enterprises, from the point of view of reequipment and structures, exhibits a greater degree of homogeneity, because of the disparities created by the scale of the modernization program adopted by the enterprises. The difference in productivity between small and large production units is much sharper. Some Brazilian enterprises have achieved levels of productivity comparable to the European level.

We should add the following remarks.

- In table II, the class of 30,000 to 49,999 spindles suffers from the influence of production units which are notably above the average, to the effect of increasing average productivity. If we take this particular case, productivity is found to be around 4,300 g/H/h.

- Under these circumstances, the enterprises between 15 and 20,000 spindles are those having the highest level of productivity.

- This trend is emphasited in table I, where the classification is made in terms of class intervals of productivity : the three highest classes giving the average number of spindles of 17,700 - 13,500 and 22,600.

Considerations on the factors which determine the two types of productivity (Unit Output production, and manpower).

A. Unit - Output.

Production units of cotton thread of similar size, identically equiped and having equivalent manpower, can have very different levels of unit output, because of the varying speed of spindles rotation and different coefficients of utilisation of the installed equipment.

The speed of the spindles depends on the rating resistance and twine of the manufactured thread.

The coefficient of utilisation of installed capacity, on the other hand, is the relation between the maximum theoretical level of output for a spindle working at full capacity and actual output.

This factor depends on interruptions in their operation, some of which are routine and others unscheduled.

Unscheduled interruptions have various causes : rupture of thread, or rate of rupture above 1,000 h/spindle, which, for a given quality, should lie within certain narrow and foreseeable limits. The unpredictable breakages are caused by interruptions in the working of spindles due to :

- effectiveness of airconditioning in the spinning rooms ;
- cleanliness of the machine tools ;
- the quality of roving ; which depends on the conditions of preparation of the thread ;
- the rating of the thread produced ;
- the number and skill of the spinners.

We should also mention interruptions due to changes in shifts, exchange of feeding reels, and prolonged interruptions caused by mechanical failure of the production equipment.

B. Manpower productivity.

This refers to the output in relation to an hour of work of those engaged in production, and which depends :

- on the level of qualification of personnel, and its ability to keep up with the rythm of production ;
- the number of interruptions in production machinery, as mentioned above ;
- the quality of the production equipment, which requires a more or less large work force to serve it.

It is usually sufficient to invest in equipment, for productivity to increase, but it is important to know that without investing in equipment, impressive results can also be obtained : systematic maintenance of the equipment ; periodic cleaning ; careful selection of raw materials ; planned production ; training of production people, and supervision of same.

2.4.2.4. Work load of production personnel.

The definition adopted in the work of CEPAL of 1960 can be summarized as follows : the work load is calculated on the basis of the relation between weighted productivity as compared with the items produced, and the items adopted as standards and the weighted unit-output itself. Workers employed directly or indirectly in spinning from preparation until reeling are taken into consideration, including supervisors.

We preferred to adopt a standard well experimented in Europe, namely the number of operators per 1,000 spindles. This factor is in direct relationship with all the parameters which determine the work load of the mill and its calculated productivity.

On the basis of the sample of spinning mills contacted, we find the following values :

| Number of spindles | Spindles | Average | Number of workers/ 1,000 spindles |
|---|---|---|---|
| 350 | 18,926 | 9,500 | 3.00 |
| 600 | 18,096 | 6,030 | 1.65 |
| 800 | 42,180 | 10,540 | 1.25 |
| 1,000 | 22,500 | 22,500 | 1.00 |
| 1,200 | 62,960 | 12,600 | 0.80 |
| 1,400 | 10,000 | 10,000 | 0.70 |
| 1,600 | 39,000 | 39,000 | 0.60 |
| 2,000 | 49,200 | 24,600 | 0.50 |
| 2,500 (1) | 7,000 | 7,000 | 0.40 |
| more than "3,000" | 11,500 | 11,500 | 0.20 |

The work load of workers engaged on the production line is ideal in mills which have 10 to 20,000 spindles. Mill (1) is a special case where standardization, i.e. the number (variety) of threads manufactured, is reduced to a minimum, in order to obtain specialized productivity.

It is a fact that such production units have the advantage of having a large proportion of work done on looms, with a minimum of interruptions and standardized products which allow them to retain the ideal parameters, that is to say the number of rotations for a minimum number of breakages and a high-quality twist.

In the non-integrated mills, the largest work loads are found in mills which have between 10,000 to 15,000 spindles.

2.4.2.5. Productivity in spinning combed wool.

The standards adopted for Latin America in 1960 and which we retain as a basis of comparison, although they are now dated, are the following :

Unit output : 52 g/sp/h at 90 % efficiency.

Manpower productivity : 1,700 g/H/h for combed thread and 3,600 g for carded thread.

The sample surveyed gives us the following table :

| Number of spindles | Type of enterprise | Average | Unit Output | U.O.P. |
|---|---|---|---|---|
| 8,000 | Spinning mill | 45.00 | 15.70 | 41.60 |
| 10,000 | Spinning mill | 45.00 | 23.20 | 51.50 |
| 6,000 | Spin. mill + weaving | 20.00 | 17.50 | 20.65 |
| 800 | Spinning mill | 15.00 | 32.80 | 28.90 |
| 10,000 | Spin. mill + weaving | 17.00 | 18.90 | 18.90 |
| 5,550 | Spin. mill + weaving | 40.00 | 17.40 | 40.89 |
| 7,300 | Spinning mill | 43.70 | 15.70 | 49.65 |
| 2,525 | Spin. mill + weaving | 4.00 | 105.50 | 25.60 |
| 10,600 | Spinning mill | 30.00 | 26.60 | 47.16 |
| 8,300 | Spinning mill | 45.00 | 18.20 | 38.60 |
| 12,000 | Spin. mill + weaving | 42.90 | 10.00 | 25.20 |
| 15,000 | Spin. mill + weaving | 45.00 | 10.64 | 28.20 |

In 1960, CEPAL gave the following results :

| 1960 | U.O.P. | 1970 | U.O.P. |
|---|---|---|---|
| 0 - 1,000 spindles | 24.0 | | 26.9 |
| 1,000 - 4,999 spindles | 25.0 | | 25.6 |
| 5,000 - 9,999 spindles | 20.0 | | 38.8 |
| 10,000 sp. and more | 29.0 | | 31.8 |

It can thus be considered that the situation has improved markedly because of the modernization of 75 % of the mills.

The greatest progress was recorded in production units having 5,000 to 10,000 spindles, especially in the non-integrated mills.

This situation is, in our opinion, attributable to several factors :

- the non-integrated mills strongly compete with each other and are aware of the incidence of productivity on the cost of their products, which cannot be improved at the weaving stage, as well as on the quality of the products of thread levels.

- the organization of the non-integrated mills at the level of spinning is superior to that of the integrated mills where spinning is wrongly considered merely as an intermediate stage in the production line.

- the integrated mills concentrate their management potential more on the weaving stage, which is more likely to increase the value of the final product and for which they have a guaranteed market.

Manpower productivity has not followed the same rate of increase as U.O. production, and on average it is 10 % higher than in 1960. Here again, the non-integrated mills clearly distinguish themselves from the integrated mills, since they achieve a productivity 20 % greater than that of the integrated mills.

The work load will also be considered on the basis of the operatives directly engaged on the looms, i.e. the number of operatives/1,000 spindles.

| Number of spindles | Type of enterprise | Number of spindles operatives | Number operatives/ 1,000 spindles |
|---|---|---|---|
| 12,000 | Integrated | 600 | 1.70 |
| 8,000 | Spin. mills | 800 | 1.25 |
| 10,000 | Spin. mills | 600 | 1.70 |
| 6,000 | Integrated | 160 | 9.00 |
| 5,700 | Integrated | 360 | 3.00 |
| 3,200 | Integrated | 172 | 6.00 |
| 8,400 | Integrated | 700 | 1.40 |
| 8,300 | Spin. mills | 880 | 1.13 |
| 3,600 | Integrated | 200 | 5.00 |

The workload is much better distributed than with cotton ; this is quite logical because of the greater variety in types of wool thread.

The workload of the personnel, just as the two productivity indices mentioned above, clearly shows the superiority of the non-integrated mills, for the reasons explained above, to which should be added that the equipment in integrated mills is considerably less modern in general than that of the non-integrated, because the latter devote a greater proportion of their investment in weaving, for reasons peculiar to this type of industry ; spinning being considered only as a stage of production in the complete cycle for the former, while, for the latter, it has greater incidence on the cost of finished products and the quality of the articles to be sold.

2.4.2.6. Productivity in the weaving works.

2.4.2.6.1. Cotton weaving.

Repeating the standards adopted in 1960 by CEPAL :

- Equipment productivity : 5.4 m/1/H
- Manpower productivity : 43.0 m/M/h
- Workload : 40.0 looms/weavers.

The sample surveyed represents 8,900 looms.

COMPARISON BETWEEN AVERAGE PRODUCTIVITIES

IN 1960 AND 1970

| Years | Unit Output | Production in meters | Looms/ weavers |
|---|---|---|---|
| 1960 | 2.93 | 8.18 | 5.8 |
| 1970 min. | 2.59 | 9.50 | 3.0 |
| average | 4.89 | 16.50 | 7.0 |
| max. | 5.19 | 36.20 | 28.0 |
| Overall average | 4.60 | 18.80 | 16.3 |

We will see that the progress made since 1960 appears much greater than at the level of cotton spinning. In fact, manpower productivity has increased from 8.18 to 20.8, i.e. more than double ; the O.P. from 2.93 to 4.06 and the workload of the personnel from 5.8 to 15.13, i.e. three times more looms per worker. This is due both to the disappearance of a large number of small weaving mills. For example, in 1966, 1967 and 1968, respectively 18, 13 and 11 cotton weavers were eliminated representing 4,120 persons employed.

The modernization of the weaving mills is also connected with this result, the influence of new equipment affecting the productivity parameters much more directly and rapidly than in spinning, where technical progress must be accompanied by technological and general organization progress. The number of automatic looms installed since 1960 is considerable (for M.G., for example 22 % of 13,720 looms are automatic, whereas in 1960 there were 21.9 % of 16,811). There has been a massive replacement of manual looms by automatic ones. We should also mention the width of the looms and projectile looms which tend to be installed in recent and developing companies. This equipment has a large incidence on the U.P. production and workload factors.

An example will help to convey the impact of loom width on the number of workers : 108 looms which employed three 18-man shifts per 24 hours were replaced by 24 wide looms which now employ three one-man shifts per 24 hours.

2.4.2.6.2. Wool and synthetics weaving

The output of this more traditional sector has not changed much since 1960; on the other hand, the toll on loom operators rose from 1.4 to 2.5 workers in the non-automatic field and from 1.6 to 4.1 for automatic looms. The impact of productivity on production costs appears to be less for goods which are designed for consumption by the higher classes; besides, the qualitative and quantitative demands of this consumer category do not make too high rates of output, the main target being the production of high-quality, low quantity items. The variety of items also influences productivity.

However, in spite of the fairly dilute internal competition, the wool industry would be well advised not to underestimate the impact of organization and technological improvement on overall potential, especially in view of the medium-term threat of synthetics.

2.4.2.7. Analysis of factors affecting output productivity

The factors affecting productivity are of two sorts : those related to organization and human factors and those pertaining to technology. We shall call the former "organization factors" and the latter "factors affecting the modernization of production facilities".

We now analyse the function of correlation between these two parameters and unit output and labor productivity on a sample of cotton spinners which were interviewed by our teams. These interviews enabled us to locate these enterprises with some measure of accuracy in the fields of organization and modernization, in terms of the data required for our analysis.

Both qualitative and quantitative data were taken into account. Surveyed factories are both integrated and non-integrated.

The group of enterprises which composed our sample operates in all 600,000 spindles and 9,300 looms. The states of Sao Paulo, Rio Guanabara, Santa Catarina and North-East are all represented in the sample.

## Methodology of correlation

The technique of statistical correlation was discusse in an Appendix to the present report (1); the reader wishi to gain deeper insight into the technique is invited to refer to this Appendix. We shall restrict our explanations here to an outline of the method we have employed in assigning marks to each enterprise for organization and for modernization of production facilities.

## Modernization marks

These take into account the average state of the production facilities of the enterprise in 1970, including air-conditioning of workrooms, handling equipment, servicing equipment, buildings, dusting, cleanliness of premises, etc...

Of a maximum of 70 marks for organization, 30 go to production equipment proper, 10 to air-conditioning and dusting, 10 to handling equipment and 10 to the propriety of buildings.

## Organization marks

This evaluation takes into account the quota of utilization of installed capacity and available time as well as the difficulties encountered by the enterprise, the opinion of the survey team on general organization, technical organization, the personality of the latter's managerial staff and the personality of the head of the enterprise. Of a maximum of 60 points, the first 4 criteria get 10 each and the last one 20. Indeed, we believe that the personality of the head of the enterprise plays a predominant role in the field of its organization.

The marks were allocated by two specialists accompanied by a third team member to avoid any subsequent changes; the mark attributed to each enterprise is the average of the two.

We are fully aware of the fact that such a sounding is only valid to a certain degree, but it will enable us to ascertain whether or not these parameters are correlated with the two types of productivity and if one predominates with respect to the other.

(1) Appendix n° I

TABLE OF ENTERPRISES IN THE SAMPLE

| Type | Installed capacity Spindles | Looms | | | | | |
|---|---|---|---|---|---|---|---|
| Integrated | 14,000 | 260 | 29.5 | 4,922 | 53.1 | 35.0 | 91 |
| Integrated | 1,200 | 52 | 23.5 | 4,028 | 38.8 | 50.0 | 98 |
| Integrated | 9,000 | 204 | 18.0 | 2,177 | 30.0 | 29.0 | 70 |
| Integrated | 10,000 | 220 | 16.8 | 2,900 | 35.0 | 38.0 | 70 |
| Integrated | 4,800 | 494 | 12.5 | 2,069 | 19.0 | 38.0 | 75 |
| Integrated | 9,500 | 220 | 21.7 | 4,185 | 38.5 | 28.0 | 85 |
| Integrated | 7,000 | 130 | 270 | 4,572 | 47.5 | 65.0 | 90 |
| Integrated | 19,000 | 490 | 15.5 | - | 17.0 | 26.0 | 50 |
| Integrated | 22,500 | 290 | 14.4 | - | 36.0 | 58.0 | 33 |
| Non integr. | 7,000 | - | 22.9 | 4,140 | 46.5 | 55.0 | 95 |
| Integrated | 11,500 | 170 | 31.5 | 6,450 | 56.0 | 70.0 | 100 |
| Integrated | 3,500 | 126 | 21.8 | - | 44.0 | 25.0 | 90 |
| Integrated | 40,000 | 850 | 24.2 | - | 42.0 | 49.0 | 90 |
| Integrated | 15,000 | 280 | 33.2 | - | 54.2 | 68.0 | 92 |
| Integrated | 9,000 | 120 | 28.4 | 3,450 | 56.2 | 70.0 | 92 |
| Integrated | 7,900 | 135 | 21.8 | 1,761 | 33.5 | 25.0 | 85 |
| Integrated | 39,000 | 220 | 37.5 | 11,854 | 51.6 | 70.0 | 86 |
| Integrated | 21,000 | 240 | 32.7 | 3,729 | 55.0 | 67.0 | 100 |
| Integrated | 17,500 | 200 | 23.7 | 2,885 | 38.5 | 54.0 | 85 |
| Integrated | 11,400 | 170 | 20.8 | 2,050 | 31.5 | 20.0 | 88 |
| Non integr. | 17,500 | - | 33.2 | 5,920 | 49.1 | 68.0 | 91 |
| Non integr. | 19,000 | - | 23.2 | 4,255 | 51.0 | 43.5 | 95 |
| Integrated | 34,500 | 340 | 27.1 | 4,070 | 47.5 | 37.0 | 95 |
| Non integr. | 7,600 | - | 21.6 | 1,941 | 43.0 | 37.0 | 90 |
| Integrated | 12,800 | 136 | 31.9 | - | 49.5 | 53.0 | 100 |
| Non integr. | 9,800 | - | 23.2 | 2,900 | 35.0 | 51.0 | 80 |
| Non integr. | 12,000 | - | 31.0 | 4,185 | 38.5 | 64.0 | 95 |
| Integrated | 58,000 | - | 21.7 | - | 44.5 | 28.0 | 85 |

In Appendix I we discussed the theory of correlation and its application to the special case under consideration; the reader wishing delve more deeply into the matter and gain insight into the methods of statistical correlation is referred thereto.

Correlation of parameters of Weighted Unit Output (WUO) and Manpower Productivity (MP) to equipment and organization

In this chapter we shall try to check whether or not there is a statistical correlation and if so of what form between the WUO and PM values and the series of quotas or "marks" attributed to the enterprises of our survey according to criteria attaching to their equipment and the propriety of their management and organization structures.

1) Relationships between WUO and the degree of modernization of production facilities.

   We have computed the linear regression function which corresponds on the one hand to the average range (dispersion) of UOP values and on the other to the series of values of equipment quotas.

   The function is :

   grams per spindle and per hour = 0.507 of the equipment quota, i.e. $y = 0{,}507\ x$.

   The graph shows this linear function brought to the value of the range.

   On the same graph is also shown the line representing the functional relationship between the organization quotas and the WUO

   This function is :

   grams per spindle per hour = 0.5758 of the organization quota or $Y = 0.5758\ X$.

   It appears that the range of points : organization quota/WUO is too wide to justify a linear adjustment : variance is too strong. We therefore calculate a parabolic function for this series; it works out as follows :

   grams per spindle per hour = 0.66 of the organization quota - 0.002 of the same quota squared or $Y = 0.66\ X - 0.002\ X^2$.

   The approximate lay-out of this line is also illustrated on graph 1.

What can be conferred from these correlations ?

Relation (correlation) between degree of factory modernization and Weighted Unit Output.

The functional variation of these two parameters is translated graphically in a straight line characterized by the relation Y = 0.507 X.
This means, always in the restrictive context of our sampling, that variance is low. In other words that the weight in grams of cotton thread produced by a spindle in one hour is directly proportional to the degree of modernization of the equipment used for this production including infrastructure, the rate of increase being the slope of the linear representation; the smallness of discrepancies or of the dispersion range indicates a strong correlation between the two parameters.

Using the 1960 standard WUO for Latin America i.e. 22 gr/sp/hr as a basis for the evaluation of the optimal quota of modernization, we find, always in the context of our sampling: 22 = 0.507.x, i.e. the optimal value of X = 43.6.
55 % of the surveyed enterprises have already matched or surpassed this quota and their output should exceed 22 grams per spindle and per hour.

2) Relation between degree of enterprise organization and WUO

The fact that we were compelled to make a parabolic adjustment of our correlation for this series of values means that the rate of increase of WUO with respect to degree or organization decreases as degree of organization increases i.e., graphically, that the correlation curve is concave towards the X axis. At first blush, this could be understood to mean that the enterprise is over-organized, i.e. too elaborate, resulting in a deceleration of unit output increase when sustained improvement of the organization is applied.

In practice this can be interpreted to mean that after a given point, further reduction of trained personnel in favor of technological progress becomes an unprofitable transaction because it means assigning insufficiently trained personnel to more complex machinery which is therefore prone to breakdowns and output interruptions; another consequence of such automatization policies is that managerial staff becomes short.

Thus, in sum, beyond the point of inflexion of the curve, it becomes unprofitable to exchange personnel for a higher degree of organization.

The degree of correlation of the function WUO/modernization is higher than that of the WUO/organization relation : this is evidenced by the linearity of the former's adjustment and proves the predominance of equipment criteria over unit output criteria and its essential corollary that strict timing and sound technical organization and management framework are indispensable.

3) Relation between labor productivity and the equipment quota

The linear adjustment of a regression function for this series is also possible, discrepancies and range of distribution being statistically admissible.

The linear function is :

L.P. = 72.1 of equipment quota, i.e. $Y = 72.1.X$

The slope seems somewhat steep because labor productivity is given in grams. If the unit is taken to be kilos, the coefficient becomes 0.0721.

The adjusted line is shown in Graph 2.

4) Relations between labor organization and labor productivity

Here again labor organization and productivity are linearly correlated :

LP = 84 of the organization quota, or $Y = 84\ X$

This adjusted line is also given in Graph 2.

What can be inferred from these two correlations ?

1. Relationship between factory modernization and labor productivity

Those two parameters are related linearly by the function $Y = 72.1\ X$ (within the boundaries of our survey). This means that the number of kilos of thread produced per man and per hour increases at a constant rate with the degree of modernization of the spinning mill.

With reference to the standard level of labor productivity adopted for Latin America in 1960, 4,300 gr/man/hour, we find that the degree of modernization required to reach this standard is :

72.1 X = 4,300 gr therefore X = 59.6

30 % of the enterprises in our sample had reached this standard.

<u>Enterprises having reached or topped the 1960 standard</u>

| Type | Spindles | Quotas |
|---|---|---|
| I | 14,500 | 53.1 |
| I | 11,500 | 58.0 |
| I | 9,000 | 56.2 |
| I | 21,000 | 55 |
| F | 19,000 | 51.0 |

To one exception, these are units having 12 to 30,000 well concentrated spindles.

It can also be seen that the degree of modernization needed to acquire such a standard of labor productivity is higher than to acquire the WUO standard; this implies the predominance of equipment factors over WUO factors. It also means that to attain an appreciable level of labor productivity, should be allowed for equipment (and infrastructure) than for the increase of WUO, especially when the level of skill of personnel and the degree of organization are not in keeping with the demands of the type of equipment chosen.

2. <u>Relation between organization and labor productivity</u>

These two parameters are related linearly by the function Y = 84 X. The standard degree of organization will therefore be 51.2

25 % of the enterprises surveyed for this study had atteined or surpassed this value.

Enterprises having the standard degree of organization

| Sector | WUO Quota | WUO Standard | LP Quota | LP Standard |
|---|---|---|---|---|
| | quota | % max. | quota | % max. |
| Organization | 38.4 | 64 | 51.2 | 85 |
| Equipment | 43.6 | 62 | 59.6 | 85 |

We find that in the sample of our survey, 85 % of the standard level of organization must be achieved in order to get a labor productivity of 4,300 gr per man and per hour while it suffices to attain 62 to 64 % of this level to obtain a weighted unit output of 22 grams per spindle and per hour.

25 % of surveyed units have reached the 51.2 quota and 64 % the 38.4 quota.

Among this units which match or top the established level of productivity, the position is as follows :

- Organization quota of 51.2 : one in five, including those having lower productivity than 4,300 gr;
- organization quota of 38.4 : four out of twenty, including those below standard productivity.

By drawing the same table, this time with relation to the modernization of production facilities, we find that 62 % of the quota is necessary to reach the WUO standard of 22 gr and 85 % to reach the LP standard of 4,300 gr.

Among the production units which match or surpass the quota which corresponds to the standards, the position is as follows :

- One firm in 17 have reached the maximum quota or 43.6, including those below standard productivity;
- Three firms out of seven, have reached the maximum quota of 59.6 including those below standard productivity.

Factories having attained the 51.2 organization quota in spite of being below standard LP.

| Organization quota | LP | Equipment quota |
|---|---|---|
| 56.2 | 3,450 | 70 |
| 55.0 | 3,719 | 67 |
| 51.0 | 4,255 | 43.5 |

Factories 1 and 2 are new implantations and labor productivity is affected by the negative impact of the breaking-in period.

Factory n° 3 just fails to achieve the standard of modernization.

Factories topping the 38.4 organization quota but failing to attain 22g/spindle/hr (WUO standard).

| Organization quota | WUO | Equipment quota |
|---|---|---|
| 43 | 21.6 | 37 |
| 44.5 | 21.7 | 28 |
| 38.5 | 21.7 | 28 |
| 44 | 21.8 | 25 |

All four are very close to the standard WUO but their equipment quota is below standards.

The plant which having an equipment quota of less than 43.6 and which also fails to reach 22 gr/sp/hr has an organization quota of 36; poor organization can be held responsible for its low WUO.

<u>Factories matching the equipment standard of 59.6 but which fail to match the standard LP of 4,300 gr/man/hour.</u>

| Equipment quota | LP | Organization quota |
|---|---|---|
| 70 | 3,450 | 56.2 |
| 67 | 3,719 | 55 |
| 67 | 4,185 | 38.5 |

Factories 1 and 2 are in their implantation phase. Factory n° 3 does not achieve the standard organization quota.

## CONCLUSIONS

The interdependence of factory organization and up-dating of equipment is revelatory.

It should be noted that, among the three modern factories which fail to reach standard labor productivity, n° 3 owes it to its lack of organization.

Along these same lines, the four factories which nearly match 22 gr/sp/hr all have a relatively favorable organization quota, in spite of fairly obsolescent equipment.

The immediate implications of these results are that factory organization sensu lato is an essential factor of improvement of productivities and output : up-dating of equipment alone is not enough. The problem therefore <u>must</u> be tackled in the broader context of the above correlations and interdepences.

We remind that, since 1960, the average rise of WUO (spindle productivity) in Brazil is in the neighborhood of 30 % and that of LP in the vicinity of 60 %, always in the cotton spinning sector.

Any massive replacements of obsolete by modern equipment is invariably associated to a reduction of employment at constant output. The first predictable effect is therefore an increase in the number of kilos produced by each worker at constant ratio of utilization of installed capacity.

Considering that the process of modernization of the Brazilian cotton industry is at a fairly advanced stage a substantial increase of labor productivity was in the order of things, especially in view of the massive elimination of marginal enterprises which so encumbered the 1960 figures.

On a par with labor productivity improvements, an increase of weighted unit output with respect to 1960 should by all standards of appraisal have taken place.

How can this discrepancy between the two types of productivity be accounted for ?

In our opinion, it is attributable to the deficient organization of many cotton spinning mills. Most spinners operated in 1969-1970 at a ratio of utilization of installed capacity of 90 %, as compared to the integrated weaving sector which operated at 70 to 75 % of full capacity.

We are of the opinion that the modernization of the weaving sector has brought about much more spectacular output improvements and at much lower cost than for the spinning sector; integrated factories tend to focus their attention on their weaving sections and view spinning as just another stage in the production line.

Unit-output of cotton spindles in Brazil is very low with respect to current world standards.
The deep-seated causalities of this state of fact can be summarized as follows :

- the size of many spinning mills is too small to enable them to meet up the demands of modern organization and overall efficiency (in the state of Minas Gerais, the average size of spinning mills is 8,000 spindles and in the North East, 6,400 spindles):
- many cotton factories have no formalized structure, with duly elaborate organization charts, clear-cut devolutions and responsibilities, etc... The very informality of such organizations results in superposition of responsibility and decision-making authority or even in the absence of managers for certain sections;
- the organization charts of some enterprises are inadequately or insufficiently structured and often ill-adapted to the actual needs of the enterprise : a same function is found enlisted in various departments; they are often construed for the exclusive use of the directorate without informing the subordinate personnel, most concerned with its effects.

Managerial centralization is strong and in violent opposition with the principle of modern management efficiency calling for delegation of authority at all levels.
This fact results in an overload of work and responsibilities in the hands of the top-managers which have no time left to resolve the fundamental problems of the enterprise.

Personnel training is often improvised or non-existent; there are very few spinning concerns with a personnel department.

The factors which influence productivity must pertain to the fields of technique and technology. The attach to the adaptation of equipment to manufacturing processes which in turn must be modern enough to make full use of the potentialities of production facilities.

These factors were clearly described by CEPAL in its 1960 survey and we need not go into them further.
We believe that they have been assimilated by the industry, considering that the program of modernization of production facilities took off soon afterwards and has been gathering momentum ever since; in 1970 capital investments in the sector has attained a very substantial level.

The other factors affecting productivity are of even more consequence than those affecting what we have termed "modernization of production facilities" and although the major enterprises (and the wary), have understood this, it is not the case of the vast majority.
There are sharp disparities of productivities and outputs from one enterprise to another and from one region to another; the average gain in productivity from 1960 to 1970 also proves that restructurization or modernization of existing structures has not developed on a par with equipment.

What are the factors of structural growth ?

They are many and often interrelated - not only one to another - especially with the factors for modernization of equipment.

How can this interrelation be explained ?

By the fact that an older enterprise, which has managed to adjust its managerial staff and personnel to the utilization and service of an obsolete equipment is in danger of creating a major unbalance if it renews its equipment but fails to renew its structural organization and adapt its personnel to the demands of modernization and the technological gap of several decades which usually occurs on a par.

This fact is all the more significant when the modernization program is carried out according to a step-wise planning and especially when it lacks homogenousness and some sections or even sub-sections of the production lines remain unchanged or are modernited at a much later stage.

What measures can be taken to achieve the maximization of equipment efficiency ?

Above all, it is mandatory that the modernization program be carefully studied and planned, with realism and as much standardization as can be afforded. This means maximum continuity both in the production line and in the modernization sequence itself.

The successive stages of modernization of a given section must be as balanced and adapted as possible with respect to the over allmodernization program.

It will for instance be advisable to suit the modernization program to the production program, i.e. to start with preliminary working and move on towards the final stages.

Thus, if it is decided to implement a three-step modernization program such as : one third of the spinning process (preliminary working) followed at a lager stage by the remaining two thirds, the utmost specialization of the new section must be achieved to avoid thread from older equipment from being processed together with thread from new equipment.

In the same context, if it is important for modernization to be adequately planned and homogenous, it is just as important to provide for such attendant improvements as re-design of lay-out and such essential facilities as air-conditioning, compartmentalization, dusting, handling, servicing, etc... These facilities and infrastructure which are the technical setting of operations must necessarily follow the modernization of actual production equipment. Managerial staff and labor should be retrained with a training and educational program made to measure for the new working conditions.

We now summarize the set of factors which have the strongest impact on the productivity of "modernizing" enterprises :

1) Modernization must take place within the broader context of an overall coherent and homogenous development program which must necessarily include a new design of production environment (lay-out, accessory facilities and habitability of the premises : cleanliness, lighting, etc...).

2) On a par with the modernization of facilities, manning and staffing frameworks must be readapted to the new methods by way of progressive retraining programs.

   A permanent training program is essential to assure that any deviations or unprofitable trends are immediately corrected.

3) The production program will have to be geared to the disparity of equipment if modernization is achieved by steps, for the entire up-dating program may become unprofitable and an investment write-off.

4) Progress in the field of productivity and quality must be recorded and controlled punctiliously and the set of factors of influence must be identified and evaluated in order to make selective and well directed stimulations.
   In particular, production personnel and managers should be allowed to participate in the benefits from increased productivity thereby creating a spirit of integration and joint undertaking.

5) This new spirit will depend to a large measure on the general outlook of the decision-makers; they also must undergo retraining or at any rate become adapted to their new situation and its prospects.

### 2.4.3. Feasibility and advisability of increasing production with equipment in place.

The above recommendations should result, if implemented, in a considerable increase of production efficiency without major investment.

Although the major industrial groups and some medium-sized enterprises have understood the impact of these factors on productivity and used it, a lot remains to be done before the remainder of the industry follows in their wake. In 1970 the productivity gap between highly organized and equiped enterprises and the tradition-bound enterprises is striking and ever widening. The relatively low overall increase in productivity of the entire industrial sector indicates that most plants are either ill-equiped or ill-organized even though their up-dating program may be well under way or even nearing completion.

Tentative estimation of overall productivity evolution in the cotton sector, from 1960 to 1970

1960 Position.

| | | |
|---|---|---|
| Cotton input | 256,000 T. | |
| Total input | 314,000 T. | |
| Number of spindles | 3,840,000 | |
| Number of looms | 102,760 | |
| Number of working hours | 5,632 H. | Max. 6,600 H. |

1970 Position.

| | | |
|---|---|---|
| Cotton input | 295,000 T. | |
| Total input | 410,000 T. | |
| Number of spindles | 2,850,000 | |
| Number of looms | 82,700 | |
| Number of working hours | 5,800 H. | Max. 7,200 H. |

1960 index of productivity

$$\frac{256{,}000{,}000{,}000}{3{,}840{,}000 \times 6{,}600 \times 0.9} = 11.1 \text{ g/s/h}$$

1970 index of productivity

$$\frac{295{,}000{,}000{,}000}{2{,}800{,}000 \times 7{,}200 \times 0.9} = 15.8 \text{ g/s/h}$$

Thus weighted unit output for 1960 is 12 g/s/h (in terms of types of thread).

In 1970 WUO is 13.6 g/s/h in terms of actual thread output, i.e. minus 14 % of production waste.

WUO 1970 = 1.42 x WUO 1960.

This clearly demonstrates that the unit output in 1970 does not match the 10 years projection of 1960, i.e. 22 g/s/h for Nr. 18 and 0.9 efficiency.

## Evaluation of the overall increase in productivity of cotton spinning in 1980

1) The average number in 1980 will be very close to that of 1970, i.e. 23.25.
2) The unit output for 1960 weighted to average number produced in the country was 14 g/s/h ; on the basis of 6,900 x 0.9 hours of work.
3) In 1970, the WUO is 18.3 g/s/h for an average number of 23.25 on the basis of 7,200 x 0.9 working hours.
4) Assuming a gain of 60 % will be achieved over the 10-year span 1970 - 1980, the predicted standard WUO for 1980 is 29.3 g/s/h.
5) Now if we further assume that the installed spinning capacity would fall by 20 % (number of spindles) over the same time-period (between 1960 and 1970 there was a 24 % elimination).
6) And that the rate of utilization of potential working time passes from 85 to 90 %.

The 1980 position is found to be :

| | | |
|---|---|---|
| Annual output in 1980 | : | 335,000 T/yr |
| 1970 output | : | 278,000 T/yr. |

Break-down by fiber :

| Raw materials | T/yr of thread |
|---|---|
| Cotton | 254,400 |
| Polyester | 10,176 |
| Polynosics | 600 |
| Viscose | 12,600 |
| Total | 278,000 T |

Production increment in 1980 = + 20 % or 57,000 Tons.

Evaluation of the overall increase in productivity in 1980 resulting from expected increases in weaving unit output.

Premises.

1) The average unit weight of cotton-type fabrics will be 130 g/m2 in L980.

2) Unit output was 4.6 m/loom/hr in 1970.

3) In the NE and according to the survey conducted by SUDENE in 1969, unit output was 3.57 m/l/h.

4) Assuming a gain of unit output of 40 % for the coming decade, the projected rate is 6.44 m/l/h.

5) The standard unit output for Latin America was 5.4 m/l/h in 1960.

6) On the basis of a 15 % elimination of production capacity (against 40 % from 60 to 70).

7) And assuming further that the rate of utilization of available working time rises from 75 % to 85 %, the following position can be predicted for 1980.

- Increase in WUO :

  74,120 x 1.84 x 6,120 = 834,551,000 metres.

- Increase due to time-efficiency :

  74,120 x 6.46 x 720 = 343,680,000 metres.

- Total increase :

  1,178,331,000 metres at 130 g/m, i.e. 153,200 T or more than 50 % of the 1970 figure.

  87.200 x 4.6 x 0.13 x 5,400 = 281,600 T/Y

Conclusions.

The above assumptions were quite moderate ; besides, the increase of loom width has not been taken into account. However, theoretical they may be, these calculations starkly demonstrate the unbalance between the cotton weaving and cotton spinning systems in Brazil. However, it should not be forgotten that there are numerous weaving mills which utilize man-made and synthetic fiber on cotton equipment and that this trend is liable to increase. Still, whatever the impact of these fibers on overally production, it will not occupy the 150,000 Tons/year surplus capacity of 1980. Besides, the jersey and knitwear sectors in general will increasingly invade the conventional fabrics market on a far with worldwide trend.

## 2.5. GUIDE-LINES FOR PROGRAMMING THE MODERNIZATION AND REPLACEMENT OF INSTALLED PRODUCTION FACILITIES

### 2.5.1. Modernization program.

Introduction.

Base of recommendations.

The situation in 1960 and 1970 and the development trends in the intervening decade on the one hand and the 1975-80 projections and world trends in the textile industry on the other are the premises of our recommendations.

Preliminaries.

1) The export of finished or semi-manufactured products cannot be an aim in itself ; it must be the outcome, a consequence, of the growth to maturity of the domestic market, itself conditioned by per capita income increase.

2) The Brazilian textile industry is both highly miscellaneous and highly disseminated and exhibits striking sectoral and intra-sectoral incompatibilities ; it cannot meaningfully be viewed as an entity.

3) We have however divided the industry into two sectors : the organized or controllable sector and the spontaneous or drifting sector.

4) The size of the country and its regional dualism and interactions must be taken into consideration in making a global orientation program.

5) The textile industry's efforts between 1960 and 1970 do not seem to have achieved the targets set down in 1960.

6) Organization, managerial and human problems were often underestimated or misunderstood ; this is demonstrated by the lag of these structures with respect to equipment modernization.

7) Many industries lack the self-assurance and outlook necessary to guide the industry out from the traditional into the modern stage.

8) The invasion of synthetics and the knitwear boom are dominant phenomena which affect the entire textile secto..

Conclusions.

The conclusions which can be drawn from these premises are conducive to specific and differentiated recommendations which take into account the characteristics and peculiar demands of each sector or sub-sector and region.

2.5.1.1. Type of equipment.

The problem of chosing new equipment for new factories, is not governed by the same criteria as those which prevailed in the modernization of existing plants.

New implantations.

The size, production capacity and lay-out of a new plant is determined on the basis of the type of production-line, adapted to specific products and the kind of raw materials available, taking into account eventual extensions in the medium to long-run, and the short-term program itself which includes the progressive servicing of installations. Then comes by far the toughest problem of specifying, for each section of the production line, the most appropriate type of equipment and technology. Each case is, of course, peculiar and specific, depending on the type of products they must be designed for, the qualifications of available manpower, the specialization and size of each component part, etc... The perfect knowledge of available technologies, probable future evolution and limitations as well as the acceptable volume of investments in view of hard facts, are most definitely essential pre-requisites of success in this research process. It is important to beware of giving way to high-productivity techniques or the most advanced technologies without sound justification, just for the sake of pioneering. Such attitudes would most certainly lead to disillusion or even failures.

On the other hand, there is no doubt that new plants will offer a wider range of possibilities for more advanced technology, namely because :

- new designs will always be comprehensive and therefore preserve homogenousness;
- hired personnel will be integrated as one man in the production process;
- the planned production program is highly adaptable to whatever kind of technology of equipment is chosen.

However, we feel that Brazil would be well advised not to engage massively and deliberately in futuristic techniques such as open-end spinning, full automation in cotton spinning plants and "avant-garde" weaving techniques. We would rather see these techniques first tested in the technical institutes or model units under the control and supervision of a national board of technology composed of research scientists and technicians. The findings and results of these studies would be broadcast throughout the industry to prepare it for the eventual utilization of such advanced technologies at industrial level. We shall return to this board of technology in a subsequent chapter in which we make further recommendations. We do not believe that at the present time such techniques have reached their utmost sophistication. In fact we are convinced that subsequent developments and adjustments will considerably enhance and improve their current possibilities.

We shall discuss, in an appendix hereto, the technical aspects of a few of these advanced techniques as well as their various possibilities.

We feel obliged at this stage to develop the philosophy which motivated our standpoint. Our comprehensive though perforce not exhautive study of Brazil's textile industry evolution since 1960 and the current account of the situation allows us to assert that, with very few exceptions, it is premature for the Brazilian textile industrialist to scatter its efforts and resources by launching head-on into constantly evolving techniques on an industrial scale, instead of tackling the most fundamental and essential problems affecting its industry. The industry would find it much more profitable to get organized on a national scale (research institute, popularized education, training and formation of management staff at all levels, information and joint awareness ...) and individually, i.e. at enterprise level. We assert that productivity and profitability would achive much more and much faster overall progress if a logical modernization program was evolved, associated with a concrete awareness of the necessity to reorganize existing structures, in the wide sense of the term.

Modernization of existing enterprises.

The point of view explicited above is aimed in the first place at the existing enterprises which have grasped the need for modernization although it also applies in varying degrees to others. The variety and break-up of modernization programs clearly reinforces the reservations formulated above. Must also be considered the limitations imposed by manufactured products which often restrict the range of choice, without gorgetting the absence of standardization and the capacity of the parties. Under these conditions, it will be wise to modernize according to a logical overall program, bearing in mind the necessity for greater homogenousness of equipment in view of the above restrictions. This amounts to the acquisition of new and more productive equipment well adapted to the specific requirements of each special case. It must be borne in mind that new equipment must also be manned by an adequate labor force which must be trained and periodically renewed in accord with the demands of this equipment. In short, it is necessary to adapt to the demands of the product, the current situation, the level of qualification and potential competence of available personnel in the general context of available modern techniques. It is preferable to invest in modern equipment, which will be rapidly amortized because of its high degree of efficiency provided it is properly manned, rather than over-sophisticated equipment which, because of its manning difficulties and hazardous utilization, will probably be less operationally efficient.

This is all the more so in the context of textile equipment where renovations occur at such a high rate that a machine which is up to date today might already be obsolete tomorrow.

2.5.1.2. **Problems pertaining to the automation of spinning mills**

1. Our framework of proposition

Total and absolute integration of all stages in the spinning process which is the summit of achievement and the ideal target of the spinning sector, is a long way off and far from realizable at the present stage, even through the elimination of the Rover (flyer) or by reverting to open-end techniques. The road to these ends is not only unpaved, but barred by technical problems and congested with unfavorable economic policies or viewpoints. Fast automation is nonetheless achievable by applying partial solutions which do not farasmuch lose any of their economic soundness. Thus for some ten years the spinning mills have managed to cover balework and beam handling in a fully automatic opening cycle. Soon after the advent of this development, Japan applied Sacolowell's 40 year-old patented technique proving that the beam was in actual fact a "necessary evil". The question how far should automation be taken can only be settled by answering a set of further questions :

- how many and what types of different raw materials and blends should there be ?
- what is the relative importance of each component part of the processing line ?
- what is the mill's actual absorption capacity ?
- which is the most appropriate range of numbers ?
- how much should be invested ?
- to what extent can savings be operated on salaries and wages ? (balance of capital and labor)

At this stage, two consecutive steps seem to be beckoning :

1) from the bale to the drawing-frames

and

2) from the stretching-set to the spool.

This two-step climb is the first and the only phase we shall consider.
The remaining possibilities are too advanced and premature to fit into the present context.
Such an automation is economically efficient when :

- it can result in a reduction of the number of passed
- while maintaining or even improving quality standards
- and, naturally, increasing yield and overall efficiency.

In practice these techniques yield the following results :

1. sometimes a reduction in the number of passes;
2. yarn quality is maintained, if not improved, by the use of adjusting or regulating passes;
3. by interaction with 1 and 2, it is possible to improve productivity,in the best of cases through input of tufts in the frames and by simplifying spinningcan manipulation.

The spinner's approach to automation is favorable and not only in the case of major enterprises. In this context, the automatic handling of bales is becoming increasingly prevalent. Initial hesitations lay in the problematic position of blends.

When the spinner decides to increase the automation of his production line, for instance from automatic opening/cleansing to include drawing-frames, the in-feed of tuft offers interesting possibilities. On the other hand, to chose a standpoint for or against channel-feeding of the drawing system is not an easy matter. Engineers are however unanimous and adamant as regards the coupling of teasel frames to the drawing-frames; there are only two alternatives : a single pass or three consecutive passes. The first choice can make allowance for limitations in the production program.
When it is possible to make do with a single pass, this system is quite similar to the classical procedure except that it requires spinningcan reception after the teasel-frame stage, although in view of the orientation of fiber-end kooks , two passes prove to be necessary.

2. Coupling of teasel-frame to drawing frame

The system which consists in joining a number of meshes issuing from the carding brushes and to feed them directly to the drawing frame is quite ancient already.
It was noted at the time that the variation in the mass of the meshes could be accounted for by adjusting the stretching strap. Europeans termed this set-up "channel-feeding", with reference to combed wool systems. In this sector, such a procedure has been applied for even longer, it consists, theoretically, in feeding a number of meshes into a channel running at right angles to the direction of shuttle movement, superimposing on to a conveyor-belt and conveying them into the drawing-frame which finally releases them as crossed bobbins or in cans.

In cotton spinning, it was usual to work with a decidedly lower number of passes than in combed wool spinning. Thus when the number of passes for thread preparation was out from 8 or 12 passes to 4, it proved necessary to adjust the drawing frame. Clearly, this achieved a substantial reduction in the number of doublings, especially with a single drawing pass. In any case this is the only way of offsetting the variation of mesh density. It should be noted that the variations in thread number is greater in channel-feeding than in conventional systems. Short-run transverse doubling is automatically adjusted to the coefficient of variation of the thread.

However, the present system is a much modified version : the drawing-regulators currently available on the market achieve appropriate regulation of in-fed meshes, even at rates exceeding 400 m/minute. In view of these improvements, it was natural to return to the conception of channel-feeding which was perfectly adapted to the demands of further rationalization. However, the coupling of two such operationnaly distinct units as the teasel-frame and the drawing-frame posed a number of problems. In the first place, it was necessary to provide for and install a reserve of meshes ("spare lung") between the two machines to avoid having to stop the entire production line or to work at reduced output when break-downs occur ; such contingencies are rare but quite unpredictable.

It should be borne in mind that the spare supply of mesh must be increased proportionately to any increase in rate turnover and that the installation proper cannot get started by simply turning a switch.

At first the movement of carding-brushes is too slow and the mesh supplied, uneven : several solutions have been proposed.

As stated previously, another difficulty is the directional orientation of the fiber ends (i.e. the necessity of making the right number of passes between the carding-brush and the throstle-frame. Some 40 years ago, Professor Brüggeman emphasized the importance of presenting as many drawn-end fibers to the throstle-frame lamination as possible. This principle is now taken for granted. However, it means the compulsory use of a single drawing operation. Due to the fact that the regularity of the thread proved to be deficient, the use of channel-feeding systems did not become fully asserted and efficient before the design and instoration of highly involved drawing-regulators. After this stage, which was reached in 1960, the experimental installations could be and were widely industrialized.

3. The regulating pass

The stretching-regulator is the key part of the installations. Its functions are :

1° Regulation of medium- and long-term variations, either at the outset or after the carding or combing brush.

2° Assure the constancy of thread number throughout production.

3° Detect and offset inordinate mass variations and incidental variations (such as those resulting from working mistakes at the level of the thrasher unit, feeding of new rolls, variations in specific gravity in the input shafts, irregularities deriving from the shift from slow to fast gear of the teasel-frame, resumption of opening/cleansing operations or carding brush operation after replacements, correction of handling mistakes, shortage of spare meshes for channel-feeding, etc..)

4° Regulate quantitative and qualitative production; assure the proper operation of up-stream machinery (stress of mesh in the flyer, ruptures of mesh and thread in the flyer and thread in the flyer and throstleframe).

5° Cut the number of control operations and sampling to a minimum.

6° Ensure the uniformity of thread numbers and thereby avoid complaints from consumers.

However, the spinner must bear in mind the following points :

short-run irregularities, i.e. in the range of effects from the lamination, which can be measured to be approximately twice the length of the diagram, cannot be corrected by the stretching-regulator, they can only be reduced.
In the first place, the single regulating pass assures the constancy or standardization of mesh counts and eliminates any flaws or defects appearing after thrashing or carding/combing operations (for instance abnormal variations of thrasher rollers or variations in the rollers themselves according with distance from the axis). It is therefore quite suitable for use both in channel-feeding, and conventional can-fed spinning systems. The above list of functions can be satisfied by the drawing-regulator, the mass of pre-worked fibers being constantly controlled and the value of the stretching index being adapted to the automatically recorded mass variations. Control and regulation techniques must therefore be most rationally and minutely adjusted for each machine.

4. How efficient is the drawing-regulator ?

At the end of the chapter we submit a series of results of the routin production of three spinning mills. The mill labelled "A" works with high-output tuft-fed carding brushes with regulator passes in the first carding pass. For a period of four months, samplings were carried out on three drawing-regulators (in the mornings and afternoons) at a frequency of 5 controls per machine. The coefficients of variation were located between 1.4 and 1.6 %. This was not enough to warrant a post-regulation of these machines.

In mill B, two sets of machinery were confronted : the first equiped with the drawing-regulator and the other without it. The grounds for comparison were therefore excellent. Without stretching-regulator, the coefficient of variation after the first pass was 2.24 % and after the second 1.35 %. With the regulator the same rates fell to below 1 % after the first and second passes. Carding brushes were coil-fed.

In mill C, the set of values is reviewed in table 2. Comparative statistics of thread ruptures in "regulated" and "non-regulated mesh" preparations were also recorded on Mill C. It appears that the number of ruptures is approximately twice as high with non-regulated mesh.

## 5. Role of drawing-regulator in modern mills

The utilization of a drawing-regulator in a modern cotton spinning mill is onceivable and justified provide the degree of automatization is appropriate. This is clearly an essential prerequisite for the profitability and efficiency of such an installation.

Actually, faultless production can only be quaranteed with a coupling of carding/stretching installations; however the reservations we have made regarding single-pass drawing must be borne in mind; they also apply to the low-doubling installations.

### Stretsching-regulators and output increment

In future evaluations or comparisons between

- channel-feeding with incorporated stretching-regulators and
- conventional systems with can-feeding and two stretching passes,

the second arrangement should always be fitted first with a first-pass stretching-regulator. This improvement of procedure will apply especially to the production of average and small numbers, thereby creating a significant shift of investment towards spinning (see below); its use in the double-pass system can also result in a more profitable and efficient installation (for instance in the conventional installation this would even make it possible to do without the thrashing set-up).

With a tuft-feeding system the installation of a stretching-regulator is a must in all cases. Experience has proven that the stretching-regulator must be placed at first-pass level, contrary to previous prescriptions. The short-term irregularities are simply offset by the doubling.

Several viewpoints should be envisaged in the choice of feeding system (channel or conventional). The focal point for such a choice is not solely the magnitude of capital investment nor the interchangeability of components (flexibility) but also labor-intensity.

These labor requirements are indubitably lighter in channel-feeding installations although this advantage is mitigated when large-capacity feeding-cans are used in the conventional system, together with automatic conveyor-belts between the first and second stretching operations. As regards tuft-feeding, in which several carding brushes are coupled together, comparative advantages are also illusory as regards flexibility when two stretching passes are applied.

Rates of output must also be taken into account. In the pre-fifties, maximum rate of output of the carding-set was around 16 m/min and that of the stretching-set approximately 30 m/min. For many decades these rates were considered normal and nobody ever worried about achieving higher efficiency. Towards 1953, technological progress got hold of the stretching-set at the time the most straightforward machine of the spinning system. It was further developed and elaborated by the incorporation of the more advanced techniques in the field of rollers, which had already been tested at industrial level, and the use of synthetic and rubber fittings; (pneumatic) suctionpumps and improvements in electrical control elements were also used to advantage. Around 1962, the rate of output of the stretching-set had been stretched to approximately 120 m/min but was already considered normal in that year. In 1965, output requirements and stretching-set possibilities had become such that few industrialists wanted machines turning over less than 250 m/min. Currently the level of 450 m/min has been attained and there are no major impediments to even further progress.

As regards the increase of carding-brush output, it only began some ten years later, simply by increasing the speed of operation, especially that of the drum, also by pneumatic suction of the veil or by using special fittings.

It was only in 1962 that the magnitude of developments required in this field in order to achieve greater output without doing so at the expense of quality was realized. During the "heroic" era, the output of carding was 5 kg/hr which corresponds to a yardage of 16 m/min. In 1965 the figure of 20 kg/hr was topped, i.e. approximately 65 m/min. In 1970 : 40 kg/hr or 130 m/min. But carding is still far from being in top gear. In the system which consists in coupling several teasel-frames to the stretching-set, the increase of carding speed generates the problem of increasing the rate of the stretching gear four-, five, six- or even eight-fold. In this race, the stretching stage is the born loser; the tempo of the stretching-regulator was, in 1969, 8.8 times that of the carding-set; this allowed by feeding 6 to 8 meshes on the stretching-set, to match the maximum carding speed. Now, if carding speed continues to increase, stretching will just not be capable of keeping up and will therefore lose its role of corrector of short-run variations. If the teasel-frame is operated below its rate of maximum turnover, with the appropriate doublings, it will be necessary to make additional capital investment in carding equipment; this means revising internal rates of return and overall profitability of the installation.

How to decide for or against automation

We have limited our discussion to the two stages of automation under review, namely :

a. tuft-feeding
b. channel-feeding of stretching-carding combination.

The following points must be studied before diagnosis :

1) The quality standard desired for the finished product
2) Labor intensity
3) Capital intensity
4) Production program and flexibility
5) Predictable developments in the spinning sector.

1) Quality of finished product

Results obtained from tuft-feeding clearly demonstrate that they allow to obtain as good a ribbon, at non-stop industrial tempo, as with the conventional rollers. However, breaks in production can result in complications due to the differentiation of densities (specific gravity) in the feeder-shafts; these complications can occur regardless of the duration of the operating interruption.

The immediate utilization of a regulator will however offset any trends towards variation. Stretching regulation is therefore compulsory to cope with the irreversible effects of breaks in actual production. Another consequence is that continuous, no-transition shifts must be assured. In Japan, tuft-feeding was focused principally on spinning automation; at first it allowed for a second pass although it was soon found that less variation occured with a single-pass set-up, which naturally included direct feeding of the stretching-set, (no intermediate cans). Naturally this method also had to dispense with the rover (flyer). Actually, the two passes were all the more indispensable here in order to feed the ribbon to the throstle-frame with the right orientation of fiber ends.

If one wishes to retain the rover, then the second pass becomes less effective. The current trend is to provide for large-capacity buffers (10 kg of spare ribbon) for carding-stretching couplings. This assures the continuity of operations if one of the carders has to be stopped (for up to 20 to 30 minutes), either by using the spare ribbon of the still operative teasel-frames or by reducing the rate of output of the entire carding set, both of which are achieved automatically by the regulator. Quality requirements are very effectively met by the regulator in such instances, by checking any variations in thread numbers.

Thus it is possible to obtain an appropriate quality standard with thuft-feeding alone or with coupling and guiding of ribbon, although reservations must be made if the aim is to produce fine numbers.
Above Nr. 50, six-fold doubling is necessary; this is not justifiable with channel-feeding installations.

2) Labor-intensity

The bulk reduction of labor requirements brought about by automation is in itself a major gain over automatic trashing systems. However, the solution of adopting large-capacity cans and automatic ejection also deserves parallel consideration. An accurate evaluation of labor intensity for each alternative is rather difficult to make. Clearly, although supervisory personnel will always be required it can also be assigned to the task of carrying the cans; a line producing 240 kg/hr (2 x 2 stretchings at 426 m/min and 8 cardings at 30 kg/h) only will require, for each 8-hour shift, 24 replacements for the carding-set (i.e. 3 cans per hour) and 48 for the stretching-set (2 x 4 x 6 = 48), i.e. 6 cans per hour.

There will also be 24 changes at the end of the first pass but none after the second as change is automatic. Thus for such an installation there will be 3 cart-fulls an hour or a total of 6 cart-fulls for the carding and stretching sets together.

3) Capital-intensity (investments)

When the qualitative and quantitave labor intensity is positive (and, in the worst of cases, does not invalidate the automation project) unprofitable investments would more than offset the project and therefore definitely invalidate it.

4) Production program and flexibility

The stretching-sets which can currently be obtained on the market have rates of turnover of 300 to 500 meters a minute; in the carding sector, the weighted rates are of the same order, i.e. 130 m/min but they have not reached their limit.

In order to make a realistic and accurate comparative analysis of the performances of channel-feeding and can-feeding systems, we must take stock of the spread of numbers which can be produced indifferently by both alternatives. The production record (table 1) shows a general propensity to the production of higher counts than in previous years; ribbon having high specific gravity means an increase in output without the attendant cost-increase. A one-gram increment from, say 4 to 5 gr represents an output increment of 25 %. As regards the speed data, output will vary from 90 to 130 kg/h in drawing and 20 to 50 kg/h in carding.

In order to obtain a balanced spread of numbers, the carding output will have to be an even multiple of stretching output. Thus it is the stretching output which determines the output of the entire production-line. However, tuft-feeding also brings into line the cleansing system; its performances will also have to be taken into account.

The "opening gear" comprises :

- four bale openers,
- 2 to 4 cleansing machines (horizontal openers, vertical cleansers, etc...)
- 2 or (exceptionally) 3 thrashers (performance : 160 to 220 kg/h) and all the attendant condensers, filling shafts and switch-boards.

In the case of tuft-feeding, thrashers are replaced by tuft-feeders which feed the carding-brushes by way of conveyer installations. A set of cleaning equipment performs at a rate equivalent to that of 3 or 4 stretchings for channel-feeding, and for can-receivers to 4 x 2 stretchings. The number of cardings and their production are closely interrelated with the production of stretching sets when the carding-brushes are coupled to the stretching-set. In this case also the former determine the rate of output of the latter (tables 2 and 3).

These tables illustrate the reduction in the number of carders per teasel-frame with the increase of carding output, up to the limit imposed by the stretching output.

For a tuft-feeding installation, they indicate that any further increase in the output of the stretching set would only be acceptable for such increments as 70 to 105 kg/h or 105 to 140 kg/h corresponding to, say, one sixth, one fourth or one third of the cleansing output. Taking an average aperture of the cleansing fork, appropriate performances would be between 60 and 160 kg/h for stretching (corresponding to 200 and 535 m/min for 5 g/m or 165 and 445 m/min for 6 g/m), provided such a weight of ribbon can be opened and worked without difficulty in view of the demands for the remainder of the production line.

Table 2 gives the rate of stretching output as a function of carding output; table 3 gives the target carding outputs to match a given stretching output.

The carding output in these tables does not take into account the weight of the ribbon.

It is understood that the weight of the ribbon is the same at the carding as at the stretching stages.

<u>Unit output as a factor of determination of most efficient machinery combinations and couplings</u>

From the angle of the formation of carding and stretching machinery combinations it is useful to reconsider the classical method of 6-fold and 8-fold doublings. Table 2 displays the currently available and already largely overshot (by ± 15 %) maximum values for an 8-fold doubling assuming :

- a modest carding output (20 kg/h) and
- a stretching output of 535 m/min.

There are two alternatives : either to reduce carding output to 17 kg/h or to lower the doubling; the latter is the most efficient. Six carding-brushes turning out 20 kg/h correspond to the present rate of stretching output of 450 m/min. With stretching-regulator coupling, doublings of 4 and 5 are also possible, at least as regards the possibility of effecting corrections and offsetting variations; in view of the tranverse doubling which this implies 5-fold doubling is usually considered a safe and appropriate minimum.

Conclusions

1. An increase of carding output of 5 kg/h with a sevenfold doubling requires a minimum stretching output increment of 25 kg/h. For a (ribbon) specifid gravity of 5 g. this corresponds to 16.5 m/min and 83.5 m/min respectively.

2. The higher the rate of carding output, the lower will be the expenditure at tuft-feeding level.

3. The formation of carding-stretching couplings is recommended; it is limited by a given drawing output and a given thread number limit.

Degree of automation and cost/benefit analysis

In planning the reorganization of a spinning mill, there are, in practice, three alternatives :

1. Coil-feeding and can-delivery of ribbon
2. Tuft-feeding and can-delivery of ribbon
3. Tuft-feeding and channel-conveyance of ribbon (spinning-line).

On close analysis, the possible fourth solution of coil-feeding and channel-conveyance is only of academical interest.

On comparison, the third possibility is found to require three more carding-brushes than the other two. This is due to the fact that the channel system requires at least five carding-brushes. Considering that three stretching-sets will be required, to achieve the rate of output of 400 kg/h (N = 1), the total number of carding-sets required is 15. In the case of can-delivery, carding output potential car be utilized to capacity; 12 carding-brushes (or possibly even less) are adequate enough.

For a thread of N=40 (25 text) the following production sequence is accepted : (table 1)

Problems of cotton spinning automation

For the installations required for each of the above alternatives, the cost of equipment will range from 4.2 to 4.4. Broadly speaking, the preparation stages account for a share of 1.1 to 1.25. Moreover tuft-feeding may turn out to be less capital-intensive than coil-feeding. However, assuming that the cost for both is equivalent (with a slight advantage to tuft-feeding), the "spinning line" is definitely the more onerous : 10 to 15 % more; this can be explained by the large number of carding-brushes it requires. (If it required the same number of carders as the first two, the difference would only be 1 to 2 %).

From the angle of returns on capital investment, it has to be admitted that, with the increasing productivity of carding sets, the can-delivery after carding is the most profitable. A cost-price analysis shows that the use of a stretching-regulator at the first pass of the two-stretchings system only achieves the insignificant increment of 0.1 to 0.2 DPF kg.

The grounds for a comparative analysis of the various procedures or systems are still very limited; this leads us to carefully evaluate costs, benefits and snags.

To this effect it may be useful to determine the various limits of operation. With the increase of carding output which enables the reduction of brushes per carding-set, it is probable that can-delivery at the end of the carding stage will again become the norm.

Comparison of cost-prices for preparation and spinning stages

A comparison of costs for preparation and spinning equipment reveals the striking shift which has been taking place for a score of years. For a cotton spinning line with an output of 370 and 400 kg/h and a thread number of 40, the evolution of parameters is :

| | |
|---|---|
| 1950 | 1:1 |
| 1960 | 1:1.5 |
| 1970 | 1:2 |

The gap becomes even greater if we take into account further development possibilities currently on the experimental bench. The increment for a stretching-regulator in the first pass of present-day installations is practically unnoticeable.

Line of production and its flexibility

The potential of any range of spinning equipment seems to have always been determined in the past by the capacity of production of the cleansing set; with 2 or 3 thrashers, its output must range from 360 to 440 kg/h. Now, in the present set-up, this mass of materials must get through the bottle-neck of the stretching stage.

On the basis of the data discussed befor this output represents a range of approximately 3 or 4 stretching sets and 16,000 spindles. The average enterprise of independent department of a major enterprise will dispose on average of 3 to 8 trashers. This will allow non-stop operation of 1 to 4 lines of production. However, these figures are not truly realistic for no such plant is equiped with so few lines.

Consequently a reconversion or modernization must be undertaken (from the bale-opener through the teasel frame, to the drawing-frame, in the case of channel-feeding). To attain greater flexibility, the following combinations which make for partial automation may be envisaged :

a. a special cleansing line for each thrasher or each tuft-feeding installation. This allows doubling or even trebbling the number of lines. However, the installation is naturally more expensive.

b. coil-feeding installations, provided the numerous interruptions due to replacements in the cleaning set are provided for.
The number of lines is then limited only by the number of carding brushes. The minimum acceptable limit of capacity of a given line will be determined by the output of a stretching-set. For high-productivity machines (see above), this compells us to divide the output of a cleansing unit by 3 or 4.

This consideration leads us to overhaul our views on the utilization of a tuft-fed installation. The high carding output would result in an increase of efficiency, for the number of carding-brushes required would be lower and therefore would require less replacements at cleansing level. It must also be borne in mind that by far the greatest share of cleansing work is the cleansing of carding brushes.

Besides, for end-results, it does not matter whether the carding is done with 3, 4 or 5 carders per teasel-frame. Thus, channel-feeding is also possible in this instance, provided the minimum number of doublings is assured (i.e. provided carding output is not too high).

c. Tuft-feeding alone is chosen. Such a choice is self-advocating when carding output becomes 1/3, 1/4 or even 1/5 of drawing-frame output (with minimum number of doublings). In principle, the cost/benefit ratio of transformation investments is balanced.

d. Tuft-feeding also is rejected and the position becomes the "most accepted" except that flexibility decreases to the extent of the utilization of already or still available capacity.

The final consideration is :

e. Most plants are equiped with one or several lines which remain unchanged for long periods; it is for themthat part-automation would be most beneficial.

In unbleached spinning, when the teasel-frame reaches hourly outputs of 50 to 80 kg, 2 to 4 sets will suffice to match the performance of a normal thrasher and thus tuft-feeding can become continuous, like current feeding, methods with 2 or even 3 thrasher feeders.

It can be contended that the output of the cleansing line can be further increased by eliminating the coiling appliance; however this condition would imply the utilization of tuft-feeding which brings us back to the problem production capacity.

Predictable developments in the spinning sector

For this study, we have chosen the spread of numbers of 40 to 50 because the option in favor of automation is on.y really valid this range. The finer numbers need many more doublings to achieve the imposed quality standard and consequently are best produced with double-stretching procedures.

However, it is also in this range that open-end spinning process is entering the competition.

So far such processes have not gained much headway or popularity; several authors have rightly stated that the OE system is only competitive in the "large number" range a contention which we need not discuss here. But, as far as future requirements are concerned, it can be said that the degree of parallelism obtained with a single stretching is sufficient for the production of a turbine thread. The OE spinning does not resolve the problem of channel- feeding and can-delevery after carding. The option must be taken on the basis of the most appropriate carding output and the associated ratio : number of carding-sets/number of stretchings.

Will also have to be taken into account the fact that OE spinning, because of its lack of flexibility as compared to throstle-frame spinning, is not only more favorable to the spinning of large numbers but actually precludes smaller ranges. Small-capacity cans designed for the feeding of open-end systems are not a problem at stretching level, neither for the autonomous machine nor for the one which is fed directly; indeed, both types are available with automatic ejectors. However, this also implies can replacements every two or three minutes, i.e. a sharp decrease of efficiency.

## Conclusions

These anticipations must not be restricted to machinery. The factory wishing to achieve greater productivity will find solutions in the form of mergers or cooperatives with better equiped or complementary factories. This will also mean a more limited requirement of different machines for small-size enterprises. The medium-size and small enterprises will also benefit from part-automation.

The above considerations are aimed at showing that the partial automation of a spinning line, ranging from bale opening to stretching-set, is quite possible to realize and the technician disposes of various alternative possibilities to achieve such a goal.

To avoid being too extensive, we have excluded the first phase of automation, namely bale opening. For this stage, the problem does not consist in taking a position for or against tuft-feeding or channel-feeding which both require a perfect balance of equipment and outputs, but lies rather at the level of the efficiency and size of the component parts.

The complexity of these problems increase together with the increase of carding output, besides in the case of channel-feeding, the stretching-set is unable to keep up. It appears that, in the case of large numbers, tuft-feeding will become a necessity to keep uf with carding output; however, for reasons of economy and quality, the double-stretching system will be given preference in future.

Besides, the stretching-regulator takes on more and more significance because it effectively offsets variations and assures the constancy of thread number, with a limited number of transverse doublings. This advantage is somewhat offset, in most spinning mills by a slight increase in operating costs.

When a factory choses channel-feeding and therefore the utilization of the entire output potential of installed carding capacity, the drawing-regulator becomes a dire necessity to resorb fluctuations in specific grativity of carding ribbon.

TABLE 1

| | Nm | D | V |
|---|---|---|---|
| Teasel-frame | 0.20 | 1 | - |
| 1st drawing | 0.20 | 6 (5) | 6.0 (5.0) |
| 2nd drawing | 0.20 | 6 (-) | 6.0 (-) |
| Flyer (rover) | 1.2 | 1 (1) | 6.0 (6.0) |
| Ring spinning frame | 40. | 1 (1) | 33.3 (33.3) |

(parenthetical figures apply only to the "spinning line")

The following production line is optimal :

| | | |
|---|---|---|
| Cards | 12 (15)° | |
| Drawing-frames(pass 1) | 3 ( 3) | |
| Drawing-frames(pass 2) | 3 ( -) | |
| Flyers | 6 ( 6) | 360 spindles |
| Ring spinning frame | 40 (40) | 16,000 spindles |
| Crusher | 2 ( -) | (for coil-feeding) |

(°) possibly more if 450 m/min is not attainable.

**TABLE 2**

Performances of the drawing-frame (in m/min) as a function of carding output (kg/h) and number of brushes (drawing output 0.94 and 5 g/m).

| Carding output (Kg/h) | Number of carders | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 20 | (558) | 497 | 426 | 355 | 284 | 213 | - | - |
| 25 | - | - | (533) | 444 | 355 | 266 | - | - |
| 30 | - | - | (639) | (533) | 426 | 320 | 213 | - |
| 35 | - | - | - | (621) | 497 | 373 | 248 | - |
| 40 | - | - | - | (710) | (568) | 425 | 284 | - |
| 45 | - | - | - | - | (639) | 479 | 320 | 160 |
| 50 | - | - | - | - | (710) | (533) | 355 | 178 |
| 55 | - | - | - | - | - | (586) | 390 | 195 |

**TABLE 3**

**Carding output (kg/h) for a given drawing output (m/min) and number of brushes per drawing set (drawing output : 0.94 and 5 g/m).**

| Drawing output g/m | m/min | Number of brushes per drawing-frame 10 | 8 | 6 | 5 | 4 | 3 | 2 |
|---|---|---|---|---|---|---|---|---|
| 5 | 250 | 7.0 | 8.8 | 11.7 | 14.1 | 17.6 | 23.5 | 35.2 |
| | 300 | 8.5 | 10.6 | 14.1 | 16.9 | 21.2 | 28.2 | 42.4 |
| | 350 | 9.9 | 12.3 | 16.5 | 19.8 | 24.7 | 32.9 | 49.4 |
| | 400 | 11.3 | 14.1 | 18.8 | 22.6 | 28.2 | 37.6 | 56.4 |
| | 450 | 12.7 | 15.8 | 21.1 | 25.4 | 31.7 | 42.3 | 63.4 |
| | 500 | 14.1 | 17.6 | 23.5 | 28.2 | 32.2 | 46.9 | 70.4 |
| | 550 | 15.5 | 19.4 | 25.8 | 31.0 | 38.8 | 51.7 | 75.5 |

2.5.1.3. Anticipated developments in cotton spinning

The race for higher efficiency and higher output which has been under way for some time in cotton spinning lines as between tuft-feeding, channel feeding of coupled teasel-frame and drawing-regulator, large capacity carding feeding cans with automatic ejection of the cans at the second pass, the clearsing set determines the overall rate of output although the automatic regulator is also a bottle-neck in channel-feeding systems. We believe that the cleansing set output can be improved by eliminating the coiling device although this would mean tuft-feeding at carding level, which leads us back to the problems discussed under that heading.

These considerations only concern the manufacture of thread numbers between 40 and 50; it is only for this range that such further automation is profitable. The production of finer numbers requires much higher doublings if quality is to be maintained which makes two drawings necessary.

However, it is in this range of numbers that open end spinning is making its appearance. At the present stage of its development it can only be viewed as an experimental endeavor the practical significance of which still reamins to be proved (except for the higher numbers).
For the future it may be that parallelisation of fibers with a single drawing pass will suffice for good turbine thread. Thus spinning remains receptive to channel feeding as well as can-reception after carding. The decision will have to be made in view of highest efficiency in terms of carding output and ratio number of carders/number of associated drawings. It will also have to be borne in mind that open-end spinning has little flexibility compared to throstle-frame and therefore necessitates mass production.

The small-size cans designed for open-end feeding are not a problem at drawing stage, neither for the individual machines nor for that which is fed directly, because both types are available with automatic can ejectors.
The can sizes demanded by open-end machines are such that replacements will have to be operated every two or three minutes; naturally this implies a considerable loss of efficiency.

It is important that future planning be focused not only on technological aspects and their evolution but also on the more general context of corporate policy; indeed, productivity and overall efficiency can be much more radically affected by concentrations of means and resources such as mergers, partnerships or cooperatives.

This achieves a limitation of the number of different lines required in sizeable units. In the case of average or small enterprises, it will mean accessibility to partial automation.

Automation can be taken up the line as far as bale nibbling although the option is determined here, even more than in cleansing, by the acceptability of standardization and the output of automated components.

The technological development still to be achieved before open-end spinning can be used at industrial level without apprehension are substantial. One of the main difficulties is to re-unite the turbine-separated fibers, a process which is conditioned by the physical state of fiber surfaces, cleanliness of the feeder-ribbon, specific gravity of fibers (especially if there are different grades of fiber and variable surface states). Despite the recent improvements achieved by some constructors, it can safely be asserted that no open-end spinning system can match the fiber regularity and parallelism achieved by conventional systems.
For technical and economic reasons, the first industrial applications will be for pure cotton and man-made or synthetic fibers. Besides, the OE process has the major disadvantage of letting isolated fibers take their initial orientation and curvature and randomly depart from the directional orientation and parallelism which was initially imposed. The result is naturally that the thread exhibits a rougher surface, slightly reminiscent of carded thread. On the credits side, however, should be noted the great regularity of OE thread, its higher stretching capacity, its soft tactile effect and some measure of distension, even at higher torsional stress.

On the "liabilities" side are listed : its 20 % lower stress resistance; the need for 20 to 30 % higher torsion than on conventional systems to produce the same numbers; less surface smoothness; abore nrs 50 to 58 quality begins to deteriorate.

From the standpoint of polyvalence of utilization of open end spinning systems, it will be noted that there are definite objections to the indiscriminate processing of natural, man-made or synthetic fibers on the same machine : the fibers must be absolutely spotlessly clean or else the rate of rupture becomes drastically high.

As far as time-saving and economy is concerned, it is true that the by-passing of the fying-frame tenter means a possible output equal to 2.5 times that of the rover but the actual time-saving remains to be provided in practive, except for the thicker numbers (8 to 20) where the advantage is admittedly real; it also remains to be proved that there will not be any need for subsequent winding on. The price of the spinning head is of the order of 600 to 700, against 150 to 200 for conventional spindles.

The essence of the problem is to attain an even higher speed of delivery than presently while cutting the unit price of spinning heads.
Very involved tests are currently being carried out on machines which incorporate electrostatic processes, but the speed of delivery still remains around twice that of the flyers.

To sum up, we may state that conventional spinning suits nearly all fibers and thread types, the OE frame is a high-output and, by definition, more specialized machine. Prospects for mechanical improvements must be weighed against marketing and rate-of-return considerations; this explains the failure of most OE innovations to reach industrial level and there is no need to dwell more extensively on the variety of causal factors which impede the lowering of selling prices down to a competitive level.

## 2.5.1.4. Impact of plant size

The considerable diversification of the textile industry which leads us to envisage selective aid by sector (next chapter) imposes the same restrictions when we try to determine the optimal size of the plant. This "ideal capacity" will depend both on the sector, the degree of specialization and standardization and, in a given sector, the position of the market or markets in which the enterprise channels its production.
However, we can lay down a set of norms which meet sectoral realities in a number of cases although they will have to be constantly up-dated and revised.

The problem is not the same nor on the same scale in Brazil and other countries now entering the modern industrial stage as in old-time industrial countries, for the following three reasons :

- The cost of skilled or unskilled manpower alike is drastically higher in European industrialized countries and the United States for instance than in industrializing countries. This labor gap is likely to be narrowed in the long-run. The quota of wages in production costs tops 20 and even 25 % in the former category and 5 % in the latter where labor costs are half as high.
- The sharpness of competition in Europe and the United States coupled with and promoted by a consumption of textiles which is far above conventional levels forces the industry to utilize its capacity with the utmost efficiency and to use all techniques of sales, marketing, advertising, market analysis and organization it can in view of the highly competitive nature of the market. Besides, this situation naturally calls for much larger production facilities and more advanced technologies than in developing countries.
- Brazil has the major advantage of very low-cost and readily available labor. The modernization of the industry's means of production which already has considerable head-way should begin with a determination of appropriate plant sizes; this determination will usually make for lower scales but much more elaborate structures at all levels : marketing organization, overhaul of management structures, improvement of technical structures, staffing and valorization of personnel at all levels.

The Brazilian industry requires a great many highly qualified managers, in the short and especially the medium-run. Their effectiveness will depend on the atmosphere which prevails within the enterprises, itself conditioned by the top management. To draw the quintessence of these investments, it is mandatory that the heads of textile enterprises become fully aware of the need to renew their structures and that they prepare the ground for these changes.
We consider this preamble was necessary for it is a pre-requisite for the implantation of modern and efficient macro-units. The geographical extent of an enterprise must be in keeping with its general management capabilities.

In the same context, and bearing in mind that generally speaking the Brazilian textile industry suffers from acute shortage of managerial staff at all levels, we feel it would be hazardous enterprise - except in a few isolated cases - to create plant groupings and mergers in the form of industrial conglomerates if these plants are geographically disseminated. The essential pre-requisite of success is not large overall capacity but rather stalwart organization and sound structural frameworks; this calls for a large number of very competent and skilled managers.

The firms which find themselvels in this situation might envisage the dispersion of their units provided each one is given its own field of specialization; this greatly simplifies management structures and narrows the profitability gap.

In order to situate the problem in a broader context we shall examine the position of Brazil's cotton sector parallely to the present position of Europe with respect to plant size.

<u>European position</u>

There are more enterprises in the textile industry which fail to reach the treshold of profitability than in any other branch. Not at all desirous to leave the production process, these enterprises try by all means and measures to maintain the highest possible level of employment so as to postpone unavoidable difficulties at treasury level.
This artificially maintained level of employment is achieved at the expense of selling prices which constrains the enterprises to make concessions in this field and thereby reduce their profit margin even more.

This explains why, as compared to equivalent enterprises in other branches of industry, even the wholesome and well structured enterprises only achieve mediocre profit margins. Any amount of suggestions have been made in the past few years to overcome these difficulties,including propositions for the dismemberment of part of the European textile industry and the orientation of entire sectors to more profitable activities.

Europe will continue to pay salaries twice or several times as high as in developing countries for many years to come or even for decades to come. Besides it will have to face the fact that in its competition with such producers as Hong Kong, India, Japan, Macao, etc.. without forgetting the countries with a centralized economy, Europe cannot hope to cut its prices by acting on labor costs.

It is widely felt that no unexpected blessing can possibly intervene to change this outlook and that once foreign competition becomes to pressing, it is more advisable to pull out while there is still time rather than try to steer a sinking ship. To stay afloat, the European industry will have to aim for the following targets to be achieved within the shortest possible term :

1. The quota of wages and salaries should be brought down to and kept below 10 % of total turnover. Even in countries where average salaries are a mere 50 % of those paid in Europe, they only account for 5 % of cost-prices against 20 or 25 % in Europe.
2. The consumption of textile products must increase at a sharper rate and represent a greater percentage of total consumption of goods. This and this alone can achieve the efficient operation of the larger units by utilizing redundant capacity.

## THE GIANTS HAVE NOT ATTAINED FULL SIZE

A reduction of labor costs by 10 % or more can only be realized provided production capacity and the most modern techniques are created.
The size of the enterprises must be such that the firm can afford modern management techniques and structures comprising, in addition to the usual departments such as technical, personnel and commercial managements, sections for market studies, promotion and design of products, publicity, sales promotion, planning, budget elaboration, control, research, adjustment, etc...
Last but not least, the firm must be large enough to hold its own on the market. All this naturally requires much larger dimensions than those of present enterprises.

The classification of German textile enterprises by volume of turnover as recorded at the end of 1968 was as follows :

less than 270,000 US $, 2366 firms
from 0.27 to 1.35 million US $, 1267 firms
from 1.35 to 6.75 million US $, 709 firms
from 6.75 to 27 million US $, 166 firms
more than 127 million US $, 21 firms

Admitting that the consumption of textiles has increased at a normal rate in the interim, these figures can be expected to evolve as follows in the next five or ten years :

from 135 to 270 million US $ , 5 groups of enterprises
from 270 to 810 million US $ , 5 groups of enterprises
from 135 million US $ 20 groups of enterprises
from 27 to 40.5 million US $ , 100 groups of enterprises
from 2.7 to 5.4 million US $ , 100 groups of enterprises.

Some 230 enterprises and groups will therefore provide an overall turnover of some 9.45 billion dollars.

But the picture is likely to evolve as follows in a 10 to 15 years perspective :

from 270 million to 1.35 billion US $, 10 groups of enterprises
from 135 to 270 million US $, 10 groups of enterprises
135 billion US $, 20 groups of enterprises
from 2.7 to 54 million US $, 75 groups of enterprises
from 2.7 to 5.4 million US $, 100 groups of enterprises.

Thus a greatly increased volume of industrial revenues (approximately 9.45 to 14.8 or 16.2 billion dollars) will be distributed as between an even smaller number of enterprises (230 to 215). The trend for the seventies is therefore clear-cut : increase in the number and capacity of major groups, decrease of large and medium-sized plants and status quo for the smaller enterprises which will however record a slight increase of turnover.

## ROLE OF THE SMALLER ENTERPRISES

This evolution will entail the development of the role played by each class of enterprise in tomorrow's market. The smaller enterprises will survive and their existence will even prove necessary and indispensable provided they entrench themselves in their own specific fields of specialization and restrict their activities to the production of their speciality. We understand by speciality, products which could not be profitably manufactured by the larger enterprises notably because of the temporary nature of demand in such fields as fashion and luxury items; these cannot be mass-produced without excessive cost.

The individualization of society will continue to be asserted so that specialized enterprises of this size will not only find a place in the sun but will be indispensable to society.

The medium-sized textile enterprises, i.e. those lying within the size bracket between the large and small enterprises and which realize a turnover of 27 to 40.5 or even 54 million dollars will find it more difficult to stay afloat. Their numbers are predicted to dwindle in time. They cannot meet the requirements of specialty production and are not large enough to compete on the mass-production market for they cannot afford to be equiped with the dynamic research and development departments of the major groups. Their only chance of survival is specialization in a clear-cut domain of the industry with enough rationalization of production, improvement of quality and flexibility to fashion moods to radically outclass their competitors. Such an enterprise would, for instance be limited to the manufacture of overcoat cloth or bedding fabrics.

As for the large enterprises, their volume of turnover will be of the same order of magnitude as in the other industrial sectors and have comparable organization and power. This group of enterprises cannot only afford to diversify but must do so to remain in business.

These groups will evolve towards chains of factories of average size each having a turnover of 27 to 54 million US $ and run by a centralized management, with all that such a set-up can offer in terms of benefits and possibilities.

Not only will the number of such consortiums and the number of component factories increase, but their achievements in terms of production efficiency will increase on a par because new specialized sectors and development of the textile industry can be incorporated.

INCREASE OF LABOR PRODUCTIVITY

Projections in this field can be summed up as follows :

Although the textile industry of tomorrow will include all plant sizes, the turnover gap between small, medium and large-size enterprises will consistently widen. However the new pattern of production will enable the industry to augment unit labor productivity in such proportions that labor costs will dwindle to 10 % of total revenues.

This projection of the European textile situation was included here so as to bring into focus the following outstanding facts :

- the size of an enterprise cannot meaningfully be measured from an economic standpoint in terms of production facilities of installed capacity, (the number of spindles or looms for instance); it must be evaluated in terms of value of production. The scale economy, or the definition of plant size in terms of number of spindles or looms for a given rate of return is no more than a theoretical model which is based on often unattainable hypotheses, such as the manufacture of clearly defined spreads of numbers, a homogeneous and up to date stock of equipment and, especially, a perfectly organized and decidedly modern structural organization. When these conditions are complied with, it is possible to make positive comparisons and extrapolations with real cases;
- the major modern enterprise must move towards diversification of production, contrary to wide-spread beliefs, so as to cover the greatest possible market.
  Research and development services are the engines of diversification and reconversion of exhausted or unprofitable production-lines. Clearly it is meaningless under such conditions to assess the potential of an enterprise in terms of the number of production units it operates;
- the small production units have their place in the sun in the textile market of tomorrow;
- the average-sized enterprises are the ones which are really threatened and which will find it difficult to survive unless major efforts of readaptation are afforded.

For the sake of clairty and to provide some means of classification, even though somewhat arbitrary, we have defined plant size in terms of the number of spindles and looms in the cotton sector of Brazil.

ANALYSIS OF THE SAMPLE OF SURVEYED BRAZILIAN ENTERPRISES

On the basis of the studies on productivity described in the present report, the survey sample of Brazilian enterprises and the assumption that productivity is correlated to efficiency (which is not invariably true because of the negative impact of such parameters as range of products, general services, commercial policy etc...), the following findings and results were arrived at :

## COMPARISON OF PLANT SIZE (IN COTTON AND WOOL) IN TERMS OF PRODUCTIVITY

| Basis of evaluation | Nr. Spindles (cotton) | Nr. Spindles (wool) |
|---|---|---|
| Maximum unit output | 10 to 15,000 | 5 to 10,000 |
| Maximum labor productivity | 15 to 20,000 | 5 to 10,000 |
| Minimum units output | 5 to 10,000 | - |
| Minimum labor productivity | 7 to 8,000 | - |
| Maximum operating capacity | 10 to 20,000 | 8 to 12,000 |
| Minimum operating capacity | 5 to 10,000 | 3 to 6,000 |

The following trends are apparent :

- integrated or non-integrated cotton spinning enterprises ranging on average from 10 to 15,000 spindles rank firts in terms of unit output and from 15 to 20,000 spindles, in terms of labor productivity.
- the productivity of non-integrated cotton enterprises is higher than that of the integrated.
- the lowest productivities are those of cotton spinning in the less than 10,000 bracket.
- the situation is approximately the same as regards unit labor productivity.
- in the wool sector, the trend is less defined although it is clear that the smaller firms having 3 to 6,000 spindles have the lowest unit labor productivity.

Scale economy.

Our viewpoint in this respect was given in Chapters 1, 2 and 3. However, we make a synoptic review of the salient points. These considerations only apply to the production units specialized in high-quality goods having a narrow range of products at all levels of manufacture. The most appropriate criterion to define the optimum size of an enterprise in a modern economic circuit is usually the volume of turnover. There is however a special sector to which scale economy criteria can be applied, namely cotton mills specialized in medium quality popular articles designed to satisfy a less demanding consumer class (lower income brackets).

This type of industry will have to be organized in Brazil if it is to survive and overcome the difficulties pertaining to low profit margin concerns.

Actually, the current tendency is for these harrassed enterprises to turn towards the more prosperous and therefore much more competitive sectors which supply the higher income classes despite the fact that the lower-class market will retain all its importance and potential for many decades to come.

The organization of this sector will be achieved in the long-run by aggressive large-capacity enterprises confident in the potentialities of their market. This assurance will have to be stimulated by the authorities and even marshalled with a comprehensive and previous survey and analysis of the sectors especially in the fields of distribution and consumer education, conducted jointly by all enterprises of this sector in an all-out effort to expand and promote their internal market.

In addition to the domestic market major external markets in Latin America are open to such large-scale groups. We would even suggest that this special sector be structured in the form of a centralized or "directed" economy jointly set up by the public sector and the best equiped members of the private sector. Such an orientation of industrial development would define :

- the market and its medium- to long-term evolution.
- products which should be marketed and quantitative requirements.
- standards of production (norms and textures).

Special facility would be accorded for the creation of major production units or the grouping of units in most favorable geographical sites of the market.

These specialized units would have the size and structure of the medium-sized enterprises of tomorrow and should be made to evolve on a par with their market (progressive education of consumers - quality discrimination). However, it will have to be borne in mind that the higher the quality of a product, the finer the thread has to be to make for closer-woven fabrics ; this means higher scale-economy.

This evaluation applies to integrated factories in the bracket of 15 to 20,000 spindles and 300 to 400 looms (classical shuttle-looms with high rates of output, i.e. ± 200 strokes per minute and widths of 1.2 to 1.5 m, average numer : 20).

## 2.5.1.5. Selective aid by sector.

In this chapter, we shall try to define what we understand by the term sector, so as to avoid any confusion with other conventional interpretations of its meaning.

In our view, it is an element resulting from the rational and ramified break-down of the textile industry, operated according to criteria which remain to be defined taking into account the following set of facts :

- interdependence of all stages of the textile sector, between production of raw materials and consumption;
- co-existence in the industrial sector of two major population categories : that corresponding to the organized or potentially organized industry which can be meaningfully influenced by a variety of coherent measures to stifle detrimental evolutionary trends or to boost development in specific favorable directions; and that corresponding to the un-coordinated or spontaneous industry which obeys natural laws and is therefore difficult to control; the second sector, in which the organization and implementation of development measures is very difficult, is, by definition close to the consumer but far from public authority;
- existence in both industrial groups or sectors of various sub-groups or sub-sectors either having similar technological means or common markets or again, constituting a set of production units depending to a great extent on the sectors or sub-sectors of organized or spontaneous industries;
- existence of geographical or regional relationships which must be taken into account.

### Definition of organized and spontaneous industrial sectors.

The sector which we have called organized consists of small, average or large production units endowed with an actually industrial structure, of immediate economic significance but whose structures exhibit some measure of evolutionary inertia and rigidity unfavorable to change on a par with economic circumstances. They are linked to the field of distribution either by their own system or through external systems which are or should be inter-related with their global production policy.

Accordingly a relatively coherent development policy could be effectively applied to this sector.

**The spontaneous sector.**

The spontaneous sector comprises highly consumer-oriented disintegrated and disseminated units, generally of small caliber having ill-defined un-sophisticated structures, of temporary or potential economic significance, but endowed with considerable suppleness and adaptability. They have few structural links with the distribution field but their closeness to the market enables them to react rapidly to changes in demand. It is difficult to integrate them in an overall coherent policy. They must therefore be allowed to follow natural evolution trends, which will, in time, bring about the resorption or elimination of marginal units and the integration and merger of the strongest, with cooperative organization for the smaller but effective units. These natural trends should of course be fostered , in the short to medium-term with appropriate measures.

**The organized sector.**

This sector will comprise the following sub-sectors :

- spinning , weaving and preparation units for cotton and combined thread - integrated or not - manufacturing quality articles;
- integrated spinning, weaving and preparation units for woolens and synthetic fibers;
- non-integrated spinning mills for cotton, combined, wool and synthetics;
- large neadwear factories for cotton and others, integrated or not;
- producers of industrial articles;
- sector of jute and similar fibers;
- sisal sector.

We have only reviewed the industrial processing sectors, it being understood that the associated sectors, such as manufactures of man-made fibers, texturization, natural fiber production, garment manufactures, are also part of the organized sector or should be considered as such.

Before discussing, the selective aid programs, we refer the reader to chapter 2.5.5.2. which discusses investment requirements and is strongly related to the current chapter. This fact also explains why we have often been obliged to reiterate some fundamental concepts stated in chapters 2.5.5.1. and 2.5.5.3.

Spinning and preparation factories manufactoring cotton and combined articles of quality (not destined for lower-class consumption).

This sector already comprises very large units, some of which are entirely integrated even up to apparel manufactures stages and distribution chains. They are in the process of intensive modernization, to varying degrees, some having already implemented cooperation agreements, mergers or horizontal associations; they often apply agressive and well organized sales methods. However this is often counterbalanced by dispersion of management potential and inefficiency of investments. This is particulary the case of those enterprises whose high capacity and dissemination of production units is not coupled with an efficient decentralized management organization and which fail to associate their expansion with the corresponding structural modernization and indispensable technical improvements, both human (technical staff) and physical (appropriate lay-out, air-conditioning, handling facilities, etc...) These inadequacies should not be generalized, as there are some enterprises having an adequate overall structural organization.

The hazards of inadequate intervention are proportionate to the capacity of a production units and to their degree of complexity. This requires that the official aid authorities take into consideration only the major projects, if it is postulated that such enterprises, which have grown up by themselves are also capable of autodevelopment up to a given level of projects costs. This level remains to be determined.

In the second place, the aid request files should be as exhautive, comprehensive and detailed as possible with emphasis on the financial soundness of the enterprise, its structure, organization, ramifications, productivity, profitability, market outlook, etc... i.e., in short : its general policy and stability.

Associated to this file should be an individual constantly up-dated log-book or evolution dossier recording the business evolution and background of the enterprise as fully as possible. This complementary file would serve as setting for the request file. Finally, the actual conference with the project promoter should be made a rule. It will provide first-hand information and on-the-spot appreciation of the situation. It will often prove useful to associate the petitioning enterprise to the hazards of the operation in order to inhibit the submission of over-ambitious or premature projects.

An attempt at the determination of priorities by type of investment for major units of this kind is made in chapters 2.5.5.3. and 5.2.2.

Average - sized units.

This category could be defined by a reference capacity of 15 to 20.000 spindles, although this is not truly representative of the category. The units engaged in the manufacture of the same types of products as the major units discussed above and which are in the process of modernization should avoid an over-diversification of their production. They will inevitably have to face the competition of the major corporations, very often on the same footing and in the same market. Those which have not yet undertaken their modernization program, in spite of official aid possibilities, have already placed themselves in a marginal situation.

Delayed attempts at modernization should be viewed with reservations. Direct contact wiht such petitioning enterprises is recommended in order to obtain and explanation for such procrastination.

On the other hand, the average units engaged on the process of modernization should be oriented towards greater specialization in quality articles having low selling prices and designed for industrial or household consumption. The overhaul and reconversion of this sub-sector should therefore be encouraged and oriented towards further specialization. Here again, petitions should include a comprehensive and exhaustive study of development potential and market outlook taking into account existing competition.

The general structures which must be instored to attain their objectives will have to be perfectly pre-defined and incorporated in the petition file; their cost will be integrated in the overall investment evaluation.

The favorable cases must be granted substantial though equilibrated aid in the form of immediate funds, i.e. in the initial phase, and post-reconversion aid, i.e. for the take-off of the overhauled production-line. The latter encouragements should be degressive in time to force the enterprise to make the necessary efforts of productivity and research in quality and efficiency. These average specialized units are the vectors of export markets in the medium to long run.

The mode of integration with which these enterprises must be endowed depends on the kind of products turned out although overall integration, up to finishing stage should be attempted without making it a rule.

The average or small units which are already geared towards these specializations should be supported in order to enable them to grow to the measure of their market requirements. Provided their expansion potential justifies it, they should be viewed as special cases instead of as a group element, and studied accordingly. Investment aids are called for, stimulating the enterprises which have spontaneously taken a forward-looking attitude. It would be a shame to have such good initiatives disintegrate because of illusory obstacles or administrative fastidiousness which might favor the development of more opportunistic enterprises.

The non-integrated weaving mills, whose range of production includes either the articles requiring no specialization or those covered by one of the previous categories are doomed to extinction. The elimination of the smaller mills is inevitable in the medium run; as for the larger concerns, in the process of modernization, they are in a hazardous and uncertain position unless they envisage direct or indirect means of integration thus enabling them to keep pace with the market's evolution.

Such integrations must achieve the conversion of these mills into average-sized specialized units. The other alternatives are : either to be eliminated in the long run or to be absorbed by major groups. Such absorptions, which tend to increase the dispersion of the major units are only interesting provided, they result in a reconversion and specialization of the resorbed unit. Any special aid allowance to these weaving mills must be made in the above context, each case being viewed as peculiar using as guide line that no further investments can be granted before the restructurization, merger or association has been implemented.

The finishing and coloring shops working to order, in the cotton and combined sectors can but overlap into the other sectors such as knitwear, fashion weaving and miscellaneous non-integrated or semi-integrated weaving, non-integrated and other spinning mills. There is no point in making a sub-classification by according to kind of materials or fiber type. This sub-sector includes both major polyvalent or specialized units, average-sized units and a wide variety of small units, mostly from the coloring sector.

The major units have partially modernized to various extents and in various manners; the average ones are usually equiped with old obsolescent equipment and the minor coloring plants have usually failed to adapt their equipment to demand. The pressures of demand are primarily due to the arrival of synthetics, the development of the knitwear sector and the growing need for special chemicals for the preparation stages. The printing sector shows a tendency to bridge its development gap in the shortest possible time and we even fear that a rush towards uncoordinated investments in this sector may result in overcapacity.

This maladjustment, or rather the re-adjustment time-lag of the minor, and to an even greater extent the major, finishing and coloring contractors has simply accelerated the modernization or the further integration of the major groups and average units thus creating a dangerously competitive situation for the contractor sector. Although this trend should not be generalized it is certainly worth emphasizing.

The profit write-offs of contractors who lose business because the major units become self-sufficient are accentuated by the sharp competition of small coloring concerns regularly fed by the knitwear sector. Indeed, a large proportion of this sector's production comes in too limited parcels to warrant the contraction of major coloring units so that their smaller competitors get the order.

This preamble was necessary if we are to attempt to outline an action program, the investment requirements having been dealt with in chapter 5.2.2.

The printing rush and the recent expansion of demand would justify the performance of an overall study of the sector in order to accurately appraise the evolution of existing and projected production potential as compared to the evolutionary trends of demand. However, it was materially impossible for our teams to spare the time required for such studies.

Investment endowments for the printing sector should be viewed critically until such a comprehensive analysis gives the go-ahead.

The major contractors are in the current precarious position not only because of the reasons stated above, but also because of some competition from the integrated units which sometimes accept contractor work to occupy their redundant production capacity.

Their purpose is open to discussion, except in some form of association with the non-integrated sectors.

Financial aid to this sector should be determined on the basis of the above discussion or in the context of aid to the average high-specialization units which do not go as far as complete integration.

In short, we believe that the major contractor concerns should find their way out of the current deadlock by their own means and resources.

**Minor non captive dyeing and finishings mills concerns**, fed primarily by the knitwear and minor weaving mills sectors, are not, as a rule, equiped to cope with the latest trends in synthetics coloring, such as the panel coloring technique. On the other hand, their flexibility is an asset for the smaller manufacturers. Another important factor is the shortage of skilled technicians qualified in the latest techniques. We view this sector as being part of the spontaneous sector.

Spinning, weaving and cotton preparation mills engaged in the manufacture of economic articles.

For data on investment requirements, we refer the reader to chapter 2.5.5.2. We feel that, for the reasons set forth in the abovementioned chapter, this sector deserves to be studied separately from the other cotton sectors and that a special development strategy should be evolved. This implies an overall knowledge of its problems and its magnitude. From the findings and results of our regional studies it can be asserted "a priori" that the future enterprises of this sector, which can be qualified as in difficulty because by definition it is relatively unprofitable, will either have to be of average size (15 to 20,000 spindles) and highly specialized or large (25 to 40,000) and more diversified, their integration will have to include weaving and possibly finishing stages. Associations with finishing contractors highly equiped because financed by corporations will meet the requirements of the major units. The production equipment of this sector will have to be up to date and highly efficient economically a feature which precludes the installation of advanced technological processes on a medium-term basis. A sound organization and structure is indispensable to guarantee profitability.

The previous study of this sector as well as the evolvement of a development policy inspired from the above guide-lines will have to be made by public authorities allowing for the necessary decentralization of decision-making parties namely to provide for regional or sectorial peculiarities. The intervention of public authorities could be pushed as far as a provisional co-management with the interested parties in order to endow the project with its best chances of success.

Spinning, weaving woollen integrated and synthetics mills.

This sector is most diversified as regards end-uses : apparel, for fashion or otherwise, rugs, carpets, blankets, curtains and home-furnishing in general, industrial articles ...

It affects mostly the higher consumer classes; its market is undergoing sharp growth and is hardly crowded by competition. Its production potential is, recent or modernized with a few isolated exceptions, in the combed woolens sector for instance. The expansion of this sector should be promoted : moderately in some cases but strongly for the more deserving concerns. Demand projections have been made and determine the probable growth curves, bearing in mind that this sector is a vector for exports which must be exploited in the medium-run. Aid to this sector should be both direct and indirect, such as investment advantages and unburdening of charges. The combed sector remains highly traditional and conservative.

Non-integrated cotton, combined, woolens and synthetics spinning factories.

These units range from capacities of 9,800 to 15,000 spindles in the woollens and combined sectors; in the cotton sector they range from 12 to 20,000. There are several instances of mergers of the two spinning types under a unified management. Some even have a dexturization department. This polyvalence enables them to diversify their production, thus meeting the requirements of the headwear and non-integrated weaving sectors. The degree of organization and modernization of this sector is highly variable from one plant to another. Its productivity usually surpasses that of integrated spinning plants having the same technological level. The quality of their products is usually higher than that of their integrated counterparts and several of them actually export some of their thread production. Their main client is the knitwear sector followed by the non-integrated weaving sector. There appears to be a lack of information between these thread-producing units and their clients, resulting in a time-lag in the evolution of thread users with respect to their purveyors, both on the qualitative and quantitative levels.

In the long run, this lack of information between two consecutive and complementary production stages could have as consequence the formation of production bottlenecks and undue dispersion of thread serials and types to the detriment of standardization. Assistance to these spinners should be taken into consideration to allow them to complete their modernization program, especially that relating to their infrastructure : lay-out, conditioning, cleansing, manipulation, etc... which is still below standards. There is an increasinly apparent risk of seeing these units edge towards integration first of the knitwear and then the weaving sectors; besides, the non-integrated spinners sell their production surplus or products which are not adapted to their own manufactur s in the latter sectors'markets. This will create a conflicting situation for the interests of both sectors of supply and, in view of the inevitable price differences, can but result in marketing disparities which in the end will be detrimental to both the spinners and thread utilizers. Aid to this sector must therefor be aimed at strengthening the position of the spinning plants on the thread market providing for adequate capacity extensions. This position is reinforced by the consideration that thread producers have a more favorable integration potential than their weaving or headwear consumers with respect to spinning. The production of fine thread is a very difficult business; the production of good knitwear or quality fabrics is pre-conditioned by the quality of their threads.

Major integrated or non-integrated headwear units.

There are few integrated units of this category. They are usually prosperous, well equiped and organized concerns. Their administrative and technical management is usually sound. Indeed, their small size usually enables them to meet most requirements without the aid of a highly qualified staff. They are the nucleus of tomorrow's knitwear industry and their expansion must in no way be inhibited. Like the major integrated units of the cotton and combined sectors, their projects for development should be analyzed within the context of demand but also in view of export potential.

Their high degree of profitability allows them to be self-sufficient investment-wise so that aid should primarily be reserved to major projects. This strategy would have the advantage of avoiding the usual phenomenon associated to an overavailability of investment funds, namely the random & premature growth of the sector. Careful planning of expansion programs in view of market study results and long-term trends is indispensable.

The undue diversification of these enterprises which is an immediate threat considering that some articles come from the spontaneous knitwear sector, which is not so well equiped in the field or distribution but has the advantage of greater flexibility, should be avoided. Currently, for instance, fashion and fancy articles, which only account for a small portion of production capacity must, to meet the requirements of fashion collections, remain the exclusive market of the spontaneous knitwear sector and the smaller and average headwear units. The larger ones must remain specialized in mass-production series so as to utilize their production potential to the utmost, the magnitude of committed capitals requiring the maximum utilization of labor potential.

The very consequent profits at stake should be viewed as distorting factors liable to encourage opportunism.

In short, for this sector we advocate : programmed expansion, specialization in mass or yard goods, type of investment not creating undue overlapping of sectors, wide participation of enterprises to their own development, consideration of export eventualities, technical and managerial staffing in proportion with the expansion.

Manufactures of industrial products.

The units specialized in this sector produce a wide variety of manufactured articles. The role of synthetics is considerable, the specific properties of these fibers resulting in major qualitative improvements provided they are properly exploited. This technical potential must be taken full advantage of but must be associated with extensive information of potential end-users and, of course, a receptive frame of mind; this publicity devolves to the manufacturers themselves.

In view of the current phase of mutation, it is very difficult to specify investment requirements in the technological field : there would be a risk of seeing the most recent investments become very quickly dated. The studies for investment programs in this sector must therefore be examined with the utmost discrimination, technical objectivity and knowledge of most recent technological developments as well as the eventual advent of new materials.

Were the producer to be ill-informed and were the project to be hastily approved by public authorities, in the case of aid sollicitation, the investment is liable to be a write-off or to have little or no effect. New technologies such as non wovens, plastification, coatings, flocking system must be thoroughly analysed and studied to determine their incidence on textile materials, and chemicals, if they are to be successfully applied. This sector, which is of major significance because of its incidence on the other industrial sectors coupled with the wide range of technical know-how it demands, should, in our opinion, be left to itself as regards capital investment, government aid taking the form of a degressive unburdening of taxation in the development stages, advantages for the financing of prime materials purchases and the payment of supplies, etc... This short-term policy could, in the medium to long run be relaxed by the creation of the study center for research and development of textile technology, which we advocate in a special chapter of the current report, in view of its notable importance for the textile industry as a whole.

This cognizance of technology would then enable the knowledgeable assessment of projects.

Problems of the jute industry.

The figures relating to the Brazil jute and malva production reflect the sharp upward evolution followed by the manufacture of these fibers in the early sixties, although in the late sixties there were some sharp annual fluctuations in the trend.

The following table gives this evolution according to the official figures on fiber production and exports including data concerning fiber consumption and processing (1000 tons).

| National fiber production | | Sack equivalents | | |
|---|---|---|---|---|
| Year | Jute/Malva | Production | Export | Domestic Consumption |
| 1960 | 51 | 48 | - | 48 |
| 1961 | 61 | 58 | - | 58 |
| 1962 | 60 | 57 | - | 57 |
| 1963 | 57 | 54 | 3 | 51 |
| 1964 | 64 | 61 | 5 | 56 |
| 1965 | 78 | 74 | 17 | 57 |
| 1966 | 61 | 58 | 6 | 52 |
| 1967 | 73 | 69 | 10 | 59 |
| 1968 | 66 | 63 | 18 | 45 |
| 1969 | 57 | 54 | 5 | 49 |
| 1970 | 56 | 53 | 3 | 50 |

After 1967, the consumption of jute materials begins to decline. The factors responsible for this trend are :

1) The consumption of jute/malva sacks does not keep up with the country's agricultural development; there is a tendency towards local processing of agricultural products resulting in lower demand for export sacks; the replacement of sack by bulk handling (granel) and the competition of substitution products ranging from paper and cotton to synthetic packaging.

2) The national consumptions of jute/malva sacks should be viewed by the light of its two main features of utilization, namely :

   a) the use of new sacks for each forwarding (mainly on exports);

   b) the re-utilization of sacks which, in Brazil can be repeated as many as 7 times.

3) The increased popularity of containerization.

4) The relatively high manufacturing prices of jute/malva mostly because of production, industrialization and marketing costs, a fact which encourages the re-utilization of sacks and the choice of substitute materials.

5) The availability of jute fibers is very limited, the plantations too disseminated and covering un-economic areas. Agricultural methods are too primitive, mostly manual, which entails the hiring of unavailable and therefore expensive labor (Amazon basin).

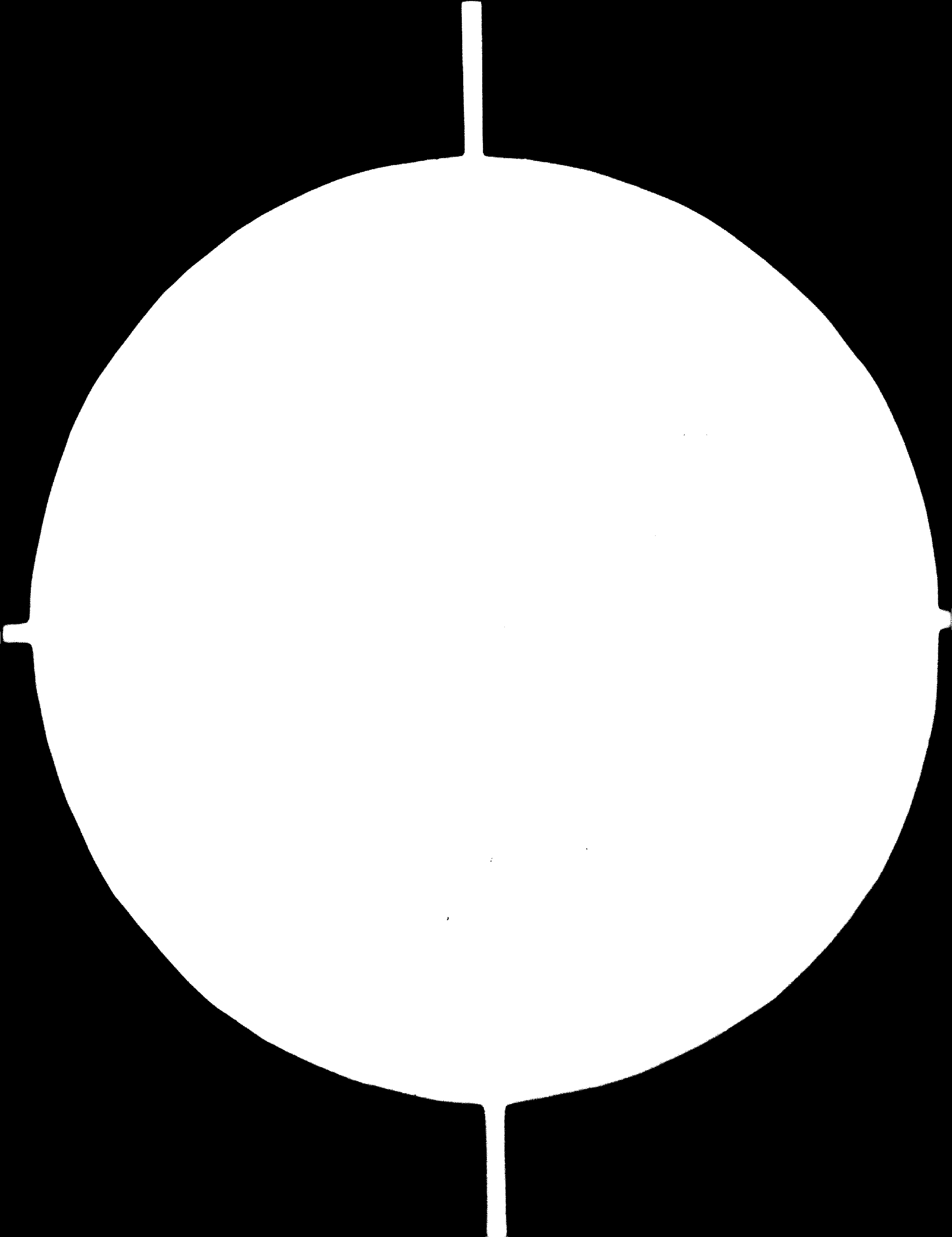
   According to some sources, the cost of production of 1 Ha of jute (dry fiber) is thrice as high as in India.

However, it should be borne in mind that jute can be utilized in other manufactures such as netted curtains and frameworks for conventional and tufted rugs and carpets, even if their quantitative significance is slight.

In this respect it is interesting to note the phenomenon which happened in the United States and Europe.

J-583

84.12.13
AD.86.07
ILL 5.5+10



4 OF 5

1.0 2.8 2.5
3.2 2.2
3.6
4.0 2.0
1.1
1.8
1.25 1.4 1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

24x
F

**Framework of tufted carpets**

% of utilized materials

| Support | 1967 | | 1969 | | 1971 | |
|---|---|---|---|---|---|---|
| | W.E. | U.S. | W.E. | U.S. | W.E. | U.S. |
| Flat polypropylene | 2 | 8 | 3 | 23 | 6 | 29 |
| Un-woven polypropylene | - | 3 | 2 | 5 | 4 | 5 |
| Polyester netting | 1 | - | 2 | - | 3 | - |
| Un-woven polyester | - | - | 1 | - | 5 | 2 |
| Various | 1 | 4 | 1 | 5 | 2 | 6 |
| Total synthetic fibers | 4 | 15 | 9 | 33 | 20 | 42 |
| JUTE | 96 | 95 | 91 | 67 | 80 | 58 |

N.B. This does not preclude the possibility of the same phenomenon happening to the packaging materials, whith a certain time-lag.

The above graph, constructed with estimates, shows two totally unrelated phenomena in Western Europe and the U.S. Indeed, in Europe jute should, according to predictions, make way entirely to its synthetic counterparts in this sector while in the U.S. the trend calls for a stabilization of jute/synthetics in the late eighties. This course is, in our opinion more plausible than the complete resorption predicted in Europe because we cannot conceive that any new fiber could succeed in completely replacing jute in this sector from the economic and qualitative standpoint in the medium to long run (10-20 years).

Thus, the European curves will, with a certain time-lag, finally rejoin the U.S. trend towards asymptotic stabilizations and located at approximately the same coordonates.

This allows to believe that the same phenomenon will occur in Brazil, though on a long-term basis.

To conclude, it can be asserted that in view of :

1) the very low quality of Brazilian jute with respect to India and Pakistan;

2) the enormous sums which would have to be invested for the restructurization of jute cultivation;

3) the trend of more industrialized countries towards the acquisition of ready-made jute fabrics.

Brazil should turn to the export of semi-manufactured or finished products. Consequently, the efficiency of manufacture should be rendered such as to cover :

1) the low agricultural productivity of jute plantations;

2) the relatively high cost of prime materials.

## SISAL/AGAVE

The sisal grown in the dry peninsula of Yucatan which is typical of arid zones, also and paradoxically thrives just as well in fairly rainy areas and even develops a higher content in usable fiber. In Yucatan the mean annual temperature reaches 25.3°C with very slight seasonal variations ; relative humidity lies between 73 and 89 % and annual rainfall ranges from 750 to 1,300 mm.

Climatic conditions are therefore similar to those found in East-Africa where sisal also flourishes and in Indonesia where rainfall averages 2,000 to 3,000 mm. It was found, both in East-Africa, Indonesia and Brazil that sisal can make do with the most arid land and poorest soil although yield is inevitably lower. Plantations in potassium-short soils are the most liable to deficiency oilments. An adequate content of potassium, calcium, magnesium phosphorus and nitrates is invariably a pre-requisite for a sisal cultivation to thrive.

The fiber yield of sisal plants is no more than 3 % of leaf weight so that for a long time producers have tried to utilize wasted materials. It was found that the previously rejected, shorter fibers have useful features, like the stiples of other textile fibers. They are salvaged by such methods as crushing followed by shaking and damp sifting. Processing refuse have for some time been used as fertilizers, their potassium contents being highly beneficial for exhausted soils. Furthermore, such materials as pectines have been successfully retrieved. The wax contained abundantly in the outer layers of the leaves is also used. Sugar (6 %) could be extracted and converted to fuel alcohol. Finally, we believe there is a possibility of making sisal-fiber pannels for home construction purposes.

There is often an overabundance of agave stems, especially at the end of a growth cycle, which have been used in the past for paper manufacture. Although the results were not very encouraging, brown wrapping paper can certainly be made from agave stems, the cellulose contents of the ground material being in excess of 50 %.

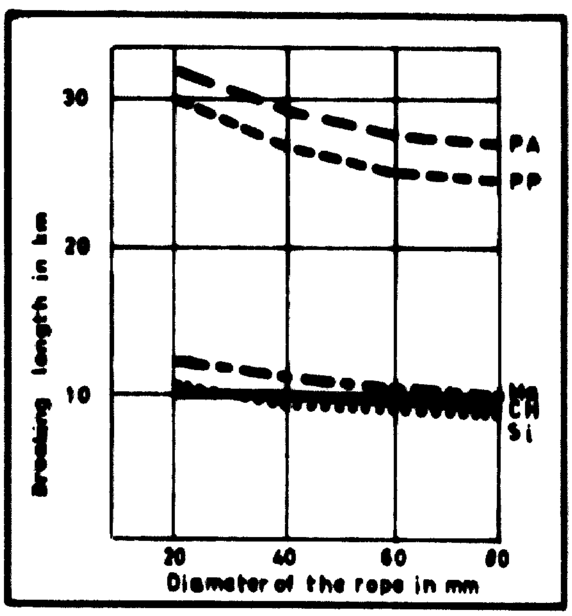
Brazil is the second world producer of sisal and similar fibers. Production is concentrated in the Northeast, the distribution by state being as follows :
Bahia : 38 % ; Paraiba : 30 % ; Rio Grande do Norte : 27 % ;
Others : 5 %.

Its main end-uses are sacks and bags in small amounts and, especially, rope in the wider sense of the term, i.e. including towing cables, laces, threads, etc...

Once again, as in the case of jute, the competition of synthetics in general and polypropylene in particular, may threaten the survival of these fibers on the world market.

The synthetic products, because of their advantages have become firmly established in the rope packaging sectors which, as stated earlier, are the main outlets for sisal products. The propylene strips and, to a lesser extent, highly-density polyethylene are less costly than their natural counterparts in addition to being lighter and more resistant ; the fact that these materials cannot be dyed is not a handicap in this field of applications.

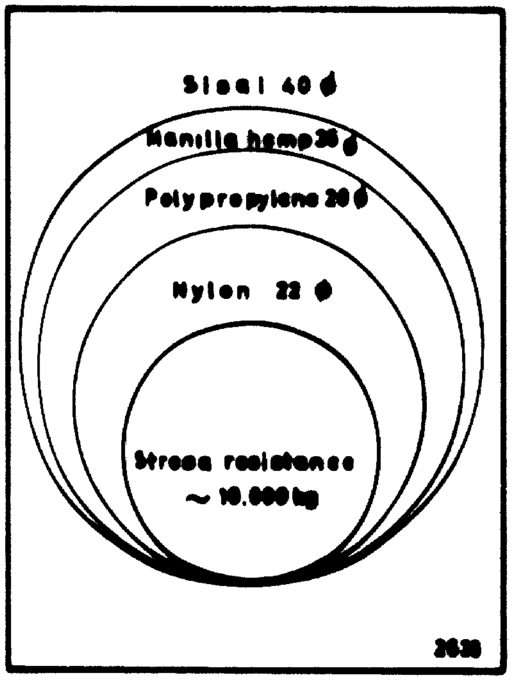
The following diagram compares, on the basis of the figures provided in the normalization cards, the critical breaking lengths for Manilla hemp ropes (Ma) sisal ropes (Si), hemp ropes (CH), polyamide ropes (PA) and polypropylene ropes (PP).




The critical values for natural fiber are very similar and correspond to approximately one third of nylon breaking length.

The polypropylene rope, similar in many ways to the hemp rope (for instance as regards extension, tactile effect...) is also apparently alike the nylon rope although actual differences are notable.

This is the reason why it has been found more realistic and accurate to determine the diameter required for the ropes to have an equivalent stress resistance.




Thus for identical lenghts of rope weighted with approximately 10,000 Kg, a sisal rope must have a diameter of 40 mm and a nylon rope of 22 mm to resist breakage.

The thicker the rope the higher will be the load resistance per meter but also the higher the cost of prime materials.

Finally, the availability of hard fibers on the world market is steadily diminishing, a fact which is accounted for by the widespread neglect of plantations, even in more under-developed countries, and to a flotation of selling prices, such as that of sisal. These reasons are motivating the textile industry towards the utilization of synthetic fibers as their preferred prime materials.

However, the demand for sisal string and rope is being maintained in the agricultural sector because of their lower cost.

We believe that in future the prices of synthetic products will continue to fall as a result of lower prime material costs and the improvement of manufacturing methods. Unless the price of natural fibers can be significantly cut, i.e. in the same proportion as those of synthetics, the latter will probably replace the former increasingly.

According to some studies, the price reductions required for the natural fibers to remain competitive are highly variable from one product to another. Thus it is estimated that the rating of, say, low-quality jute in Europe should fall to approximately 60 pounds sterling a ton to maintain its place in the market of large-capacity sacks. The price of better quality jute, used in the manufacture of carpet and rug framework and linings would have to be brought approximately to 70 pounds.

The prices of hard fibers would have to be compressed to a slightly lesser extent.

The proponents of these figures estimate that, to discourage synthetic competition in the rope sector, the prices of sisal in Europe would have to be maintained at their current level but would have to be cut in North America. It is, however, possible that the price-cutting will not have to be as drastic as predicted, depending on a variety of factors, including the possible preference of consumers for the natural product or its possibilities of re-utilization.

The potential market loss at stake, in the majority of industrialized countries would be approximately 650,000 tons of jute and 250,000 tons of hard fibers in 1975, in the event that these natural products failed to secure a competitive position with regard to their synthetic counterparts. To date, the demand for jute barely reaches 150,000 tons and that of hard fiber, some 600,000 tons.

The competition of synthetic fibers will probably have serious repercussions on the national revenue and the balance of payments of most natural fiber producing countries namely : Pakistan, India and Thailand for jute and Tanzania, Brazil, Mexico, the Philipines, Kenya and Angola for hard fibers.

The sisal problem and that of hard fibers as a whole is, in our opinion, far more momentous in the long run that the jute problem which will probably be solved by the appearance of new demands such as that of the recent tufted industry, currently in full expansion. In any case we believe that sisal will develop on a par with jute, namely because it is firmly and traditionally incrusted in the handicraft industry and that, properly managed and in view of the current tourist policy, may become a very flourishing industry in the near future.

Thus, understandably, it is not possible to make concrete overall modernization programs a priori without rejecting eligible enterprises and accepting others which on closer analysis would have proved unacceptable for financing. Actual on-the-fied selection must be operated and any attempt at theoretical uniformization is bound to failure.

Such a definition of overall modernization programs was attempted in 1960 by CEPAL and we believe that despite its theoretical nature it is just as valid today as it was then not as practical code of procedure but as a general setting or pattern for the actual program.

Three alternative reequipment programs had been set forth in 1960 :

Alternative 1.

Did not call for renewals of equipment but focused instead on improving productivity and overall efficiency by administrative reforms and improved organization.

Alternative 2.

Called for partial renewal of the older stock with up to date conventional equipment then in current use in Europe ; in addition it required the modernization of some opening machines, teasel-frames, spindles and looms.

Alternative 3.

Made for complete reequipment with highly automated and sophisticated machinery such as utilized in the most modern plants of Europe and the States.

Alternative 4.

Was not retained as an actual possibility because it called for the utilization of very advanced machinery still in the experimental stage.

The second alternative was retained as being the most appropriate at the time and there is no doubt it is still so today. Its cost was estimated in 1960 at 170,000,000 US $ not including the North East.

From 1960 to 1970, the total capital investment for the textile industry has largely surpassed the estimated requirements and, naturally, modernization is still going on.

This clearly proves the utility of setting a general pattern or principles of modernization (Alternative 2 in this case) but the unbalances between global estimates and actual expenditures also shows that the freedom of each enterprise to determine the type of equipment precludes the making of acurate evaluations.

Accordingly all that can be done at central level is to determine priorities, trends to boost and trends to hold back ; in short the differentiated implementation of a selective aid policy geared to the interactions between sectors and regions.

Jute and similar sector

We have decided to insert here the chapter devoted to jute and malva because it does not fit into the general context and lacks inter-connection with other textile sectors.

Threat of polypropylene

In 1971 a chemical plant for the production of powder or granular polypropylene was set up in the North-East to feed potential utilizers. We believe that the launching of this unit is premature and that it should have been weighed in the overall textile context, i.e. taking into account possible regional and intersectoral interactions.

It would have been preferable to previously prepare the ground for the reconversion of a portion of the jute industry in the North and North-East before confronting it with such a terrific opponent which may well upset the economic balance of these regions.

We therefore recommend the authorities responsible for the orientation of economic policies to make the most of the present situation by preparing jute industrialists for polypropylene processing.

If in actual fact the producers of this new raw material were to market their polypropylene among end-users of jute-bagging, such as coffee traders, sugar refiners, etc... by helping them finance bagging manufacturing plants the jute industry would find itself deprived of a major portion of its clientele and the ensuing crisis is liable to have repercussions in other sectors.

As there is no changing this state of fact, all that can now be done is to prepare the jute factories to adapt, either by installing polypropylene extrusion and spinning facilities or adapting their weaving equipment;

These considerations apply especially to major enterprises. A second alternative would be the partial transformation of production-lines to majufacture coated fabrics for industrial use, or rug frameworks.

2.5.1.6. Regional structures and disparities

Selective aid by sector implies a thorough knowledge and clear appraisal of the favorable trends and orientations required to achieve a balanced growth program for the country's textile industry.

The regional characteristics should also be taken into account; they have great impact in Brazil, notably because of its territorial immensity and diversity. Many regions are already endowed with the regional planning agencies which we advocate throughout this report, but they will have to be generalized to all regions.

Our framework of recommendations must be viewed in the general context of our methodological approach which in turn is derived from the evolution of the textile sector as whole from 1960 through 1970.

The regional peculiarities, disparities and inteferences resulting from the country's enormity and regional pluralism imply that any future policy for the overall coordinated and sustained economic growth of the country incorporate regional (and sectoral) factors of differentiation.

In the context of the industrial sectors we define the following regions :

- the North-Eastern and Northern regions
- the state of Minas Gerais
- the central region, which comprises the states of Rio, Guanabara, Sao Paulo and Parana
- the Southern region which comprises the states of Santa Catarina and Rio Grande do Sul.

Northern and North-Eastern regions

Underdevelopment, hot and unpredictable climate, agricultural resources clearly focused on the textile industry, such as fine cotton varieties, jute, malva, sisal... are the outstanding features of these regions clearly agriculture is the dominating source of revenues and accordingly per capita income is comparatively very low. The installed capacity of textile factories is however considerable. In 1970 there were 450,000 cotton spindles and 11,500 cotton looms employing a total of 32,000 workers.
This region accounts for 58 % of the country's jute production and for practically all sisal mills.

The cotton industry has undergone drastic modernization from 1960 but especially since 1965 under SUNDENE sponsorship. There have also been a large number of new implantations and large-scale reconversions.

Despite the fact that raw cotton is readily available locally a paradox can be observed in the trade of finished or semi-manufactured products. Since 1960, thread and cloth exports have increased 100 %, bound chiefly to the South and south-central regions, but the imports of the same type of products are more than twice the volume of the exports. Most of the imports of the North-East come from Minas Gerais (21,000 tons) which produces a total of 36,000 tons per annum.

The labor productivity of the North-East cotton spinning industry is 3,435 g/man/h and the weighted unit output 15.6 gr/spindle/h while for cotton weaving yardage output is respectively 34.2 m/man/h and 18.9 m/loom/hour. The spindles stock has diminished by 30 % in cotton spinning mills since 1960 while that of looms has fallen 13.5 % in the same period. The cotton input has been decreasing for the past three years and the thread numbers (counts) is higher than it was in 1960.

The reader is referred to the chapter dealing with Raw Materials where we have discussed the policy which should be adopted for the North East.

The elevation of average number of cotton output coupled on the one hand with the trade of finished products with the South and on the other with the import of cheap cotton goods from Minas Gerais do not find a rational explanation at regional level (internal demand) but rather at the level of optimal utilization of available raw materials. If mills specialized in low-cost cotton production were to be massively implanted in the North East, where they have become scarce due to the elimination or reconversion of the majority the textile industry of Minas Gerais would lose its major consumer and find itself in a very difficult position. This is an excellent case in point to stress the importance of taking into account the regional plurality of Brazil and its associated regional interactions, in planning overall economic growth.

Another instance of the regional impact of a decision is the implantation of polypropylene powder manufacturing in the vicinity of Bahia a plant, which turns out 12 to 13,000 tons of powder per annum. Now, if this polypropylene were allowed to be channeled towards bagging (currently the major outlet for jute in the North and North-East), the jute industry would, in view of the lower-weight advantage of polypropylene, be dealt a still blow. On the other hand, if development planning takes into account the weighted regional impacts of both sectors, for instance by channeling polypropylene production towards cordage or cables a new interaction would appear, this time with the sisal sector which is even now planning to install additional capacity in this sector:thus sectoral planning must take into account the plurality of intersectoral and interregional interactions.

This implies intricate coordination of projects at top decision-making level but in conjunction with regional development planning directorates. Thus decisions emanating from a central planning agency would in all probability result in deep-rooted and irreversible unbalances if regional development planners are not previously consulted and their arguments weighted on an overall scale of economic significance. The country is much too big and plural for this to be otherwise, as the country's notorious "boom-and-bust" growth policies have proved time and again.

Conclusions

- the cotton produced in the north is of a finer grade and stronger than in the south; this position can be further strengthened by improving the yield of plantations and standardizing qualities;
- the cotton factories of this region should therefore be designed bearing in mind this dual target of top-grade and prime-quality cotton;
- requirements for low-cost popular goods are met in part by the regional industry but also in large measure by a major quota of the industrial output of Minas Gerais. If Minas Gerais were to shift towards higher qualities, the northern region would be forced either to turn elsewhere for its supply of low-cost popular goods or to expand its own production capacity;
- the implantation of synthetic fiber factories geared to the knitwear industry has already begun in the North of the country and should result in regionally profitable structural changes; the popularity of synthetics-made outerwear is guaranteed by the climatic conditions of the region. The quota of synthetics in cotton blends is very slight although the use of continuous filament in cotton-type weaving is already gaining popularity (light articles, shirts, polos...)
- the jute industry is well developed in the north and for some urban centers it stands as the core of economic and social life; any major changes to these economies would result in such a regional upheaval that its repercussions would be felt throughout the associated sectors of the textile industry. A sharp change of the balance without previously preparing the ground with plans for reconversion or mutation, would provoque the economic collapse of microregions whose revival is liable to be very long, if at all possible;

- the same problem is found in the confrontation of sisal to polypropylene; the technical benefits from the untimely or uncontrolled intrusion of this new material are largely offset by damages which would result to the jute and sisal industries. However, if there is no other alternative, the public sector should help implement the reconversion of these industries without delay;
- the recent opening of a chemical plant which will manufacture 12,000 tons of polypropylene demands the protection or adaptation of the major jute factories of the North and North-East within the best delays, i.e. before the inslaught of the new materials makes their position untenable. There is even a chance that the consumers of bagging will be urged to produce their own prime materials.

State of Minas Gerais

The textile industry of this state is extensive; the cotton industry alone consists of 80 mills having a total of 400,000 spindles; with an average of 8,000 spindles per factory, the average size of the mills is comparatively small. There are 13,700 weaving looms of which 30 % are self-operating (automatic). Weaving mills are also small on average : only 5 % have more than 100 looms. Most mills are family concerns; usually integrated. Out of a surveyed sample of 80 factories, only 5 were not cotton-processing. Juiz de Fora has a fair concentration of knitting mills.

However, finishing facilities are inadequate and should be redesigned according to a comprehensive and coherent modernization plan. Per capita income in this state is low; the average price of textile goods, in terms of yardage output is 58 % of the average price for the entire country.
60 % of production is exported to the North East.

Conclusions

- Minas Gerais is still a very secondary cotton producer but is endowed with the physical pre-requisites to flourish; its land is fertile and well suited to cotton farming; climatic conditions are ideal; land and labor are both readily available.

- The industry is very cotton-oriented and usually composed of family concerns, on the average very small; the intrusion of synthetics is, so far, negligible;
- the vast majority of fabrics are of mass-consumption type and traditional design; unit prices are very low;
- a natural trend for the industry of this state to follow would be the reconversion towards higher-standing items such as those for home-furnishing or industrial uses, a change which would achieve the two-fold purpose of
  1) increasing overall profitability of production
  2) providing for the hazard of seeing its main consumer - the North-East - become self-sufficient in this type of goods (new implantations, increase of installed capacity);
- we believe that the most rational evolution take the form of a revision of the current range of products, improvement of quality, renovation of unduly traditional designs. In addition to the direct benefits from such developments, this would assure that the North-Eastern outlet remain open : this region is a potential buyer of finer and higher-standing goods for traditional industry has dwindled to insignificance : why revive it if the neighboring Minas Gerais still has a sound infrastructure which is only waiting to be reorganized and strengthened ?

We advocate the following framework of measures aimed at strenghtening this sector :

1) Creation of a core of 5 or 6 small family concerns, well grouped geographically;
2) Instoration of a common cotton-working plant of large capacity and high rate of output;
3) Subsequent implantation of a garment factory;
4) Specialization of each family unit in one or two specially designed articles;
5) Finishing and garment manufacturing plants would be adapted at the outset to each specialization;
6) Each factory would maintain its individuality, the only common point being joint planning and common finishing and manufacturing factories;

7) Each of the latter would be run by managers independent of the corporated units;

8) At the end of a pre-determined term of, say 10 or 15 years, each family would become part-owner of the finishing and garment manufacturing factories, without ever becoming majority holders however;

9) A board of Directors would be constituted comprising one representative from each spinning or weaving mill and each finishing and manufacturing factory, the costs and benefits of the two factories would be distributed according to a pattern and modalities which have to be studied to distribute the burden of liabilities and benefits evenly among all "shareholders". The managers of the finishing and garment factories will be given a share in the latter's profits and any decisions concerning them will be taken jointly by the Board of Directors at a majority vote (of to be determined);

10) Any decision affecting or committing the corporate group must be taken by the Board of Directors.

11) Any claims resulting from manufacturing defects are shouldered by the responsible unit(s) : flaws at cloth level would be borne by the specialist units which produced it, flaws at garment level would be borne by the managers of the common factories and the associated units, according to quotas which remain to be specified by the board of directors in conjunction with an expert representing the incriminated factory. This procedure need only be applied for substantial damages, i.e. above a pre-determined cost limit. Below such a limit, the responsibility and costs are shared earlier as specified.

12) The two most essential pre-requisites for such an undertaking to be a success would be, in our opinion, the involved and very thorough preparation of the project dossier, a very well organized campaign of information directed by an official regional agency; substantial incentives for potential entrepreneurs in the form of very consequent benefits and support subject however to the full acceptance of the "joint venture" nature of the project; guarantee of autonomy for each associate; a pre-conditioned and open-minded market.

13) Such a dynamic and development-oriented industrial core would be a medium-term vector for the exportation of finished products to Latin American markets in a first stage and Europe in a subsequent stage (very wide high-quality fabrics);

- the concentration of knitting in Juiz de Fora would also be favorable for very profitable restructurizations such as the formation of knitters, garment manufacturer's and fiber producers associations, between parties having convergent interests in the market, but above all who could pool their resources by creating common services : common purchasing and information agencies, finishing and garment factories and joint coordinated distribution and marketing policies; this could even be carried as forth as to include the implantation of common laboratories with the most recent equipment or again of common data processing (computers) management planning systems.

The Central Region, which covers the states of Rio, Guanabara, Sao Paulo and Parana

Accounts for 65 % of domestic cotton spinning installed capacity and nearly 75 % of weaving capacity. In the combed wool sector, 70 % of spinning equipment (spindles) and 78 % of weaving equipment (looms) is concentrated in the state of Sao Paulo.
80 % of the country's knitting potential is in the Central Region. There is also a large concentration of custom finishers and dyers.

85 % of the non-integrated spinning mills are situated in Sao Paulo; they feed the knit-wear sector and the innumerable non-integrated weaving mills. A major concentration of minor weaving crafts can be found in Americana, totalizing 10,000 looms; these deal chiefly in man-made, cotton and synthetic fiber and thread, in that order. There are also four or five large finishing and yarn-dyeing concerns in Americana.

This region has become the country's prime producer of cotton, especially medium-long and short grades. The productivity and yield of plantations is much higher than in the North East.

Sericulture is concentrated in Sao Paulo as are the attendant silk industries.

35 % of the jute industrial capacity is in the Central Region; so is 65 % of cotton and rami bagging capacity.

The production of man-made and synthetic fibers is very consequent; actually, not so long ago it accounted for 100 % of installed capacity.

Conclusions

- the differences in types of industrial groupings are clear-cut; the states of Rio and Ganabara are specialized in fine thread for lace, embroidery and ribbon manufactures; narrow fabrics of all sorts are turned out in appreciable quantities.

  Very large well organized and rationally structured integrated factories for cotton and cotton blends are found side by side with less adapted and therefore less successful enterprises. Synthetic spinning and knitting is well represented; the combed and carded wool system has practically disappeared.

- the closeness of a consumer market having the highest average per capita income of the country and the ready availability of synthetics will naturally guide the textile industry of Rio and Guanabara towards high-quality goods. The garment industry is already well installed and finds all its necessary accessory materials, narrow fabrics, etc. locally; however it will have to achieve the improvement of its structures;

- the local market will undoubtedly develop considerably as will the possibilities and outlets for exportation of quality goods; however, the latter should not be given priority over the former;

- the state of Sao Paulo has the full range of textile sectors and activities, but also the majority of non-integrated weaving mills for fancy and fashion goods as well the majority of luxury-items knitting factories. In other words a large number and variety of small, highly consumer-oriented, units always ready to suit their production to the whims and needs of fashion and high-society.

  The major integrated units are very large and the garment industry is already endowed with large industrial-scale units; furthermore, the marketing structures of this state are already beginning to adapt to the demands of the rapidly changing situation : luxury boutiques, fashion-shops, shopping centers, etc.

A very large number of small weaving crafts and family knitting workshops also thrive; the attendant sectors, i.e. spinners (upstream) and dyers and finishers (down-stream) are just as numerous. These spontaneous or unorganized sectors are hardly if at all controllable.

In view of such an extraordinary diversification and spread of production scales, it is practically impossible to make clear-cut recommendations aimed at specific regions or sectors; we can but note that this profusion of initiatives and miscellany of interests can only result in a form of improvisation for the smaller units; now, as they depend up-stream on non-integrated spinners and downstream on dyeing and finishing plants, it is clear that unless their purveyors (spinners) continue to integrate according to present trends and their consumers (finisher, dyers) make the necessary technological adaptations (dyeing of synthetics, panel coloring, etc...) these spontaneous sectors may well have to go out of business for lack of the vital frame work of support. If as a last resort they envisage a form of integration directly into the spinning sector or, alternately, the finishing and lower sectors, they will only achieve a dissolution of scarce means and resources and the overburdening of their already slight structures.

Associations or partnerships with spinners and finishers are therefore the only appropriate orientations below a given size-limit.

This kind of development requires close interrelationship and cohesion of potential parties as well as homogenous and effective interprofessional organizations; these pre-requisites are not currently met in the state of Sao Paulo. One solution would be to decentralize these organizations by subdividing them according to sub-regions or even micro-regions so as to achieve the indispensable coordination and interrelatedness of the interested parties.

In this respect, it seems relevant to recall a strange but actual phenomenon which is illustrated by several instances throughout the world and concerns the problem of textile metropoli :

A number of these super industrial centers have exhibited a decline of productivity in the past 30 years; some economists contend that such a recession is attributable to an atmosphere of mutual distrust and lack of understanding.
Whatever the case may be, the following aggregate of causes can be held responsible for such a turn of events :

1) The more members there are in an employer's association and the more disparity there is among them, the more liable the association is to dissention and ineffectiveness.

2) The more concentrated a market, the more attractive it is to non-industrial concerns and/or capital.

3) The more consequent these interests are, the greater will be the mutual mistrust among industrialists.

4) The latter point coupled to the first two finally entices the industrialists to disassociate from in the association and to only attend its meetings on very special occasions.

5) The interaction of all these factors of disintegration converges towards on isolation and uncoordination of initiatives. It could also be assumed that this atmosphere results in the retraction of an enterprise into the shell of its self-sufficiency (although it can also be attributed for some measure to over-confidence or over-presumption).

   In practice, this either leads to wrong decisions of prestige or to a position of passive expectancy resulting, respectively, in failure and senility.

The Southern Region : States of Santa Catarina and Rio Grande do Sul

A series of particularities in these two states demand that they be discussed separately.

1. Santa Catarina

   The textile industry of this state is primarily devoted to the spinning and weaving of cotton and cotton blends and to knit-wear. This is the only Brazilian state where the number of cotton spindles and looms has sharply risen since 1960.

In fact it has grown nearly 100 % in the ten-year span.
Its factories have specialized in home furnishing and it has the largest cotton knit-wear factory of Brazil.

This industiral nucleus is, by and large, very well organized, well structured , modern and dynamic. It has evolved to the stage of a pooling of resources for the installation of common services such as computers,very modern laboratories, corporate planning departments, etc...

The knit-wear industry, as mentioned earlier is also flowering and some enterprises have attained large capacities and structures, by industrial standard.

Conclusions

The remarkable development of this state should serve as model for other states having similar starting conditions; its industrial organizations and associations are active and their programs are aggressive and constructive rather than passive and defensive. Their effectiveness is naturally enhanced by the fact that their members have concurrent instead of conflicting interests (specialization makes for little internal competition). Their mutual support actually includes common exportation services.

There is no reason for which other similar textile cores should or could not apply similar policies regardless of whether they are composed of new implantations (the ideal formula) or fully-grown geographical concentrations.

The pre-requisite of industrial complementarity between the units of such centers is not absolute; it definitely helps to make the endeavor successful but it is not indispensable. The will of cooperation and joint achievement can suffice, provided it is translated into aggressive organized efforts. Whatever the case may be, the number of associates should be restrictive, for the reasons discussed in the preceding paragraph.

Assuming it is an acquired fact that such development efforts deserve maximum encouragement, we wonder whether such constraints as the strict enforcement of the laws on similarities, bans or restrictions on imports of quality cotton when it becomes short or too expensive due to poor pickings, etc.. are not obstacles to growth and accordingly whether they should not be adapted to such special sectors as the one discussed above. Such a policy would not be discriminating nor create a precedent : it should be presented as an official encouragement and incentive to highly laudable initiatives in keeping with the nation's overall development views. (The exports of Santa Catarina are the highest of the country, as compared to the other states).

2. Rio Grande du Sul

This state stands, second to Sao Paulo in the production of wool and blended wool items. It also comprises a regionally concentrated knitwear sector and substantial non-integrated spinning mills; carded wool manufactures are important too and the production of hand-made wool yarn is firmly implanted.

Conclusions

This raw wool-producing state has apparently lost ground in the wool industry since 1960 in favor of Sao Paulo. The reasons for this should in our opinion be sought in the nearness and direct contact of the consumer market for this kind of goods in Sao Paulo and, as a natural consequence of this state of fact, its better adaptation of marketing methods and infrastructure to consumer patterns and demands.

Were the wool production of Rio Grande to achieve substantial increase and, especially, greater centralization and organization of its producers, it might be profitable to install local defatting and washing plants provided, that is, the development of finer quality and more elastic grades was actually realized by the current cross-breeding program. The grading of qualities could also be achieved in these cleansing plants and the cleansing technique could be adapted both to the quality and to end-uses (combed & carded wool, carpets, semi-combed).

Wool processing could be taken up to the topping stage thus enabling the processing plants to influence the quality of their produce until the most advanced stage prior to spinning.

Such a system cuts marginal losses of materials, tends to improve quality (which will have to be standardized) and reduces unit transportation costs. This incipient organization of the wool sector could subsequently lead to the implantation of a central laboratory for wool; it would be in charge of studies for the improvement of qualities, basic research and analyses to fix responsibilities in case of interindustrial contentions and to promote wool on the textile market.

A secondary focus of interest but which also deserves attention is the eventuality of installing lanolin-recuperation plants in the large-capacity cleaning installations. This fat is widely utilized in the cosmetics pharmaceutical and chemical industries.

## GENERAL CONCLUSIONS

We would not assume to have made an exhaustive survey of all the regional facets of the textile industry. Our aim was rather to stress those aspects which we thought were of major interest or were most likely to bring out the regional lines of force which should be taken into account in economic planning; we have managed to convey the impact of regional interactions on the growth prospects of the textile industry and the importance of ensuring that regional development officials and industrial associations have a sufficient knowledge and understanding of their regional problems to collaborate effectively with top planning officials in the general efforts of growth coordination, then we feel we have contributed to gaining deeper insight into the problems of the textile industry at regional level.

We have also tried to prove that the strengthening of a regional economy is more easily and much more effectively achieved if the private and public agencies are allowed to work together towards a common goal.

2.5.2. Role of domestic machinery manufacturers.

TABLE OF INVESTMENTS FOR MACHINERY AND EQUIPMENT
IN BRAZIL 1968-1970

| SECTORS | % of foreign equipment | % of domestic equipment | % Total |
|---|---|---|---|
| a) Spinning and weaving | 84.0 | 16.0 | 100.0 |
| Natural thread and fabrics | 79.5 | 20.5 | 100.0 |
| Blends and their fabrics | 84.3 | 15.7 | 100.0 |
| Chemical threads and fabrics | 88.3 | 11.7 | 100.0 |
| b) Hosiery | 80.6 | 19.4 | 100.0 |
| c) Trimmings | 75.0 | 25.0 | 100.0 |
| d) Cordage and zippers | 81.2 | 18.8 | 100.0 |
| e) Bagging | 77.0 | 23.0 | 100.0 |
| f) Hangings | 83.0 | 17.0 | 100.0 |
| g) Garments | 85.0 | 15.0 | 100.0 |
| h) Narrow fabrics | 80.6 | 19.4 | 100.0 |
| i) Lace | 78.0 | 22.0 | 100.0 |
| j) Finishings | 86.0 | 14.0 | 100.0 |
| k) Others | 89.4 | 10.6 | 100.0 |
| Average | 81.8 | 18.2 | 100.0 |

Source : C.D.I.

The above quotations are derived from the data provided by a 420 investment projects.

## II. TABLE OF PRODUCTIONS OF TEXTILE MATERIALS IN BRAZIL

| Type of machine | 1968 | 1969 | 1970 |
|---|---|---|---|
| Looms | 2,167 | 1,822 | 1,990 |
| Warping frames | 13 | 8 | 13 |
| Ring spinning frames | 143 | 191 | 200 |
| Twisting frames | 3 | 5 | 15 |
| Flyers | - | 1 | 20 |
| Carding-machines | 2 | 20 | 20 |

## III. TABLE OF SALES OF THE MAIN DOMESTIC MACHINERY MANUFACTURERS

| Years | Sales in 1,000 Ncrs. |
|---|---|
| 1968 | 34,600 |
| 1969 | 38,850 |
| 1970 | 52,600 |

## IV. EVOLUTION OF INVESTMENT IN DOMESTIC AND FOREIGN EQUIPMENT AND MACHINERY BETWEEN 1968 AND 1970

| Type of equipment | 1968 | 1969 | 1970 | 68/70 |
|---|---|---|---|---|
| Foreign-made | 87.3 | 84.3 | 66.9 | 81.8 |
| Domestic | 12.6 | 15.7 | 33.1 | 18.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

It can be inferred that, from 1968 to 1970, the percentage of domestic equipment sold to Brazilian textile enterprises rose from 12.6 to 33.1 %, i.e. from a total selling value of 34,000,000 Ncrs to 52,000,000 Ncrs (at the going rates of exchange), which represents an increase of merely 10 % at constant value (adjustment to devaluation).

Thus there is clearly a distortion between the percentage of table IV and the figures of tables II and III. It can however be concluded that the quota of domestic equipment to total investments for equipment and machinery has been growing steadily for the past three years.

In the course of our analyses we have been led to question the advisability of strongly protecting the domestic industry of textile equipment construction with such drastic measures as are current in force and which are likely to be detrimental to overall economic growth and industrial development of the country.

Indeed, although certain items of machinery or equipment bear favorable comparison to their foreign equivalents, others are definitely not up to present-day standards and fail to offer all operating and efficiency guarantees.

Such an unduly rigid protectionism will be followed in the long-run by the inevitable back-wash of its inherent drawbacks, notably the fact that national constructors can afford to be relatively uncompetitive with respect to international standards. Another hazard which derives directly from the law of similarity, is that ill-designed equipment or equipment of very limited scope of application be confronted in a given enterprise with complete and polyvalent foreign-made equipment, i.e. which is designed to adapt to the full range of applications (e.g. weaving looms).

This state of affairs forces some Brazilian textile industrialists to do without such material and, in addition, to find a way around the "law of similarities". The approach of these industrialists towards domestic machinery is so negative that they prefer to pay the import duties on foreign equipment (that is when they cannot prove the absolute necessity of acquiring it). Our contacts with the industry on the subject of Brazilian machinery prove that they have a very clear idea of their requirements in terms of technical equipment, for their criticism of domestic manufactures is most constructive and precise.

In this respect, we believe that closer relationships between constructors and utilizers would compell the former to realize their inadequacy and thereby, with some Governmental instigation, result in a more balanced situation. Such an improvement could but benefit the textile industry as a whole. It goes without saying that it is preferable to manufacture more expensive but also better adapted and more appropriate equipment, meeting present-day technical standards, rather than drastically dated machinery which is really more expensive in the long-run.

Manufacturers of textile machinery have a capital role to play in the development of the industry, considering that theirs is the job of steering the industry in the direction of progress or stagnation. They cannot be effective in this role without turning-in and adapting to the efforts of their consumers.

The business of machinery manufacture is not and cannot consist in simply duplicating 10-year-old models ; it consists primarily in designing, innovating and keeping abreast of the more advanced technological developments.

The role of any constructor, textile or otherwise, is not even to keep up with progress, but to make progress.
It is sad to say that machinery currently turned out by Brazilian manufacturers is far from even keeping up with the modernization of all other major industrial sectors.

Conclusions.

We firmly believe that the exaggerated protectionism with which the national machinery manufacturing industry is favorated can only provoque its stagnation in the long-run or even seriously damage the textile industry as a whole.

Comparative analyses should be reconducted by an industrial technical commission and the files submitted by constructors should be reconsidered in the light of the commission's findings rather than give them the benefits of the doubt. Files should be less technical, (i.e. less based on technical characteristics) and much more technological (i.e. based on data of turnover, efficiency, quality of produce, polyvalence, ease of maintenance, resistance to wear and tear, etc...).

In other words, the benefit of similarity should not be granted until the equipment has performed satisfactorily for several years in an industrial unit.

The application of the law of similarity should also be made more flexible, that is it should provide for exceptions or specific cases related to the ends and designs of the requestee. In particular, peak factories should not be subjected to similarity constraints.

The mitigation of similarity constraints on the one hand and stricter criteria of technological appraisal of self-protective propositions field by the constructors, strengthened by a minimum imposed time of testing and a closer adaptation to actual industrial demands on the other, would render immeasurable services not only to the industry as a whole but also to the constructors themselves, by compelling them to make the necessary efforts of adaptation in the way of modernization of design, technology and general suitability.

### 2.5.3. Suitability of domestically available raw materials.

#### 2.5.3.1. Governmental policy.

Brazil has chosen the policy of self-sufficiency in the supply of fibers - both natural and man-made - which it achieves by import substitution. This policy inevitably limits the possibilities of diversification and quality improvement to the country's means of production. These means must therefore be analysed in depth, both at quantitative and at qualitative level.

If the planning of overall output by way of demand projections, in view of regional realities and the impact of the exports policy.

#### 2.5.3.2. Conclusions.

Cotton.

Turnover and exports are in constant growth since 1960 although a southward shift in the relative magnitude of production has been recorded.

There is a sharp discrepancy between the quality of output in the North and South regions. Furthermore the varieties of the North-East would be much more in accord with the requirements of the international market if the guaranteed aspect of output quality and quotas was given more attention.

Productivity is evolving to satisfaction in the South whereas there is little change in the North-East. A few reasons which can be held accountable for this unsatisfactory situation is the shortage of technical assistance, the total absence of conscious coordinated development programs and the lack of concertation between cotton growers and industrial consumers, a relationship which is beginning to appear in the South.

Wool.

The small domestic producers account for half of total consumption ; these producers will have nothing to do with modern sheep-farming techniques.

Silk.

The national sericulture federation groups a very large number of small domestic culturists. Internal demand is growing but so is production and this sector is a potential vector of exportation.

Jute-Malva.

This hard-fiber sector constitutes a major source of revenues for the states of Amazon and Parana, in the medium-run. In the long-run the economic impact of these fibers could diminish. Plantations are highly parcelled and disseminated and therefore most unfavorable to the wide-spread use of mechanization ; quality is lower than in other producing countries and costs are higher.

Sisal.

This economically marginal culture is important in the regional context of the North-East. The collapse of world quotations as of 1969 compells farmers to limit their harvest quotas so as to amortize their expenses.

Internal demand is constant.

Man-made fibers.

- Viscose : the coefficient of utilization of installed capacity has fallen from 80.2 % in 1968 to 72 % in 1970.

- Acetate : the knit-wear sector absorbs production faster than it comes, but this is a reversible trend.

Synthetic fibers.

- Polyester : demand is in rapid expansion, both for open-end and continuous filaments, at the expense of nylon. This tendency is generalized and attributable to favorable and maybe lasting structural features : advantageous coefficients of elasticity and stress resistance, and high melting temperature which is important for texturing. The quality of production is not constant from one series to another and there is too much centralization of producers, making for little choice or competition in the market.

- Nylon : the rate of growth of nylon production is small, due mainly to the competition of other synthetics. This does not apply however to industrial uses which are in increasing demand.

- Acrylics : Brazilian acrylics manufacture is in its adolescence and is coming up against the distrust of consumers consequent to failures in the utilization of this material ; the working of acrylics demands special technological know-how. The climatic conditions of the country are liable to shrink demand even more, in spite of the fact that home furnishing is destined to become a major consumer.

- Polypropylene production is at the burgeoning and therefore experimental stage of evolution ; however it already creates uncomfortable expectancy and concern in the sectors of jute and sisal.

- Polynosic fibers : these are currently imported and likely to revive the popularity of cellulosics in the cotton sector.

2.5.3.3. Recommendations.

Cotton.

The Brazilian textile industry has consumed 300,000 Tons of raw cotton in 1970, i.e. more than half of total fiber consumption. Installed and operating capacity is 2,800,000 cotton spindles. Such a sizeable stock demands a homogenous and comprehensive cotton policy with some measure of decentralization, to cope with the dual aspect of production distribution (two distinct zones). The quantitative and qualitative apportioning of raw cotton for exportation must be primarily geared to the satisfaction of domestic requirements. Policies in this respect must be aimed at protecting internal supply in quantity and quality as well as prices.

irrespective of any fluctuations due to poor harvests or natural contingencies, so as to cope with the nefarious effects of speculation.

The instoration of quality labels and the implementation of information and support campaigns would decelerate the drastic fall of cotton consumption which results from the massive and unchanneled flood of man-made fibers.

The enforcement of quality norms and standards must become generalized ; this implies a more comprehensive approach to the problem ranging from the over-dissemination of cotton farmers and their lack of technical support, to distribution and marketing which fail to take sufficient account of actual industrial requirements.

Wool.

In the short-run, the requirements for fine qualities will have to continue to be met by imports ; in the longer-run, requirements should finally be met by domestic production ; the role of cooperatives in this respect may become dominant, especially if they turn out to be pilots instead of simple consulting and information agencies.

Jute-Malva.

These natural fibers will have to be supported and boosted in the medium-run for they are the fuel of some regional economies. The tendency should be toward the limitation of propylene utilization to uses which are not direct competitors on the jute's own market. Expansion of production should not be sought ; instead, effort should be focused on the improvement of current farming conditions, which are not at all capital-intensive.

Sisal.

This fiber must also be promoted in the medium-run so as to secure the availability of raw materials for the existing regional industries.

In the long run, the areas of plantations will have to be shrunk together with the transformation and possible reconversion of installed capacity.

**Man-made fibers.**

- *Viscose* : Installed capacity must be restricted.

- *Acetate* : In the medium-run installed capacity will also have to be limited ; in a long-term perspective, capacity will be readapted to the evolution of demand.

- *Polynosics* : Imports can be maintained as such to allow burgeonning trends to define themselves ; in the medium-term, the appearance of new implantations may bring about increased and increasing demands for industrial uses, although judging by world trends and past evolution, the development of polynosics is hardly likely to rise up to expectations ; this is due mainly to the high cost of wet-spinning.

**Synthetic fibers.**

- *Polyester* : The spear-head invasion of this fiber in the industry, warrants a full-scale planning of new implantations ; the approach must make a distinction between open-end continuous fibers so as to decentralize production units.

  The information of industrial circles must also be carefully balanced, such ingredients as technological objectivity will be useful ; the invasion of more traditional sectors is at stake.

  Another essential requisite is that the percentage of polyester in fiber blends be computed in function of the general conditions of utilization of the finished product in the Brazilian market. Price control must naturally be exercized.

- *Nylon* : A long-term planning of production unit implantations must be provided for to cope with the pressure of polyesters, acetates and the development of the home furnishing sector. Installed capacity can be maintained as such in the short-run.

- *Acrylics* : We recommend a medium-term planning to take into account any technical difficulties which may arise.

- *Polyefines* : Investments must be limited to experimental units so as to avoid damaging the industries of regional significance, such as jute and sisal.

The reconversion of jute and sisal factories may indeed prove to require much more capital investment than the technical infrastructure for the manufacture of polyefines. This position must in the long-run be harmonized with the evolution of the jute and sisal industries.

## 2.5.4. Suitability of present factory buildings.

### Findings and results.

A distinction should be made between newly implanted factories and old buildings.

The former, when land is readily available, are designed in keeping with the codes of good practice; horizontal, spacious, perfectly isolated to make for optimal and economical air-conditioning, equiped with roomy and attractive social premises. Their design also takes into account environmental effects on man and adequate extension possibilities.

Factories which were implanted many years hence are often housed in multiple-story buildings where heat losses are detrimental to the proper and economic performance of the air-conditioning system. There are many such units which have no air-conditioning installations.

The relative lay-out of production rooms is often such as to bar, even at the expense of high investment, any lay ont reorganization. They are often composed of unmatched buildings either added or transformed in the course of the enterprise's development.

It is however possible in some cases to convert existing horizontal buildings and to reorganize their lay-out. We have encountered a few quite remarkable instances in Brazil.

### Recommendations.

The general design of new factory buildings should be entrusted to architectural consulting firms or to industrial architects. The design must take stock of the type of enterprise and the equipment which it is designed to incorporate and must be based on a detailed study of the most economic circuits for the production-line, providing for ample transit storage areas between the various stages of production as well as adequate areas for eventual extension. This study must be conducted in conjunction and close collaboration with the project promotor. The height of roofing will have to be calculated in view of the type of production units and the ease of evacuation of steam or excess heat, in finishing and coloring plants for instance; to minimize air-conditioning costs or again to make for optimal natural lighting conditions well adapted to the requirements of each type of production.

We have come across newly built factories in Brazil having highly excessive vertical space resulting in a massive waste of air-conditioning power. Provision must be made for outhouses, accessory buildings, training and welfare premises according to an overall harmonious lay-out. It would be unthinkable to operate savings in this respect.

The problem of factories housed in obsolescent buildings is much more complex and involved. It depends on the magnitude of the enterprise, its degree of complexity , financial possibilities, geographical situation, condition of buildings, etc... Before discussing possible extreme solutions it is mandatory to make a complete and minute analysis of the reconditioning possibilities of the existing buildings in the context of medium- to long-term modernization programs. This manner of procedure implies arriving at a decision before undertaking the implementation of a re-equipment program. Thus, the enterprise which decides to modernize will have to revise its lay-out design and space requirements to provide for optimal servicing of equipment storage of transit materials, design of conditioning facilities, economic efficiency, etc...

Special attention should be given to personnel cantines, mess-rooms and recreational facilities which are often disgraceful.

Such a study will allow the evaluation of transformation costs and the elaboration of a works planning so as to preserve the rate of production throughout the operation without too much up heavel. It devolves to the promoter to determine whether or not such costs are acceptable, in view of the major benefits in productivity and profitability which can be achieved provided the developments are carried out efficiently. In such situations a comprise is often synonymous of a dead loss and improvisation means uncoordinated and therefore useless efforts. Besides in the last account, the overall cost of such piece-meal development is, usually equivalent to that of an overall co-ordinated effort.

In short, it can be concluded that the older horizontal plants can be remodelled and rehabilitated at profitable cost; the problem is more complex for the old multi-story factories whose buildings have grown by accretion without master plan : they do not warrant the commitment of major rehabilitation investments. In fact a paralell study for their programmed transplant should be conducted and compared.

Such a program should take into account that dismantled and reassembled obsolescent equipment without previous overhaul, is liable to refuse to function as before. The cost of overhaul must therefore be included in the transplant planning and cost evaluation.

To complete the study of the situation an attempt at valuation of the advantages and liabilities of such a transplant should be made.

Some aspects which should be considered for the transplant are :

- the complexity and magnitude of the enterprise, which are directly proportional to need for a transplant;
- the relation between the project site and the current site of implantation, in view of such factors as manpower availability;
- the speed and profitability of liquidation of the evacuated buildings;
- the necessity of not interrupting the productivity of the enterprise, (if need be, the loss of earnings should be valued);
- the cost of construction works and the actual transplant operation;

In the benefits column should be listed the following positive aspects :

- productivity gains, i.e. increased rate of turnover;
- reduction of production costs, flaws and refuse materials;
- greater stability of manpower;
- improvement of production quality and better control of installations;
- possibility of eventual extension which can be planned freely.

Transplants should not be generalized but rather viewed as alternatives which can be the object of previous and comprehensive studies whenever the complextity, magnitude poverty of housing facilities and development potential of the enterprise endows such an operation with substantial chances of success and ensures its survival in the long run.

It should be noted that such extreme solutions are seldom taken into consideration, often through lack of imagination or for subjective reasons.

Public authorities could encourage such operations by providing industrial zonings available to the industry equiped with adequate facilities and provide financial backing or encouragements, all of which should be amply publicized in the industrial circles. The industrial zonings should be reserved for this sole purpose and the emplacements would be chosen by the promoters after a study of the most appropriate population concentrations for the economic transfer of labor to the factory.

## 2.5.5. Investment orientation.

### 2.5.5.1. Effects of investments.

The evolution of investment in equipment from 1965 to 1970 is tabulated below, in 1000 US.$ :

| Years | Investments | Imports | % of national equipment |
|---|---|---|---|
| 1965 | 15.800 | 13.400 | 15 |
| 1966 | 23.000 | 19.600 | 15 |
| 1967 | 33.000 | 28.000 | 15 |
| 1968 | 70.000 | 56.000 | 12,7 |
| 1969 | 80.000 | 67.200 | 15,7 |
| 1970 | 80.000 | 53.600 | 33 |

The following table, which reviewsthe evolution of investments allowes from 1966 to 1969 and expresses the percentage per type of firm, was drawn up on the basis of the data provided by IBGE surveys :

| Years | 1966 | 1967 | 1968 | 1969 |
|---|---|---|---|---|
| Investments in Ncrs | | | | |
| 0 to 99,000 | 86,05 | 80,36 | 71,56 | 68,14 |
| 100 to 749,000 | 13,27 | 16,43 | 22,63 | 26,68 |
| 750 to 1.249,000 | 0,34 | 1,78 | 2,78 | 3,12 |
| 1.250,000 and more | 0,34 | 1,43 | 3,03 | 4,06 |
| | 100,00 | 100,00 | 100,00 | 100,00 |
| Number of factories surveyed | 1.132 | 1.120 | 1.153 | 1.155 |

(This excludes enterprises manned by less than 10 people)

The following table is a complement to the above listing the incentive requests between 1968 and 1970 and representative of the natural development trends of the past three years. It is based on C.D.I. data.

Trends in the knitwear sector
in 1,000 Ncrs

| Sectors | 1968 | 1969 | 1970 |
|---|---|---|---|
| Knitwear | 13.087 | 42.000 | 6.500 |
| Haberdashery | 6.721 | 12.000 | 905 |
| Linenwear | 3.750 | 2.400 | 420 |
| Texturization | 8.580 | 13.100 | 2.426 |
| Cotton | - | 4.526 | 24.293 |
| TOTAL : | 32.138 | 74.026 | 34.614 |

Trends of investments by sector
including miscellaneous finishing
1000 Ncrs

| Sectors | 1968 | 1969 | 1970 |
|---|---|---|---|
| Print | 361 | 810 | 15.810 |
| Coloring | - | - | - |
| Finishing (miscellaneous) | 2.200 | 220 | - |
| Apparel | 3.970 | 3.540 | 5.393 |
| Strips | 6.850 | 8.219 | 9.612 |
| Blankets and rugs | 2.300 | 5.200 | 9.195 |
| Bags and sacks | 6.200 | 2.300 | 3.830 |
| **TOTAL :** | 21.981 | 20.289 | 43.840 |

Trends of investments in spinning and weaving mills
1000 Ncrs

| Sectors | 1968 | 1969 | 1970 |
|---|---|---|---|
| Cotton spinning | 2.197 | 5.390 | 27.539 |
| Cotton and combined spinning | 7.802 | 1.970 | 9.300 |
| Synthetics spinning | 2.080 | 7.600 | 7.420 |
| Woollens spinning | 3.250 | 11.842 | 13.585 |
| Man-made spinning | 20 | 520 | - |
| Synthetics thread manufacture | 31.920 | 93.400 | 71.800 |
| Artificial thread manufacture | 1.935 | 1.990 | 7.000 |
| Cotton weaving | 3.650 | 5.910 | 1.500 |
| Cotton and combined weaving | 1.500 | - | 800 |
| Synthetics weaving | 6.300 | 2.700 | 450 |
| Woollens weaving | - | - | 400 |
| Man-made weaving | 1.700 | 300 | 2.200 |
| Integrated cotton | 25.000 | 35.700 | 44.000 |
| Integrated cotton + polyester | 6.500 | 12.200 | 68.750 |
| Integrated woolens | 2.220 | 7.400 | 1.300 |
| Integrated man-made | 9.050 | 8.400 | 2.850 |
| Integrated synthetics | 1.000 | 72.400 | 7.500 |
| TOTAL : | 105.998 | 267.589 | 266.281 |

The first table of the current chapter, which was established with data provided by the department of foreign affairs of the Banco do Brasil and our own knowledge regarding investments in national equipment, exhibits two major trends :

- the volume of investments for equipment has grown sixfold between 1965 and 1970;
- the proportion of national equipment appears to be increasing.

For the expired five-year period, the sum-total of equipment investments reaches 315 millions US \$, i.e. 1,000 US \$ per head of employed personnel. It should be borne in mind that this amount must still be incremented with the investments in infrastructure and engineering works. New constructions account for a major part of this supplement. For instance, from 1960 to 1965, the investments in the North-East for cotton and sisal sectors alone amounted to 100 million US \$, and at the time the SUDENE development program was far from its climatic amplitude.

The second table of this chapter, which reviews the evolution of investments per enterprise category between 1966 and 1969 allows us to draw the following conclusions :

- the percentage of firms making minor investments is in a downward trend; however, considering that the class intervals correspond to Cruzeiros at their current rating, the increase of class 2 may be accountable to the passage from class 1 to class 2 of a significant number of enterprises;
- the percentage of firms investing for less than 749,000 Crs is decreasing;
- the percentage of firms engaging in major investments is sharply rising;

The various tables of natural trends to investment can be interpreted as follows :

- in 1969, the investments in the knitwear sector were twice as high as those of 1968 and 1970. The sharp fall of 1970 is due to special circumstances in the cotton knitwear sector;

- in 1970 there was a rush for investments in the printing sector,
  - investments in the strips, rugs and carpets sectors is rising steadily;
  - investments in the finishing and coloring sectors are negligible;
  - investments in non-integrated spinning are undergoing substantial increase, mainly in the cotton and wool sectors;
  - there have been major investments in synthetics fiber production;
  - minor and decreasing investments in non-integrated weaving plants;
  - considerable investments in integrated plants for the cotton and combined fiber and very restricted in these for wool and man-made fiber. In 1969 a peculiar situation was responsible for the trend in the integrated synthetics sector.

In an effort to provide the missing complementary data on the investment trends of the last three years, we have determined the number of enterprises filing incentive requests and their subsequent development, by sector, including the average investments in each class :

| Sectors | Number of enterprises | | | Average investments | | |
|---|---|---|---|---|---|---|
| | 1968 | 1969 | 1970 | 1968 | 1969 | 1970 |
| Cotton spin. | 7 | 8 | 6 | 315 | 675 | 4.260 |
| Combined spin. | 2 | 2 | 4 | 3.800 | 980 | 230 |
| Wool spin. | 5 | 9 | 5 | 650 | 1.315 | 2.720 |
| Synthetics spin. | 3 | 4 | 3 | 700 | 1.950 | 2.800 |
| Cotton weav. | 6 | 8 | 4 | 610 | 740 | 400 |
| Compounded weav. | 1 | 0 | 4 | 1.500 | 0 | 200 |
| Wool weav. | 0 | 0 | 2 | 0 | 0 | 200 |
| Synthetics weav. | 3 | 3 | 1 | 2.100 | 900 | 450 |
| Artificials weav. | 7 | 6 | 4 | 230 | 50 | 550 |
| Cotton integrated | 16 | 30 | 23 | 1.560 | 1.190 | 1.500 |
| Compounded int. | 6 | 8 | 11 | 1.100 | 1.525 | 4.000 |
| Wool int. | 2 | 1 | 2 | 1.110 | 7.400 | 650 |
| Synthetics int. | 1 | 1 | 1 | 1.000 | 72.400 | 7.500 |
| Artif. Int. | 3 | 6 | 4 | 3.000 | 1.400 | 325 |
| Texturization | 8 | 12 | 5 | 1.700 | 1.100 | 500 |
| | 50 | 80 | 30 | 262 | 525 | 220 |
| Haberdashery | 18 | 21 | 5 | 375 | 575 | 180 |
| Linenwear | 9 | 4 | 3 | 420 | 600 | 140 |
| Strips | 8 | 10 | 8 | 875 | 820 | 1.200 |
| TOTAL : | 155 | 213 | 125 | | | |

This table reveals the following facts :

- individual investments increase in magnitude in the non-integrated cotton spinning sectors and decrease in the non-integrated combined spinning sectors;
- they also develop in the wool and synthetics non-integrated spinning sectors;
- they are small or non-existant in non-integrated weaving sector except for synthetics weaving where they are in a downward trend;
- they are substantial and stable in the integrated spinning and weaving sectors;
- they are substantial but in a drastically downward trend in the texturization sector;
- the knitwear, haberdashery and linenwear sectors incorporate many enterprises prepared to invest; their number is diminishing together with the magnitude of their investments;
- the investment trends recorded in the strips sector is stable as regards the number of investing firms as well as the magnitude of their commitments.

By confronting the conclusions inferred from the preceding table of investment trends and the above table of the number and magnitude of investments, the overall findings and results are as follows :

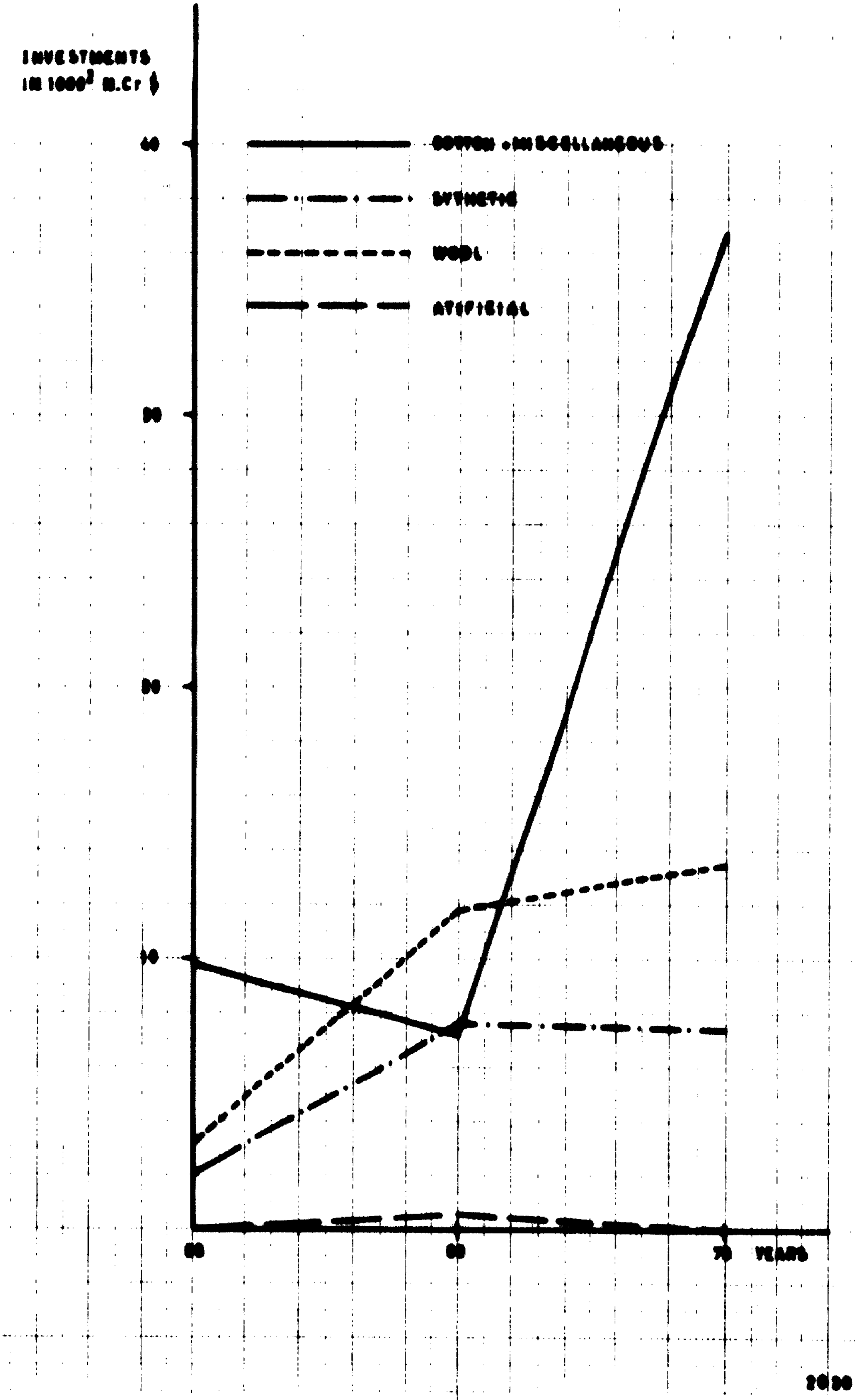
- Total investments increase in number and magnitude from 1968 to 1969 only to collapse in 1970;
- the magnitude of separate investments is growing substantially in the wool, cotton and synthetics non-integrated spinning sectors as opposed to that of the synthetics and cotton sectors;
- there are very few investors in the wool and combined cotton spinning sectors;
- on the other hand, there are more and more investors in the non-integrated weaving sectors, but their commitments decrease in magnitude;
- large but decreasing number of integrated cotton units making large-scale investments;

- growth in the number of integrated cotton and polyester plants making large investments accompanied by a sharp increase in the magnitude of same;
- few plants from the integrated woolens sector show a tendency to invest, but those which do, make major investments;
- again, few but major investments in the integrated synthetics sector;
- average number of investors in the man-made integrated sector and very sharp fall in the average magnitude of investments;
- considerable shrinkage in the number and especially the consequence of investments in the texturization sector;
- same compression in the haberdashery sector;
- likewise in linenware;
- stability in the number of investors in the strips sector and upward trend in the magnitude of their investments.

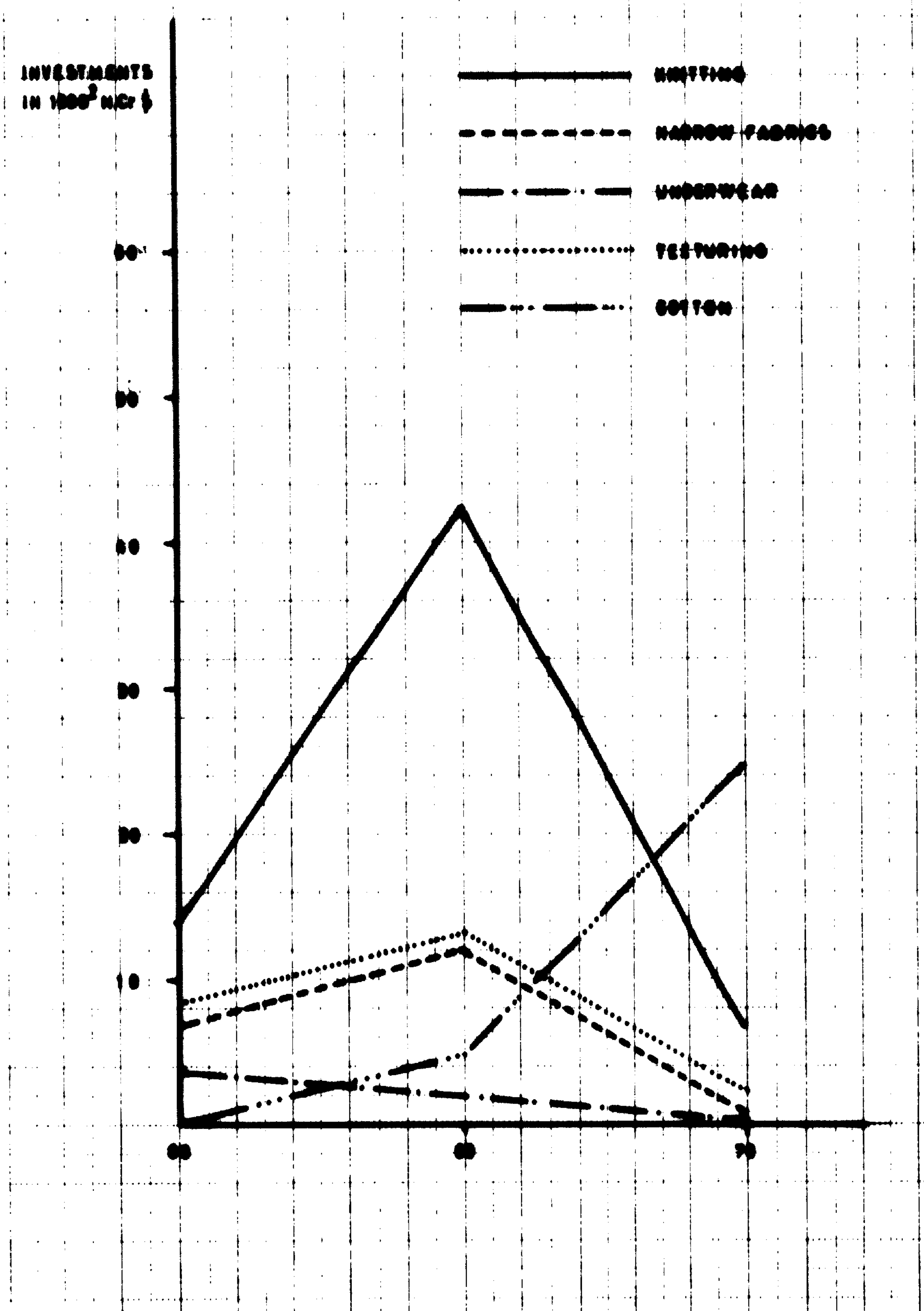
The outstanding features which issue from the above overall analysis, quite apart from the conclusions drawn from the study of structural changes in the textile industry from 1960 to 1970 which were fairly well supported by the study of natural investment trends, are the conflicting trends of the non-integrated spinning and the knitwear sectors or alternately their direct relationship; the upward trend of investments in the wool cotton and synthetics sectors, both in number and magnitude as compared with the knitwear and associated sectors in which the investments are shrinking both in number and magnitude. This situation is illustrated in the following graph.

The maille-sector is, for many non-integrated wool cotton and synthetics spinning mills, the principal client; the non-integrated weaving sector has been considerably thinned by a selective process in the past decade : the investment trends are however small and the up-coming fashion weaving-mills require high-quality thread. Headgear manufacturers are in the same situation. It could be inferred that this state of affairs results from an incompatibility between on the one hand the quality demands of the maille and fashion weaving industries, the latter giving priority to consumer demands, and on the other possibilities of weaving mills.

## INVESTMENT TRENDS IN SPINNING



## INVESTMENT TRENDS IN KNITTING



There appears to be a time-lag between the investments in and development of the consumer sector and the purveyor sectors. This fact would tend to prove the lack of information of weaving factories on consumer trends, probably because their marketing services, being autonomous with respect to the weaving enterprise, are hardly concerned about these problems and fail to keep the manufactures informed on consumer demand developments. The increasing rate of development of thread production in general and the majority of non-integrated spinning mills working with the fashion weaving and knitwear sectors in particular, could provide another explanation : the lack of planning at investment level could have resulted in a rush towards the knitwear and associated sectors, entailing the mushroom growth in production capacity not counterbalanced by an equivalent development in the investments for the spinning sector which was therefore unable to keep up with demands. However, we have noted that the individual rate of increase of the small and average-sized headwear enterprise has been highly various since 1968. A sampling of 50 firms has shown that some are in full development while other are in full regression. It is known that the overall development of this sector is positive though that of its component enterprises is conflicting. Therefore, there appears to be a risk of having the spinning sectors invest with too much optimism and consequently regressing in a subsequent stage. This second hypothesis, however, is in our opinion less plausible than the first. Only a thorough complementary study of the two sectors knitwear and spinning ould settle the matter. The influence of the weaving sector fcr fashion apparel should also be taken into account. If we refer to the figures given in 1960 relating to the investment requirements for the modernization of Brazilian textile industry, we see that, over a span of ten years they have been largely overshot; were also made apparent, the very mediocre productivity progress of the spinning sector with relation to manpower requirements. Progress is much more spectacular in cotton weaving. In the wool sector the productivity benefits are less substantial than in the cotton sector. On the other hand, both in the cotton and wool sectors, the range of productivity levels is much wider than in 1960 among the low- and high-productivity factories; in fact some units have shown remarkable performances, although a large number of others are still below the 1960 standards of Latin America.

This show-down proves that the overall valuation of investments required for the development and modernization of an industry is nothing more than a theoretical measure of its under development and must necessarily be coupled with an analysis of investment distribution efficiency. Ther are still factories which are far from attaining an acceptable level of modernization, even by Latin American standards and are still in their 1960 stage of development, while others have achieved 80 % re-equipment.

If we make the ration of overall investments in the textile industry during the past five years, to the number of people employed there in, excluding handicrafts, we find that the equipment investments amount to 1,200 US $ a head, over the 5-year span. We consider this is little in comparison with the investments allowed in other major industries. However, if we include the marginal sectors which directly dependent on the textile industry, such as retailers, apparel, natural or man-made fiber production, equipment constructors, etc... the volume of investments in five years is quite low.

To conclude, we believe that the solution to the problem lies in a better equilibrium and planning of investments, both on the regional, inter-structural and individual level and on an ameliorated re-equipment programming. On a par with technological investments and in harmonious co-ordination with them, structural and manpower investments should also be provided for, without ommitting those concerning the marginal sectors of the industry and which strongly affect and often inhibit its development.

## 2.5.5.2. Investment requirements.

### Findings and results.

In chapter 2.5.5.1. we discussed the investment program implemented since 1960 and endeavored to determine the natural trends which appeared from the incentive requests in the main textile sectors.

The observation of effects enabled us to emphasize the relative magnitude of investments and their consequences. The analysis of trends has confirmed the predicted sectorial evolution and revealed inter-sectorial interferences which we interpreted to the best of our knowledge indicating any alternative solutions.

The current chapter, devoted to recommendations, will be aimed at definieng certain investment requirements, without attempting to quantify them, but also at evolving measures aimed at supporting while at the same time assessing them from a qualitative and efficiency standpoint and to distribute them as equitably as possible between the various sectors. Especially, we will endeavor to specify the qualification criteria for the choice of decision-makers who be called to implement and promote the lones ofaction.

Recommandations :

From the angle of requirements, we must make a distinction between the sectors we have termed "organized" and "spontaneous" respectively. In both cases, we shall try to establish the developmental guide-lines which should be promoted and the trends which should be opposed.

Organized sector.

In the spinning and weaving sectors for cotton and combined thread, requirements will be different according to whether the spinning or weaving mills are integrated or non-integrated units. The non-integrated mills, which plan to gear both to the purveyance of high-quality thread for non-integrated headwear factories or fashion textiles will, in the medium-run be obliged to diversify their production and boldly engage in the manufacture of synthetics. In the longer run, they will feel the need to envisage integrations with the knitwear and, to a lesser extent with the weaving sectors. To this end they will require modern equipment, fully adapted to the production of synthetics, perfectly air-conditioned and dust-free spinning work-rooms, comprehensive up-dated and well co-ordinated quality control equipment and other means, as well as an adaptable and unsophisticated thread

This set of operational efficiency pre-requisites will have to be governed by criteria of homogenousness of the production lines.

The structural investments will be geared to the instoration of an organization which will enable the assessment of production costs, the implementation of a permanent statistical control at all stages of the production and processing lines, the integration of a permanent personnel training program, a technical and marketing service in permanent contact with consumer parties establish and predict consumer demand trends and study the causes of founded complaints, etc...

We have made a detailed review of the structural organization investment requirements for this specific sector of the industry, a listing which is by no means restrective, because it is equally applicable to the other major sectors and that these investments are just as important as those for the other categories. Also because we believe that the development-oriented integrated factories should be made aware of the fact that the quality of fabrics and the productivity of a weaving mill is preconditioned by the efficiency of the spinning stage.

In the non-integrated, cotton and combined weaving sector, a distinction should be made between the factories devoted to the manufacture of fashion and common articles respectively.

Very few units of the latter kind are still in activity except in the hanicraft sector and we believe they will all be called to disappear under the pressure of medium-sized and large integrated units. They must not be supported whit write-off investments. However, there is one trend which deserves special attention, namely the weaving of cotton or other bags, which is being neglected by the larger units in favor of a reconversion for the manufacture of usual or very specialized items. These reconversions also affect the integrated plants. The small non-integrated weaving concerns may find this a new manufacturing possibility requiring little or no investments.

The non-integrated fashion weaving mills have development potential, whatever fiber sector they operate in.

Their investment requirements, in the technical field, would be for : modern and classical weaving benches, air-conditioning of weaving work-rooms, quality control on reception of prime materials and design services for the various articles and collections; the organization of these units requires practically no investments.

Among the integrated units of the cotton and combined sector, in view of the scale of investments and the current structural organization as well as the range of manufactured articles, a highly elaborate appraisal of requirements must be made.

The major modern plants in Brazil must be supported in proportion with their resources and means but also in view of their efforts to promote quality, diversity and price policies of a nature likely to benefit the consumer market. We would go as far as saying that the enterprises which strive towards quality improvment and price-cutting are the flag-bearers of wholesome competition on the domestic market, a positive feature which has always been lacking in Brazil because of the government's protectionism of its textile sector. Such a competition can but result in the long run in an overall improvement of the consumer market and quality standards, by eliminating marginal enterprises which are content to remain so and by promoting the development and creation of a sound structural organization both on the administrative commercial and technical levels; the current dissemination of production units should be countered as much as possible otherwise the enterprises will have to cope with a comparative dissemination of management potential at all levels. We firmly believe that although investment programs are indispensable for production equipment they are second to those for structure and organization.

Concern for the obtention of optimum quality standards should lead to the acquisition of the most appropriate equipment still required and not to the evolvement of highest output technologies. The technical infrastructure required for the most efficient exploitation of past and future investments such as laboratory and quality control equipment at all stages of the production-lines, air-conditioning installations in the production rooms, dust-clearing and cleansing installations perfectly adapted manipulation equipment, duly outfitted and organized maintenance teams, public relations, social welfare and promotional services, etc... should also be viewed as deserving a measure of priority.

In addition, it should be borne in mind that a well organized efficient spinning mill is an indispensable corollary to any modern weaving factory.

Apart from the major new-look integrated groups, the medium-sized units of the integrated cotton sector with a capacity ranging from 15 to 20,000 spindles and 300 to 400 benches, should be divided into two groups : those which are geared to the middle and upper class consumer markets and the industry, i.e. which compete with the powerful referred to above, and the others, i.e. those which supply the lower consumer classes with low-price articles.

The former are in danger, in the long run, of being resorbed by the larger societies unless they make the necessary effort of adaptation and specialization in very high-quality articles designed for the market outlets which are still open. Such a specialization implies in the first place an awareness of this state of fact and secondly market analyses to determine possible outlets and evolve feasible ways of procedure based on new ideas and constructive imagination. Before charging head-on into high investment probably, ill-adjusted to future evolution, it is mandatory for these firms to ascertain whether or not the selected line of action will, in the long run, remain as profitable as it then appears. This process requires even more investments in time and though it would therefore be wise to secure the preservation of equipment by investing first in structural improvements, infrastructures, etc... which are useful whatever specific type of textile manufacture may subsequently be reverted to.

Even so, a take-off orientation is still necessary and the general sector of preference : non-woven, carpets, industrial-type items, etc... must be pre-determined so as to make the appropriate structural and infrastructural developments. Once the structure and organization framework are in place, it will smooth the way for the implementation of a production-line in a specific sector and the reconversion and re-orientation having the best chances of success : the choice of sector is the primary factor determining operational organization : it is therefore well advised to consult specialized operational research firms and not to hesitate in developing whatever other means seem appropriate to this end.

The major or average-sized manufacturers of economic items, for the reason already mentioned earlier in this report, might be incloned to whithdraw from this low-return sector in favor of sectors which they deem to be more profitable. In so doing, they cluster around a market which is increasingly competitive and difficult to infiltrate.

Now, this given sector, which is mostly concentrated in the NE and MG states must be allowed survive and in our opinion should be re-organized with government aid. In practice, this means that the average size of its enterprises must grow (15 to 20,000 spindles or more), modernize and specialize if they are to cut production costs to a profitable level, also that they must exhibit more creative imagination and renovate the design of their items which have often remained unmodified for several decades, thus making use of the fact that the lower classes, also, have a sense of good taste and appreciate esthetics or can acquire them given a proper chance. This revival of the mass-oriented sector should be fostered and promoted by government aid programs capable of restoring the sector's self-confidence and initiative.

This official encouragement, to which we shall return further along in the report, in chapter 2.5.1.5. should initiate the structural reoganization of the sector by promoting the creation of corporations, margers, professional associations, etc... This will be implemented by way of information campaigns and surveys among industrial sectors to present the official view and facts on the problem and to obtain the reactions and opinions of the industrialists concerned.

Investment programs in this major sector must be planned on the basis of a detailed study of the sector, from all angles and at all levels.

This consumer class is of great moment on the overall market; it is expanding at a sharp rate and will probably become a major outlet for mass-produced items having a steadily increasing quality level.

The sector of coloring and finishing contractors and the average and large factories, integrated up to the finishing stage, is still highly obsolescent to date (1970). Except for the large concerns which have been able to install continuous or semi-continuous preparation lines, modernized or modernising printing departments and a few scarce coloring plants, adapted to the processing of synthetics, the coloring and finishing sector is poorly endowed. In the wool sector, the situation is also very poor. It is noteworthy that this is a worldwide trend and that this sector is often the object of the very last stages of an investment program, except for the continuous or semi-continuous manufacturing lines which have some priority. This could be attributed to the difficulty of valuating the benefits of a modernization program in these sectors.

It is often forgotten that preparation lines, especially in the cotton and combined sectors is a splendid means of standardization of production; indeed, a proper preparation line designed by modern techniques making use of recent chemical progress and adapted to the various types of production-line, is highly effective in uniformizing the range of threads in the spinning stage and that of fabrics in the weaving stage. Also, the preparation lines can be disposed in such a way as to ensure that diversification takes place at the latter stages of production. It therefore appears that this is a major source of increased profitability. To what extent should the integration of preparation lines be pushed ? It is logical that the major units should wish to achieve integration up to the finishing and coloring stages so as to exert control over all stages of production before the actual sale. This attitude can be attributed to such motivations as the full control over all production stages and quality standards, maintenance of certain internal secrets of manufacture, total independence and control of contractor costs and their attendant taxes, etc... Is is less logical for small units to finish their produce themselves because they are perforce restricted to elementary types of finishing work; this degree of integration is not suited to their means. The case of average-sized enterprises requires a more subtle approach determined by their degree of specialization.

In the cotton sector in view of the postulate that the average enterprise is faced with two alternatives : either to specialize to the utmost in low-cost quality goods, or to expand, it should not make investment commitments in finishing processes prior to having reached a decision as to the best solution. The finishing and coloring contractors include major and relatively well equiped units but which charge preparation costs far above the smaller weaving mills'and small headger mills'possibilities. The small coloring shops are not equiped to meet the requirements of current trends, namely for the piece-meal coloring of knit-wear, the coloring of synthetic fibers, etc... The problem is accentuated by a blatant lack of the technical know-how required to keep abreast of developments. However, it is predicted that there will be a growing need for more, or at least better equiped and modernized small coloring and finishing shops for the maille sector to cope with increasingly complex and extensive technical requirements. This involves the acquisition of costly equipment and thorough technical knowledge, both of which must be so determined as to make for optimal polyvalence, operational adaptability and profitability. Very often the decision-makers' basic training does not enable them to undertake the studies required for the knowledgeable elaboration of the attendant investment programs. The need of consolidating, amplifying and modernizing this sector in keeping with the demands of knitwear and fashion sectors, coupled with the magnitude of investments often required for the instoration of modern coloring processes, the high degree of chemical knowledge required in the field of synthetics fiber coloring and prime materials required therefore and the strict demands of new trends, countered by a drastic shortage of highly qualified coloring experts and chemists. Investments should therefor be concentrated or grouped in horizontal associations and ressource pools. This formula is the only which in our opinion offers any guarantees for positive results in the near future. It calls for the re-organization of those sectors which plan the forthcoming re-orientation of their manufacturing policies towards new or as yet unavailable specific techniques, for the joint financing of finishing and coloring plants made to measure.

This does not necessarily imply new implantations : it could also be an association with existing plants or joint agreements which make adequate provision for their future needs. Such an effort would enable the interested parties to make the costly investments required, at low individual cost, taking comprehensive account of the realities of the market.

These associations, work agreements, joint horizontal integrations or investments would also be applicable to the average integrated enterprises of the cotton sector, or the major weaving factories which could thereby benefit from the common contractor finishing services of the major units while bearing a mere fraction of the common charges. Such arrangements are wide-spread throughout the world, mostly in the United States.

In the jute and similar sectors, investments should not be indulged in too freely; extensions in production capacity should be avoided; in fact the sole guide-line for investments should be the concern of maintaining equipment in good condition taking stock of the possibilities of polyvalence of for instance, certain weaving equipment.

These principles should also govern the sisal and other hard fiber sectors according to their regional economic significance.

Unorganized or spontaneous sector.

This sector includes handicrafts, the major part of the knitwear and fashion or fancy articles sectors.

Marginal handicrafts are doomed to disappear in due time and can but conform to natural laws of evolution. The artistic & folkloric crafts, which are of touristic or cultural interest must be upheld and if possible corporated. Such natural corporations can be achieved for such common functions as the acquisition of raw materials and marketing prospection . It is of capital importance that such associations do not enrich promoters at the expense of the crafts.

Regional authorities must ensure that a just distribution of costs and benefits is operated and supervise the take-off and implementation of these semi-organized structures, within the context of the development and promotion of tourism.

The investments required in the spontaneous knitwear sector are limited to equipment acquisitions, initial infrastructure requirements being of little consequence. To allow the trade to follow its natural course is the guide-line for these sectors, preferably with national equipment in the early stages even if the promoters are neophytes because it helps national economy. This wide and highly disseminated sector could be viewed as a major school of practical training from which today's already organized though budding sector and especially the industrial sector of tomorrow, will draw their manpower requirements. It is important to favor geographical concentrations, while preserving the interests of regional economies.

The industrial nucleus of the knitwear sector of tomorrow should be prepared today and equipment should be chosen by the promoters without restraint in order to implant a non-restrictive production equipment stock. Excessive limitation in the choice of equipment would entail, in the long run, a stagnation and strangulation of production possibilities. These enterprises are already experienced enough to make sound judgements, contrary to the spontaneous sector. Quality knitwear is a vector for exportation; it must be rendered operative by influencing quality.

The fashion and fancy clothes sector, whether it be integrated or not, has great development potential and the knitwear sector will be called to develop with it; it must be encouraged though, without indulging in premature expansion, i.e. taking into account demand evolution as well as the organization of associated promotional, marketing and distribution sectors. This includes, for instance high-quality apparel, distribution operations, promotional activities of all kinds, broadcasting and advertising media, etc... Creative imagination and quality must predominate in this development process, which means that their investments must be given priority.

They include coloring equipment, adjustable printing equipment, laboratory, ambient conditioning, high-standing finishing equipment, sampling equipment, fancy thread manufacturing facilities, etc... together with new techniques for the blending of man-made and natural fibers with all the coloring side-effects which such blends permit. It should be remembered that in this sector the non-integrated spinning mills are very useful.

We have tried to outline, in the current paragraph, the context into which must fit the investment policy for the textile industry, with no pretence at having exhausted the subject. We must now specify the means to attain such ends, the structures which should be instored at government and industrial level and evaluate, for some sectors the overall cost of predicted investment requirements for the next decade. The organization of government structures and that of industrial structures shall be considered in volume 2, chapter 5.

### 2.5.5.3. Guide-lines of a policy for sustained growth

In Book 2, Chapter 5 of the present report, we shall endeavor to describe in some detail the official and industrial structures which should be instored to facilitate the implementation of a sectoral policy of industrial and economic growth designed to materialize the evolutionary guide-lines which issue from paragraphs 2.5.1.1. ; 2.5.1.5. ; 2.5.1.6. and 2.5.5.2.

We shall now situate and discuss the philosophy which served as foundation for our recommendations and which derives directly from the 1970 position and the policies prevailing from 1960 through 1970.

Our recommendations are based on the findings, results and conclusions of our various studies and analyses.

Their premises consisted in the following definition of the present position.

1) The extent and cost of the development effort sustained by the public sector, namely capital investments of increasing magnitude, especially between 1965 and 1970, reached the limit of absorptive capacity in 1970 (necessity of making a global appraisal and redistributing investments).

2) The full impact of these efforts on the sector as a whole was :

   - substantial modernization of a fair number of enterprises, elimination of many marginal units, incipient modernization or stagnation of the remainder, but overall accentuation of unbalance and disparity between industries and regions.

   - increase of the spread of productivities and in general low returns with respect to capital investments in terms of productivity.

   - tendency towards integration, mergers and concentrations.

   - boom of the knitwear sector and lack of adaptation of its secondary sectors which fall to keep up with developments and greater qualitative and quantitative demands.

- spear head invasion of synthetics and necessity of coordinating and organizing the installation of the intruder.

- diminution of employed personnel, wage disparities, growing need for skilled personnel and competent managers at all levels.

- consumer prices have remained unaffected by the public sector drive.

3) The good and not so good adaptation of the secondary sectors of the industry, such as the producers of raw materials and the marketing and distribution sectors.

This bird's eye view of the present situation and the results of our analyses were conducive to a set of recommendations for the private and public sectors, which can be summed up in the following synthesis.

It is necessary to :

1) Differentiate action programs.

2) Diversify interventions.

3) Make allowance for interactions between action programs.

4) Coordinate all types of intervention.

5) Make the most efficient use of the resources afforded to enterprises by previous interventions.

6) Exploit the results of previous interventions.

Pre-requisites for the implementation of recommendations.

In view of the existence of special sectors and regional peculiarities, our study could not include the very thorough analyses which would have resulted in a detailed program and have provided for sectoral and intersectoral priorities. It is limited to defining a general action program or strategy but specifies the sectoral and regional needs and lackings which in turn should lay the grounds for the subsequent definition of special well-directed efforts.

The means of achievement of the targets outlined in the recommendations will be set forth in Book II, Chapter 6 of the present report.

In order to render these recommendations operational, the following three pre-requisites must be met with :

1) to grasp the full extent and implication of the Brazilian textile problem, both in terms of employment (2,500,000 workers employed in the industry, including secondary sectors like raw materials and distribution) and in terms of capital investments, results to date, and future prospects.

   To grasp the necessity of moving on from the globalization of the problem and its means of resolution to the differentiation and diversification of the means to support and boost favorable trends and inhibit unfavorable ones.

   To grasp the actual magnitude of the aid, which is considerable, but the shortage of its scope in terms the number of people employed in the whole sector. The rate of return on investments must therefore be increased, i.e. within the limits of feasibility : cost benefits ratios must be lowered but at the same time intersectoral, regional and interregional disparities must also be reduced bearing in mind the interaction of programs.

2) If a policy for sustained and coordinated growth is to be implemented successfully, it is essential that :

   - a highly competent technico-economic study group be created to achieve the pre-requisites of the action-program and to study the relevant files.

   - an elaborate information campaign be prepared and so geared as to finally bring together all the sectors, co-operators and potential partners which play a part, directly or indirectly, in the general evolution of the sector.

   - all parties concerned be mobilised (Industry, State Institutions, Ministries directly or indirectly relevant to the problem...).

   - the regional authorities who will be entrusted with the orientation of regional development be consulted and integrated in the overall coordination efforts.

3) The third pre-requisite is defined by the question : Why is it necessary to achieve such a comprehensive mobilization ?

- Because a differentiated and selectively directed aid program is impossible to implement unless it is fully understood by all parties concerned and properly interpreted. This means that the strategy, with its interregional and intersectoral intricacies must be clearly defined and understood and substantiated with detailed studies of certain peculiar sectors or sub-sectors.

- Because before undertaking a task of such a magnitude and far-reaching consequence it is indispensible that all agencies be well acquainted with the implements of their trade and periodically briefed on new developments, new or amended trends, results and effects of investments...

<u>Practical means of achieving the instoration of the optimal structural framework</u>.

1) The next stage after the information campaign and mobilization of parties consists in determining preferred lines of force and deriving an action program which takes into account priorities, interferences and the favorability or unfavorability of trends.

2) On the basis of this program, it will be necessary to differentiate government aid ; i.e. for instance and depending on the peculiarities of each case : substantial aid at first, then gradual degression ; degressive aid in the form of miscellaneous benefits ; degressive aid from one project of a given program to another, so as to balance an unbalanced sector or sub-sector ; selective aid to investments ; fixation of minimal or maximal commitments, as the case may be ; priority for structural and infrastructural investments after a given degree of modernization ; no technical assistance nor investments for advanced technological installations unless they fit into a specialization or reconversion program which is duly supported by reliable market studies and economic justifications ; differentiation of similarity constraints among the various sectors ; etc..

In practice, the subtleities of such a differentiated and selective aid program will attach to specific problems as they arise and to specific sectors ; the purpose of this paragraph was therefore merely to define our conception of the term differentiation in the context of our methodological approach.

3) According to the sector of application, the files for incentive or credit requests will have to be re-examined, reconditioned and further upholstered by additional data in the light of the action-program guide-lines, so as to get a fuller understanding of the requesting enterprise.

4) The technico-economic entity which will be entrusted with the study of request files will have to dispose of individual files for each major enterprise so as to assess its position and evaluate its degree of modernization. The smaller enterprises will be enlisted either in sectoral or regional indexes.

5) Requests for substantial aid or aid programs from large of medium-sized enterprises will have to be accompanied with a complete and thoroughly detailed medium-term modernization project inscribed in a general long-term perspective.
This will avoid working in unduly short-sighted perspectives and engaging in blind-alley or unprofitable orientations ; besides the approximative calendar of key planning dates will enable the public authorities to make their planning of commitments and to elaborate their investments budgets.

6) Direct contact with the enterprises requesting major subvention will have to be a rule ; the same applies to first requests.

7) Files will be analyzed both in the technical and general contexts.

8) Sectoral priorities will be taken into consideration.

9) The final decision will be taken by joint consultation of all parties including the directors of ·egional development.

We have made provision in our set of recommendations for the parallel instoration of polyvalent institutions, boards of promotion of textile goods, central information agencies & regional advisory boards ; we have also sketched the outline of a better adapted trade-union structure ; these various complements have been dealt with in detail in Book II - Chapter 5.

03161
(2 of 2)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

# REORIENTATION OF THE TRADITIONAL TEXTILE INDUSTRY IN BRAZIL

VOLUME II

Recherches et Développement

ASSOCIATION
DE BUREAUX D'ÉTUDES
★
VERENIGING
VAN STUDIEBUREAUS
★
ASSOCIATION
OF CONSULTANTS'GROUPS
★
ASOCIACION DE OFICINAS
DE CONSULTORIA
★
RUE BREDERODE STRAAT, 2
1000 BRUSSELS
PHONE : 12.01.43
CABLE : RESANDEVELOP BRUSSELS
TELEX : RESDEVELOP BRU 23818

rd

Ref. 123.3/G446/04/6

REORIENTATION OF THE TRADITIONAL TEXTILE INDUSTRY IN BRAZIL

UNIDO PROJECT N° SIS 70/900

CONTRACT N° 71/13

# RESEARCH & DEVELOPMENT IN COLLABORATION WITH ENGINEERING VESDRE

December 1971

# S U M M A R Y

VOLUME II

## CHAPTER III - GENERAL METHODOLOGY



## CHAPTER IV - BASES OF OUR RECOMMENDATIONS



## CHAPTER V - DETAILED RECOMMENDATIONS

# C H A P T E R III

## GENERAL METHODOLOGY

## 3.1. THE MAIN FIELDS OF STRATEGY

3.1.1. Uncertainty.

The uncertainty factor is relevant principally to the following questions :

a) Economic measures :

Production,consumption, end-uses, inputs, outputs, etc... are only known within a rather large margin of error and therefore provide only a nebulous picture of the textile system. The uncertainty is created primarily by the "spontaneous" sector, with its host of small manufacturing and processing shops which are often not even recorded let alone surveyed, and are characterized by their great dissemination and changeability. This sector is clearly unaffected by any centralized effort of industrial orientation and has also been called "unorientable", elsewhere in this report. The uncertainty gap created by this sector can only be bridged by "information systems".

b) Economic evolution :

Brazil is in a phase of major determinism and economic decisions such as inflation, acceleration of growth, preferential development of some sectors, trade policies, etc... which may have to be revised or cancelled as in the past, thereby invalidating the system of projections constructed on the basis of present policies and outlooks. This overhaul of the perspective in which textile sector was viewed and oriented would also mean the invalidation of its orientation policy. This is the economic uncertainty. It can be overcome by dissociating the industry's development program from global policies, i.e. making it sufficient stalwart and stable as to remain practically unaffected by the ups and downs of other sectors.

c) Technological evolution :

For a score of years, the textile technologies have evolved alternately towards continuity (improvement of existing processes, such as larger drawing-frames) towards the suppression of some production stages or towards total discontinuity (open-end).

The future of today's advanced technologies and their development paths are difficult to predict as are the probable appearance in the next few years of henceforth unsuspected technologies.

The strategy for the sector will have to make provision for these eventualities which we have called the technological uncertainty.

3.1.2. Time factor.

The time-distribution of effects which can be expected from the action-program leads us to distinguish two aspects of strategy :

- the transitory phenomena which characterize the position of the sector at a given time and which can be affected in the short-run;
- the fundamental phenomena which characterize the medium-run behavior and "health" of the sector.

Both the short-term and medium-term phenomena must be viewed in the perspective of the overall long-run economic policy.

The strategy for a medium to long-run orientation program must be divided into various phases according to delays of effectiveness : some steps give immediate results, others yield their fruit progressively and still others attain their targets at a much later period.

3.1.3. "Horizontal strategy".

We understand by horizontal strategy the series of actions and development efforts which concern a given manufacturing or processing stage of the textile industry, such as "spinning", "weaving", "garment", etc... Naturally this is a somewhat simplified illustration but it gives the general approach to this aspect of strategy.

A coordinated development program for such a horizontal "slice" of the industry would be directed at the following key points :

| 1. Outpout | 2. Input (factors of production) |
|---|---|
| Choice of products | |
| Quantity | Capital assets |
| Quality | Labor intensiveness |
| Prices | Productivity |
| -Marketing | -Supply |

(communication)

This bilateral approach applies to all stages of production. The output side is discussed below; for the input items, it can be seen that efforts are concentrated on the various elements affecting production and productivity. Capital assets will be divided into fixed capital and servicing :

Financial viewpoint

| Capital investments | Capital supplies and servicing |
|---|---|
| - quality | - self-financing |
| - cost | - subsidies, tax exemptions |
| - choice of equipment and formation of capital reserves | - amortization (servicing) |
| | - profits |
| | - lending agencies |

Thus the operations pertaining to capital formation (investments) are not of the same nature as those pertaining to the financing of capital assets. Government interventions since 1966 have encouraged capital investments (fixed assets); this is definitely a sound policy.

### 3.1.4. Vertical strategy.

A glance at the structural chart of the textile structure shows the sequence of production steps from "fiber production" to the sale of finished goods. This is what we call the vertical structure of the industry.

Clearly, for a given quality, it is the consumers'price which determines an industry's competitivity especially on the world market.

Now, it is just as clear that the elements which compose the price of a product are distributed throughout the production process, from the price of raw materials to the cost of marketing and distribution and through the cost of all attendant inputs (added value) at the various stages of manufacture. Elsewhere in this report we have discussed an illustrated the striking consumers' price discrepancies and incompatibilities from one region and producer to another.

The action program which will be derived from the "vertical strategy" must not be focused on a single "slice" of the sector; it must also reinforce all the lower (downstream) stages of production; this often entails different forms of aid than capital investment.

The vertical strategy must therefore avoid that an "upstream" stage be unburdened of its share of production costs at the expense of the lower stages and that it be vested with sufficient economic power to control output (quantity, quality or price). Such a state of affairs would grossly handicap the subsequent stages which are closer to the consumer and his demands; besides, it would have a detrimental effect on quality and prices and therefore on the competition of the industry abroad.

To this effect, strategy must create internal competition between the upper and the lower stages all the way down to distribution and sale if possible through integration. Considering there is no outside competition, this will at least achieve competition on the domestic market, an excellent **preparation** for the **international arena.** This will not be achieved unless retailers and consumers learn to recognize the products turned out by the "organized or vertically integrated sector". Once such discrimination occurs, it will be a confrontation of the organized sector and the mass of disseminated "unorganized" and non-industrial workshops. This is the essence of the problem. Once the consumer recognizes true quality, the effects of increased demand will back-fire all the way up the industrial chain.

### 3.1.5. The strategy of communications.

The economic characteristics of inputs and outputs are not the only elements in this highly interdependent framework where communications must be **the conjunctive tissue which holds it all together.**

3.1.5.1. Concrete communications are those which concern the regional framework (transports, telephone, postal services, etc... production stages (compatibility of products) and all such physical systems. Concrete measures are also required to consolidate this communication network.

3.1.5.2. The abstract system of communications is less tangible but just as important. It exists or should exist between all production stages, regions (closely interrelated and complementary), sectors, representatives of public and private organizations, syndicates, wholesalers, financial institutes and (why not) consumers. This system achieves the coordination and concertation of efforts and should be developed to the utmost. To this end, adequate organizations and agencies must be instored, organized and strengthened. Their role can also be one of collection, processing and broadcasting of data and information.

3.1.6. Conclusions.

This discussion, which by no means exhausts the problem, provides the general setting of the various actions and orientations and the pattern of their inter-relations.

The determination of programs and their component steps can then be achieved, on the basis of

1) the evaluation of the efficiency of each specific step or measure;

2) the order of priorities and the trends to be encouraged or opposed;

3) the degree of freedom to initiatives and favorable autonomous drives;

4) the break-down into phases of intervention.

Concrete ways of implementing these goals and determining these patterns consist in classifying them in view of actual available resources and the types of intervention which are compatible with free enterprise.

Such a general strategy is aimed primarily at narrowing the uncertainty (or "probability") gap referred to in paragraph 1 above.

An exemple which illustrat  this point is that in view of the uncertainty governing the competitivity of Brazilian textile products on the world market, it would be far more advisable to evolve an action program which supports or builds up the domestic market rather than supporting an immature industry and offering guarantees of immediate outlets abroad; the former would be so much more hazardous and costly than this more rational approach.

## 3.2. FROM STRATEGY TO ACTION

### 3.2.1. The targets

The action program will be aimed at making the most efficient and rational utilization of scarce resources to improve the general structure of the sector and to generate export potential.

The kind and volume of interventions are limited by
- the uncertainty and lack of knowledge of the sector and its specific problems
- the volume of resources available
- the kinds of interventions acceptable to both the public and the private sectors.

The implementation of strategy consists in evolving and applying an action program which eliminates or minimizes the uncertainty or risk of investment. This does not forasmuch preclude all-out and ambitious efforts: it simply means following a set of ponderated guide-lines to avoid "boom-and-bust" growth so characteristic of developing countries. Such were the objectives of our cost/benefit analyses.

In this section we shall extrapolate the discussion of the various fields of strategy described in section (3) by developing the various corresponding fields of action specifying their place of discussion in this report.

The framework of this report was imposed contractually in the terms of reference and we found that the discussions which follow are essential to situate our recommendations in the proper context but could not be fitted in the imposed framework without overburdening it. We hope hereby to help the reader to visualize the global pattern of strategy and the kinds of interventions it calls for.

### 3.2.2. Uncertainty and bases of recommendations

#### 3.2.2.1. Economic Evaluation

In order to narrow the uncertainty gap and to acquire the most realistic premises for economic analyses, it is necessary first to evolve a system of evaluation of the economic situation. To this end, the following alternatives can be envisaged:

a) carry out exhaustive surveys at some specific times of the year: efficiency and output at all stages of production, consumer demand, data concerning labor, capital, equipment, etc ...

b) instore a permanent system to record the variation of some important parameters which can be measured without difficulty: index of production, price of raw materials, consumer price index ...

c) set up a general system of permanent data collecting and statistical information.

Clearly, this last program provides the most comprehensive economic picture: however, this maximal program mobilises considerable means and resources. In fact it requires:

1- a sound structural organization, including means of transmission
2- specialized services
3- data processing installations
4- the close and spontaneous collaboration of all sectors and instances concerned
5- considerable financial resources and above all
6- that the entire sector be surveyed.

The study group has come to the conclusion that this set of pre-requisites cannot be met at present (Cfr 3.1.2.2).

Accordingly such an overall set-up for statistical survey should be relegated to a later stage in the intervention program.

As regards alternative a) there are the usual drawbacks associated to <u>static</u> observation and which can only be overcome by making the observations at regular intervals. Even so the intervals will be too long to provide guide-lines for action-programs, especially in a country with such a fast rate of change as Brazil.
This is precisely the problem which was illustrated in the input/output tables.
Considering its lack of significance at overall planning level, this method can only be viewed as a non-fundamental and therefore transitory means of information.

Now, alternative b), which concentrates on a limited number of highly significant parameters not only carries the smallest risk and uncertainty but 1° it is less capital intensive, 2° it covers a more selective set of data in a field which is much too extensive to be comprehensively evaluated without excessive cost, and 3° it contributes to lay the ground for the subsequent elaboration of more complete information systems, by gradually achieving the pre-requisites for such a set-up.

3.2.2.2. Techno-economic evolution

1. We should remind first of all that in view of the climate of uncertainty which accompanies this evolution, the lines of action may be conditioned or predetermined by decisions of economic planning at a higher level.

Thus, for instance, this lines of action could be determined by the economic policy attaching to the growth/inflation conflict. We point out in paragraph 3.1.2.3. and in other parts of this report that no measures which do not directly contribute to the profitability of the textile sector should be taken except in case of continuous inflation (for instance protectionism or elimination of competition at marketing level), or in case of deflation (real efficiency and productivity).

Moreover, this uncertainty is reduced by the existence of a global plan for economic development; if the plan in established in a joint and coordinated manner and provided there is adequate communication and concensus, the uncertainty pertaining to subsequent economic decisions is reduced because of increased probability of seeing the plan carried through.

This is what motivated our recommendations for joint consultation and coordinated decision-making between the industrial sector and the governmental planning agencies.

One of its immediate benefits could be to avoid to much incompatibility between production capacity and per capita income.

2. This leads us to discuss the place of projections in the growth planning pattern. Our projections are aimed at providing an estimate of quantitative and qualitative requirements. Their role in the action programs is to provide guide-lines on the desirable tempo or rate of investments and other interventions as well as to determine the direction of favorable trends. Thus, for instance, we shall make recommendations, based on these projections, regarding the most rational rate of incentive allocation.

The projections must also make provision for any changes of orientation which might prove necessary because of the uncertainty factor, after an intermediate period of observation in which it may appear that the offer/demand ratio does not evolve according to expectations. In practice, this boils down to creating a statistical office to keep track of this evolution and enable the planning agencies to make any necessary adaptations. This would narrow or bridge the uncertainty gap and, especially, would eliminate the hazard of following in the wake of most textile industries in the world which are being drastically over-equiped with production facilities (notably for synthetics).

3. On an even more general level, it will be necessary to closely follow the evolution of the textile industry throughout the world:

a) the constantly increasing role of major international groups and corporations

b) the popularity of synthetics

c) the increasingly important role of national agencies for the promotion of foreign trade

d) explicit support to exports and systematic modification of relative prices; this naturally makes the entry and competition in foreign markets very difficult and costly

e) sclerosis of countries'policy of autonomy due to international agreements on the import of certain products (cotton for instance)

f) organization of international markets into major economic zones

g) relative fall of prices for the export of prime materials

h) reduction in the number of jobs in the textile sector

i) relative increase of expenditures for home furnishing once the needs for apparel have been satisfied

j) growing probability of technological schisms.

These examples of world trends and phenomena should also be part of the general framework or "setting" of any industrial development program. The major guide-lines of such action programs are, in the context of our methodology, the lines of least uncertainty. Accordingly the following principles have guided our approach:

- more importance and hope is accorded to the effectiveness of bilateral trading agreements with countries or economic communities and which would be founded on an international distribution of charges and studies of comparative costs rather than on the "conquest" of these markets without distinction or comparative appraisal of advantages.
- in keeping with this approach, more attention will be given to specific products which have very real chances of competition on the world market (malva?) than to the discovery of an open market with high per capita purchasing power

- to rejoin another key point mentioned earlier, action will be aimed at developing an ability for adjustment to technological change and evolution; this aspect could be entrusted to a special techno-economic entity

- finally, and we cannot pretend to make an exhaustive review of the problem here, points h) and g) hereabove are conducive, when viewed on a par with the anticipated overcapacity of synthetics production, to the following considerations: Brazil is one of the few countries where production facilities match actual domestic input of raw materials. This headway will have to be exploited to the full. Although no specific means can be proposed at the present stage of evolution, the example of wool should be borne in mind and maybe future technologies will afford such opportunities.

### 3.2.3. The "Time" dimension and the stages of action plans

The introduction of the "time dimension" in planning is effected in two ways:

1° distinction between transitory and structural or fundamental phenomena

2° distinction between the various phases of intervention as determined by the degree of emergency of the various steps or re-orientation phases.

The analysis of transitory and fundamental phenomena serves as a guide to determine the delays of effectiveness of the relating interventions.

If we refer, for instance, to the crisis of 1966, which is illustrated graphically in figure , we find that the measures taken in 1967 were implemental in restoring some measure of balance. This is an excellent case in point to illustrate the temporary impact of transitory phenomena. Actually its effects have by now been nearly erased and the governmental action on the cost of capital investment and its incentives for modernization of equipment were most timely and are continuing to yield positive results.

However, it is also found that certain economic parameters such as unit output, per capita income growth, etc ... are reacting at a far slower rate than in other industries. True is a well known fact that the improvement of production facilities bears its fruits in the longer run; but, when this promotion overhead of capital is accompanied by such changes as

- unburdening of marginal input costs (tax exemptions)
- wage discrepancies with no correlation between wages and productivity
- the possibility for the enterprises which have placed themselves in this inflationary situation to transmit their price increases to "clients" in the lower stages of production,

then an illusory and transitory situation of prosperity sets in, which lasts only as long as this unstable equilibrium can be maintained. Besides it is limited to the isolated fractions of the sector which meet these peculiar conditions and is therefore a highly negative factor for balanced growth. It is possible that the present situation in Brazil exhibits some aspects of this artificial economic profile;it is characteristic of the development of most sectoral and regional economics.

Whatever its drawbacks may be, this problem at least offers a guide-line for development. Indeed, the existence of such a situation in some parts of the sector does not mean that the responsible parties must necessarily make an intensive exploitation of their overhead capital or even eliminate their less efficient equipment.

They can and must act on productivity so as to guarantee the continuation of their prosperity, even when :

- inflation is relatively low
- there is internal competition with the downstream production stages.

Propositions in this respect have been made elsewhere in the report.

It should also be remembered that most component sectors in the textile industry are closely interrelated. Intersectoral interactions are discussed later in the report but they also find their place in the present context because of their incidence on time-distribution and priorities. For the unstable profitability of isolated fractions to be converted into a normal, balanced economic situation in the medium or long-run, it will have to be accompanied by the development of complementary activities (see "vertical strategy") even though this process may entail the formation of production bottle-necks wich have to be eliminated in the short-run. Selective aid propositions provide some measure of solution to this problem.

A few examples wich help to visualize the type of action required:

1. - it is recommended that the major production units aim at maximum standardization of their output and distinguish their products with an easily identifiable label of origin; also that they remain unaffected by temporary fashion phenomena (or that they create their own fashion in conjunction with other major producers) so as to avoid the high research and production-adjustment costs which make such excessive mobility unprofitable for large concerns. Mass, standardized production must remain the principal asset of such units.

   - on the other hand it will be desirable for the dyeing and printing factories to maintain adequate flexibility and adaptibility. Recommendations have been made in this respect, mainly for improved communications and market sensitivity.

2. in the short-run the development of on-credit sales can be expected and hoped for so as to increase the marginal propensity to consume. These marketing procedures will, in a first stage, probably generate a transitory wave of purchases due to consumer euphoria but in the medium-run it will play a significant part in inflationary mechanisms, will make marketing units highly dependent on financiers and the banking system as a whole and, last but not least, it can only bring an illusory increase in purchasing power without affecting per capita income in any way. For these macro-economic reasons and probably also because of the general feeling of abuse which attaches to such credit practices - in the final analysis they are unfavorable to the consumer population, especially the uneducated classes - the sudy group has prefered not ot lay too much stress on the interest of such transitory market promotion.

   On the other hand, they do stress the interest of developing the organization andguarantee to industrial credits: procedures wich afford much more lasting and real results.

3.2.4. Horizontal Strategy

This strategy concerns a given stage of production, i.e. a slice of the vertical pyramid of the textile industry (ranging from fiber production all the way to consumption). Returning to our presentation of strategic principles, the following classification of components of the associated action program can be made.

There are first of all a seriesof decisions to be made concerning the choice of action guide-lines. For each guide-line or objective, there are several alternative means of implementation.

Objectives

1. Output (turnover)
   - 1.1. Choice of products
   - 1.2. quantity
   - 1.3. quality
   - 1.4. price
   - 1.5. outflow - distribution - marketing

2. Input (costs)
   - 2.1. Fixed assets-overhead capital
   - 2.2. labor
   - 2.3. marginal cost of production
   - 2.4. supplies: purchase of materials from higher levels (including taxes)

Clearly, each of these elements can be promoted individually. To return to our initial criteria the following two cases are in point:

- intervention at taxation level (2.1.) is indirect and concerns the government's own financial resources: the fiscal measures concerning exports are also of the "government's resources" type and are discussed in 1.5;

- the intervention at price level and choice of products level (1.4 and 1.1) are direct and deterministic and therefore concern the nature of the intervention. The first choice criterion is therefore in itself an action guide-line.

In the input column, point 2.1 deserves some discussion here. Points 2.2 and 2.3 are also discussed but elsewhere in the report.

Capital operations

| Debit (costs) | Credit (revenues) |
|---|---|
| 1. Gross capital formation | 2. Financing |
| 1.1. acquisition of equipment | 2.1. self-financing |
| 1.2. choice of equipment | 2.2. subsidies, tax exemptions |
| 1.3. sources of equip't supply | 2.3. loan servicing |
| - foreign | |
| - domestic | |
| 1.4. quality | 2.4. savings (profits) |
| 1.5. price | 2.5. loans |

Thus, for instance

- the law of similarities affects points 1.3 and 1.2
- tax exemption and investment in the North-east is of the "financial resources" type and affectspoint 2.2.
- the measures recommended for 2.4 concern the improvement of relation with the banking system which certain industrialists deem inadequate.

Now, as regards the actual choice of action guide-lines bearing in mind the uncertainty gap, let us take as premises the following two hypothetical rates of growth

H1 : 6.5 % per year / H2 : 3.5 % per year.

Returning to some of the already discussed cost/benefit items which can be the object of a non-dirigistic intervention, namely capital, labor and productivity, we find the following table of alternative targets (bearing in mind the existence of the non-orientable sector):

| Items: | H1 : 6.5 % | H2 : 3.5 % | |
|---|---|---|---|
| capital | X | X | I orientable sector |
| labor | X | X | |
| productivity | X | X | |
| capital | X | X | II spontaneous sector |
| labor | X | X | |
| productivity | X | X | |

The crosses in the table stand for the potential "costs" or "liabilities" attaching to the corresponding decision.

As regards the spontaneous,sector, we find first of all that the uncertainty margin is much larger because

- it is practically unknown
- no projections can be made regarding the effects of any given intervention or action program.

This means that "a priori" the organized sector will get priority attention in order to minimize the risk of making write-off investments and inefficient utilization of incentives.

Thus the economic development of the unorganized sector should not necessarily be controlled, but rather favored along a number of selective natural trends. This sector has the advantage of flexibility and self-sufficiency, which are definite assets in a development process which has no pre-determined or determinable path and for which there is a large margin of uncertainty. Besdies there is the probability of seeing "graduation" of some units from the spontaneous to the organized sector or again an exodus of skilled labor, fully trained in the workshops of the spontaneous sector, into the vacancies offered by the organized setor. Thus the former can always act as training ground for the industry proper. Orientation will therefore be aimed primarily at making the industrial sector as profitable and efficient as possible, even if it is found that ventions in the spontaneous sector are necessary to this effect.

Returning to the organized sector, our analyses have shown that the labor requirements are met at quantitative level and that the spontaneous sector constitutes a ready market for further supply. Thus interventions at labor-intensity level are not likely to yield appreciable returns.

Now, at capital-intensity level, considering the uncertainty attaching to future growth patterns, it is clear that any bulk, overall capital outlay at 6.5 % is

1° very costly and may even create a limitation of resources
2° is liable to be inefficiently utilized if the actual rate of growth turns out to be nearer 3.5 %
3° fails to guarantee the balance of requirements in the long-run and instead satisfies transitory and often opportunistic requirements.

Accordingly, in order to minimize the risk of waste and inefficiency through unbalanced utilization of resources,

1° the amount of capital should be such as to aim for a rate of expansion of 3.5 % only
2° the rational utilization of capital should achieve the 6.5 % growth provided productivity is high
3° aids to capital formation must be highly selective

in order to avoid any unbalanced utilization and to ensure that the established targets are aimed for and achieved.

Special attention is therefore given to se aid by sector, both on the debit side (choice of products) as on the credit side (financing).

This approach leads us to the conclusion that interventions at capital level must necessarily be accompanied by the improvement of productivity.

3.2.5. Vertical Strategy

The vertical competition among production stages can only be generated in a closed market by the exertion of internal influences, notably through strong distribution and marketing structures.

Precisely because of their size, these organizations will be able to get lower selling prices from their purveyors at constant or even higher quality.

The parveyors at the bottom of the production pyramid, will be placed in similar position with respect to their purveyors and will have two alternatives to maintain a reasonable profit margin:

1° to improve their productivity and efficiency; the necessity for such an improvement is directly proportional to the share af added value (marginal costs) in the selling price; or

2° to exert pressure on their purveyors so as to get lower purchasing prices. In this case, the necessity for such measures will be inversely proportional to the quota of added value in selling prices.

Thus the first alternative will be an invitation to improve productivity and the second to exert vertical pressure (competition) on selling prices.

The second action, i.e. pressure on the previous stages of production, will be all the greater if there is a concentration of power,

a) either because of large-scale producers in the organized sector acting in conjunction
b) or because of the existence of major common purchasing agencies for the spontaneous sector.

# CHAPTER IV

## BASES OF OUR RECOMMENDATIONS

## 4. EVOLUTION OF THE BRAZILIAN TEXTILE INDUSTRY.

### 4.1. Evolution of the employment market.

| Years | Employed personnel | % of text personnel with respect to manufact. ind. | % of salaries with respect to manufact. ind. |
|---|---|---|---|
| 1960 | 328.297 | - | 20.00 |
| 1961 | no data | - | - |
| 1962 | 365.753 | - | - |
| 1963 | 342.360 | 18.4 | 13.2 |
| 1964 | 342.364 | 17.8 | 13.00 |
| 1965 | 311.699 | 13.6 | 13.00 |
| 1966 | 324.443 | 15.7 | 12.00 |
| 1967 | 350.332 | 16.5 | 11.5 |
| 1968 | 353.654 | 15.7 | 11.5 |
| 1969 | 308.345 | 15.3 | 9.5 |
| 1970 | 297.840 | 14.5 | 9.00 |

$\bar{X} = 332.500$

According to IBGE, the evolution of the labor employed in the textile industry from 1960 through 1970 exhibits a 10% decline with respect to the mean value for the decade and nearly 20% with respect to 67/68. This evolution is in keeping with the world trend and results from the elimination of the marginal enterprise and the internal redundancy of modernizing factories.

The evolution of salary scales in the textile industry can be seen to lag far behind that of the other manufacturing industries taken as a whole.

This can be accounted for by the following factors :

- lack of appeal to low-productivity tradition-bound enterprises of such labor encouragements as productivity bonuses and other marginal benefits;
- labor redundancy

- difficulties of marginal enterprises which rely on low - if any - revenues and which cannot afford to keep up with the wage increases of the other manufacturing industries;
- uncertain qualifications of available personnel.

Taking into account new implantations but only those approved by SUDENE from 1960 to 1965 (for 1964 and 65, only 50% of approved projects were counted) it appears that 22,911 new jobs were created in the cotton sector and 1,746 in the sisal sector.

INDUSTRIAL PROJECTS APPROVED BY SUDENE AND NUMBER OF INDUSTRIAL JOBS MAINTAINED OR CRATED - 1960/65.

| | Number approved | Specialist Manpower (a) | Semi-Specialist Manpower (b) | Non-Specialist Manpower (c) | TOTAL |
|---|---|---|---|---|---|
| Chemicals | 25 | 325 | 853 | 1.138 | 2.217 |
| Textiles Cotton | 61 | 4.122 | 10.377 | 8.412 | 22.911 |
| Beverages | 3 | 21 | 136 | 912 | 1.069 |
| Food Products | 32 | 221 | 841 | 3.014 | 4.076 |
| Miscellan. | 23 | 313 | 1.046 | 1.368 | 2.727 |
| Metals Cement | 30 | 499 | 1.080 | 2.321 | 3.900 |
| Ceramic & Glass text. | 17 | 125 | 413 | 1.661 | 2.199 |
| Sisal Apparel | 15 | 96 | 107 | 1.542 | 1.745 |
| Footwear Textile | 4 | 23 | 433 | 353 | 809 |
| TOTAL | 210 | 5.746 | 15.286 | 20.721 | 41.753 |

a) Engineers, Chemists, foremen, technicians.
b) Machinists, Helpers
c) Unskilled Laborers & Apprentices

Source : SUDENE

Furthermore, the knitwear sector, which was practically non-existant in 1960 provoqued the creation of some 7,500 new jobs in the organized sector, i.e. the enterprise having a personnel force of more than 9.

Thus, if all the new jobs created by new implantations or expansion and by the development of the knitwear sector are taken into account, it may be considered that the textile industry has lost 20% of its labor capacity from 1960 to 1970.

FACTORIES OF MORE THAN 9 EMPLOYED WHICH WERE ELIMINATED

IN 1967/68/69.

| Years | Employed force | 1970 turnover in Cruzeiros | 1970 turnover per capita-Crs. |
|---|---|---|---|
| 1967 | 6.040 | 224.370.000 | 35.058 |
| 1968 | 3.840 | 137.260.580 | 35.744 |
| 1969 | 5.410 | 260.901.500 | 48.226 |

It is estimated that since 1960 the winding up of enterprises has resulted in the elimination of 50,000 jobs, without counting the spontaneous sector (1 to 9 workers).

Accordingly : it is reasonable to conclude that the 20% loss with respect to 1960 corresponds to the disappearance of unprofitable marginal units.

The creation of new jobs (new implantations, knitwear) offset by the redundancy generated by modernizations contribute to a balanced employment situation taking into account the spontaneous sector. The impact of modernization however has become accentuated since 1967/68 with the intensification of investments. We therefore estimate the rate of growth of employment in the textile sector to be negative.

On the basis of a, IBGE classification, we now try to establish sectoral evolutions.

We have assumed that the enterprises listed in the classification had a labor force corresponding to the average for the sector under review.

The sectoral evolution of the organized sector (10 workers or more) is synoptically shown below :

**EVOLUTION OF PERSONNEL FORCE IN THE MAIN SECTORS OF THE TEXTILE INDUSTRY FROM 1966 TO 1969 (PLANTS OF 10 OR MORE)**

| Sector | Employed personnel 1966 | | EP 1969 | | % Increment 1966-69 |
|---|---|---|---|---|---|
| | Force | % total | Force | % total | |
| Cotton beneficiamento | 5,355 | 1.65 | 6,935 | 2.25 | + 36 % |
| Cotton weaving | 21,413 | 6.6 | 19,020 | 6.17 | - 7 % |
| Wool weaving | 5,075 | 1.56 | 5,175 | 1.70 | + 7 % |
| Cotton weav. + spinn. | 34,066 | 10.5 | 47,500 | 15.4 | + 46 % |
| Wool weav. + spinn. | 3,940 | 1.21 | 4,055 | 1.31 | + 8 % |
| Cotton spinning | 97,657 | 30.1 | 56,565 | 18.34 | - 39 % |
| Wool spinning | 6,813 | 2.1 | 2,835 | 0.92 | - 57 % |
| Synth.+man-made spinn. | 30,498 | 9.4 | 29,065 | 9.43 | +0,27 % |
| Knitwear | 17,845 | 5.5 | 20,690 | 6,71 | + 21 % |
| Hosiery | 2,920 | 0.9 | 5,760 | 1,87 | +107 % |
| Total text. ind. | 324,443 | 68.5 | 308,345 | 64,1 | |

- According to IBGE, factories of more than 9 accounted for 68,5% of the total force in 1966 and 64.1% in 1969.
- The size of non-integrated weaving mills, whatever their thread sector, is decreasing, in terms of labor.
- The knitwear sector is growing, in relative value.
- In the cotton sector, the spinning mills are decreasing their labor force, in relative value although the integrated mills are expanding theirs.

In absolute value, the most striking results are :
- a very sharp increase in the employment force of the cotton sector
- a drastic fall in the non-integrated cotton and wool weaving sectors
- statu quo in non-integrated MMF weaving
- in the knitwear sector : + 21%
- slight fall in the cotton spinning sector.

Labor requirements according to these statistics and on the basis of trends in recent years will evolve as follows :

- growing rate of demand at spinning level; the number of redundant posts in the non integrated sector is largely offset by demand in the integrated sector.
- labor redundancy in weaving due to job liberations in the non-integrated sector
- growing demand in the knitwear sector.

Moreover, our contacts whith industrialists have enabled us to make the following predictions :

- A shortage of printing personnel : in Minas Gerais for instance, the average salary for a printing hand is 360 Ncrs a month as compared to that of weaving and spinning personnel which is no more than Ncrs 240 and 220.

- Lack of skilled dyers to meet the growing demands of the knitwear sector and the pressure of synthetics; this means the necessity of developing piece-meal dyeing techniques and pressurized dyeing of synthetics.

- Shortage of hosiery specialist personnel, especially on "fully-fashioned" machines.

Evolution of labor costs.

Labor costs are relatively low. As compared to the average for other Brazilian manufacturing industries, we find a substantial discrepancy between the per cent evolution of employment and the per cent evolution of salaries and wages. From 1963 through 1970, the percentage of jobs in the textile industry with respec to the manufacturing industries fell from 18,4% to 14,5% while the percentage of salaries changed from 13,2% to 9%. Apart from this lag with regard to other industrial sectors, within the industry itself there are too many and too striking interregional incompatibilities.

In the state of MG, it is estimated that the average salary in 1970 was Ncrs 252 per man and per month, i.e. 35% less than the average for the states of Rio, Guanabara and Sao Paulo. Even within the state of MG there are sharp differences as between the capital and the hinterland : the average for Belo Horizonte is Ncrs 202,8 while in the country it is 177.

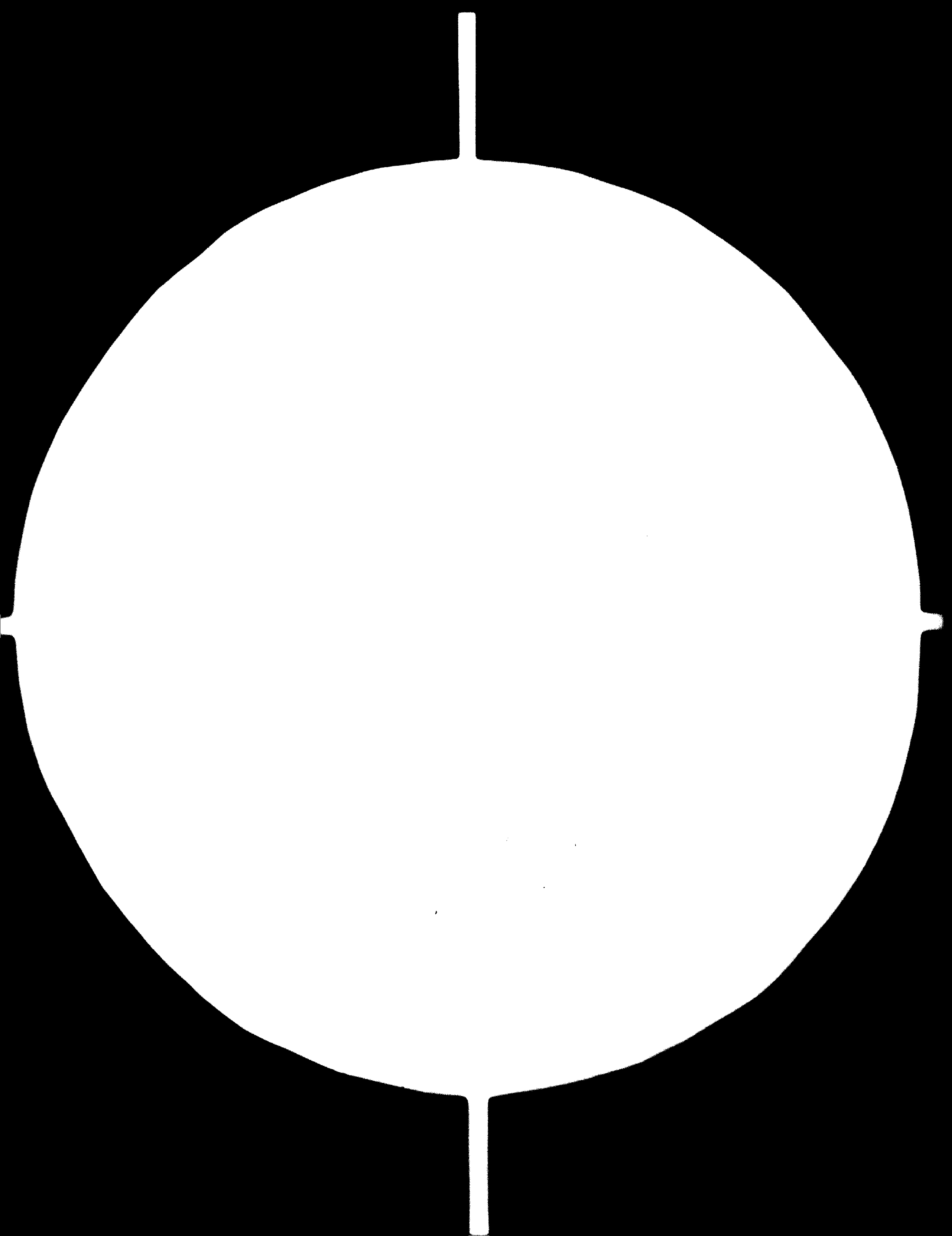
**REGIONAL COMPARATIVE ANALYSIS OF AVERAGE MONTHLY SALARIES OF MG, SP AND GB IN THE TEXTILE INDUSTRY.**

| States | Factories | % of total | Labor force | Labor costs (Ncr 1000) | Average salary (Ncr) |
|---|---|---|---|---|---|
| MG | 27 | 50 | 14,965 | 3,260 | 217 |
| SP | 96 | 47.1 | 72,409 | 24,744 | 341 |
| GB | 10 | 73.6 | 13,689 | 5,485 | 301 |

Source : INDI

J-583

84.12.13
AD:86.07
ILL 5.5+10



5 OF 5

1.0 2.8 2.5 3.2 2.2 3.6 4.0 2.0 1.1 1.8 1.25 1.4 1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

24x

F

These exaggerated discrepancies clearly demonstrate the lack or absence of labor promotion in certain more traditional regions. However, this factor alone does not explain the labor situation and we believe that the low profit margins of enterprises specialized in popular low-cost goods designed for the lower classes are also partly responsible.

Conclusions.

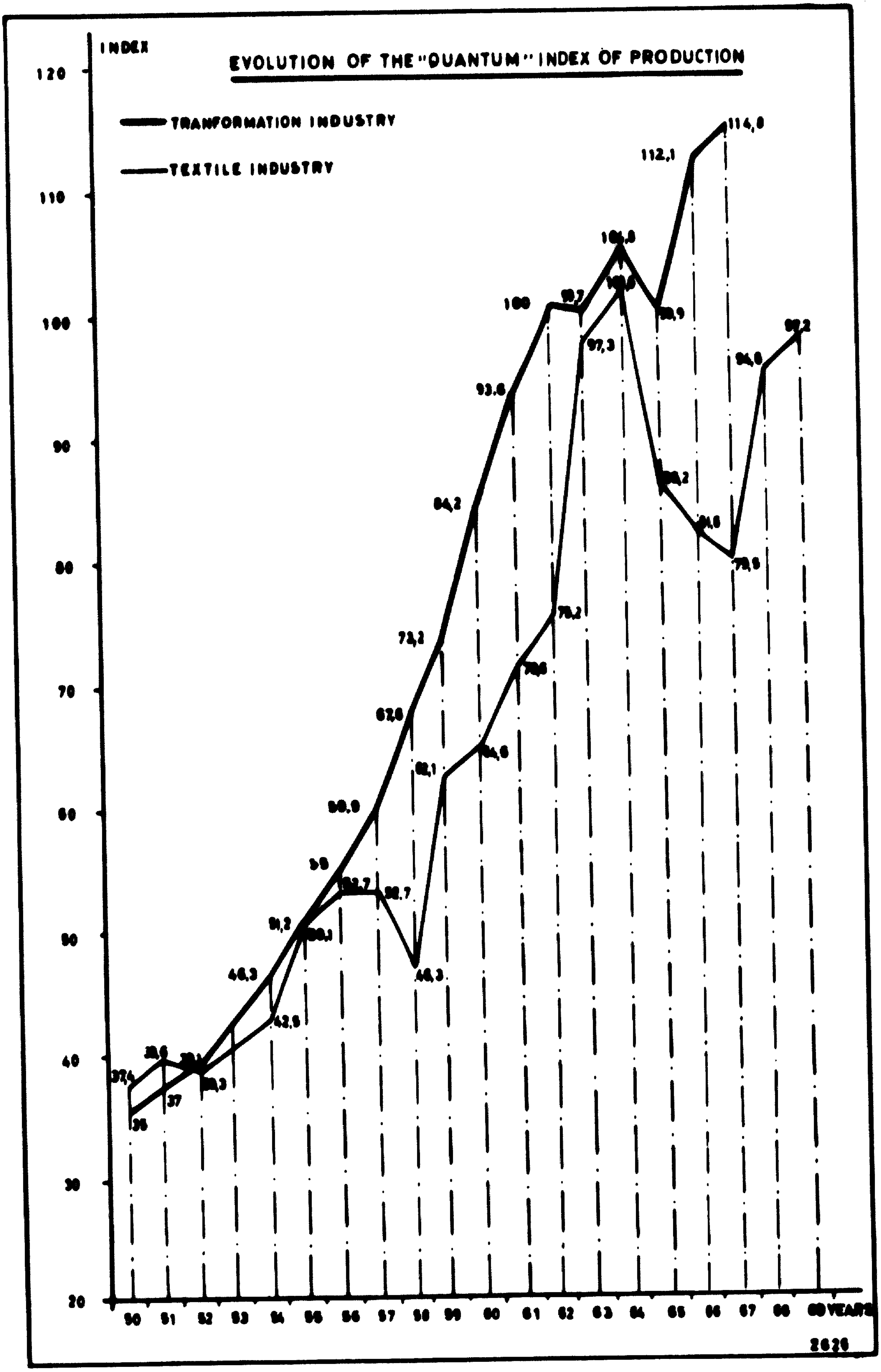
On the grounds of the data supplied by IBGE and in keeping with this agency's classification, we may make the following assertions :

- Shortage of skilled personnel is most strongly felt in the spinning sector
- There is some redundancy of weaving personnel in the employment market
- The knitwear sector needs more and more specialist and skilled personnel;
- Developing dyeing mills are short of specialized colorists and printing personnel;
- The disparity of salary scales generates unfavorable interregional and regional unbalance.

4.2. Evolution of industrial turnover.

| Years | Turnover (1000 Ncrs) | % with respect to the manufacturing industries |
|---|---|---|
| 1963 | 832,180 | 11,9 |
| 1964 | 1,576,445 | 11,7 |
| 1965 | 2,118,305 | 11,1 |
| 1966 | 3,330,158 | - |
| 1967 | 3,826,016 | 9,7 |
| 1968 | 6,132,344 | 10,4 |
| 1969 | 6,899,819 | 9,9 |

In relative value, the turnover of the textile industry has fallen more than 15 % with respect to the manufacturing industries. It should be noted that in the latter, a number of categories such as foodstuffs, wood, printing, etc... have diminished significantly with respect to the rest so that the absolute fall in the textile industry is still greater than appears in this table.


EVOLUTION OF THE "QUANTUM" INDEX OF PRODUCTION
INDEX
TRANFORMATION INDUSTRY
TEXTILE INDUSTRY
120
110
100
90
80
70
60
50
40
30
20
YEARS
2626

All this corroborates our previous assertion that the textile industry has undergone massive job elimination through the resorption and winding up of marginal enterprises thereby grossly offsetting the turnover increase of the other sectors and lagging far behind such fast developing industries as mechanics, elcetricity, chemicstry and all other producers of durable goods.

Evolution of the production index.

Graph : Index of textile industry / index manufacturing industries.

Since 1958 the growth of the quantitative index of production of the textile industry has lagged farther and farther behind that of the other manufacturing industries.

The gap has widened from year to year except in 1963/64 when a spectacular increase of output occurred, projecting the index practically to the level of the manufacturing industries. This ephemerous revival was only due to the propitiousness of the markets for speculative investments in large stocks of textile goods. As of 1964, the measures taken to curb the trend resulted in a deceleration and retrogression of the index which fell from 102,6 to 85,2 as compared to the manufacturing industries which only registered a retrogression of 4,9 points.

The 1964 measures deeply marked the textile industry until 1967 as evidenced by the cascade fall of the index : 85,2 in 1965, 81,2 in 1966 and 79,5 in 1967.

The 1968 and 1969 indices are provisional and require confirmation.

This situation clearly demonstrates the fragility of the industry; it took her tree years to cushion and check the index collapse while the other industrial sectors overcame the trend and resumed their normal rate of growth as early as 1966.

TABLE OF TURNOVERS AND LABOR FORCES BROKEN DOWN BY REGION.

| States | % of turnover | % of labor force |
|---|---|---|
| Ceara | 2,8 | 2 |
| Paraiba | 2,2 | 2,1 |
| Pernambuco | 3,6 | 5,2 |
| MG | 6,2 | 9,3 |
| RJ | 4,7 | 7,7 |
| GB | 7,1 | 8,1 |
| SP | 58,4 | 48,4 |
| Parana | 2,9 | 0,9 |
| S. Catarina | 3,6 | 5,7 |
| RGS | 2,8 | 3,1 |
| Others | 5,6 | 4,3 |
| Total | 100,0 | 100,0 |

INTER-STATE COMPARATIVE ANALYSIS OF PRODUCTIVITY INDEXE IN 1966.

| | MG | RJ | GB | SP |
|---|---|---|---|---|
| Mean annual turnover per worker | 53 | 48 | 77 | 100 |
| Mean per capital salary | 68 | 68 | 80 | 100 |
| Average energy consumer per prod. unit | 74 | 97 | 109 | 100 |
| Added value per prod. unit | 56 | 53 | 84 | 100 |

4.3. Installed capacity.

4.3.1. Soft fibers.

The following table gives the evolution of installed capacity since 1960.

EVOLUTION OF INSTALLED CAPACITY

| Break-down by State | Spindles | | Looms | |
|---|---|---|---|---|
| | 1970 | 1960 | 1970 | 1960 |
| Sao Paulo | 1,714,800 | 1,636,978 | 52,820 | 49,056 |
| Rio Guanabara | 388,000 | 844,572 | 18,980 | 21,995 |
| Minas Gerais | 420,000 | 531,494 | 13,846 | 15,812 |
| Santa Catarina | 228,000 | 101,990 | 3,550 | 2,445 |
| Rio Grande do Sul | 62,000 | 46,248 | 1,160 | 1,530 |
| North-East | 400,000 | 642,306 | 11,500 | 22,476 |
| | 3,262,850 | 3,803,588 | 111,656 | 113,313 |

| Break-down by fiber type | Spindles | | Looms | |
|---|---|---|---|---|
| | 1970 | 1960 | 1970 | 1960 |
| Cotton | 2,839,800 | 3,537,000 | 82,710 | 93,489 |
| Wool | 283,000 | 241,985 | 4,926 | 4,296 |
| M.M.F. | 148,000 | 52,908 | 20,200 | 14,193 |
| Lin-Rami | 20,000 | 26,614 | 820 | 1,335 |
| | | | 111,656 | 113,313 |

KNITWEAR SECTOR

| Year | Texturing | Circular | Linear | Chain | Fully-fashioned |
|---|---|---|---|---|---|
| 1960 | - | - | - | - | - |
| 1970 | 540 | 3,000 | 11,500 | 2,800 | 300 |

The outstanding features which are made apparent by this table are

1. General situation.

- Knitting.

Practically non-existant in 1960, this sector had in 1970 an installed capacity of more than 18,000 machines including 2,800 chain looms and 3,000 circular looms. Texturing has also developed fast and now comprises 540 heads.

- Spinning.

The number of cotton spindles has fallen by 20 % since 1960. The number of spindles in the wool system has apparently increased although it should be noted that the penetration of synthetics in this sector makes it impossible to distinguish between natural and synthetic fiber equipment. The growth of the spindles stock simply means that the spinning of combed wool and synthetics have increased from 1960 to 1970.

The number of spindles in M.M.F. spinning, short system, has sharply risen although it is worth noting that this figure includes combed wool-system spindles used for the spinning of synthetics and M.M.F. Lin-rami spinning capacity has drastically fallen.

- Weaving.

The number of looms has fallen by 2 or 3 % which in actual fact means, if the extra-wide looms, which are numerous in 1970, are taken into account, that there has been no change .

NUMBER OF WIDE LOOMS - 1971 AVERAGE

| Width | 85 " | 110 " | 130 " | 153 " | Total |
|---|---|---|---|---|---|
| Number | 24 | 26 | 347 | 6 | 403 |

The absolute number of cotton looms has diminished by more than 10 % from 1960 to 1970. The average width of the looms has also grown however.

The expression of loom capacity in terms of number of looms fails to be applicable in 1970 ; the only accurate means of measurement is in terms of the number of Km of wefting per hour. This approach is justified by the modernization of weaving stocks which has generated large discrepancies in loom widths and rates of wefting.

2. **Analysis by state.**

a) Spindles.

The sharpest recession in the number of operating spindles is in the states of Rio, Guanabara, Minas Gerais, Rio Grande do Sul and Nord-Este where this number falls from 642,000 to 400,000.

Only the states of Santa Catarina and Parana have expanded their stock (more than 100 %).

b) Looms.

The total number of looms in the state of Sao Paulo has risen substantially. This is accounted for among other things by the penetration of M.M.F. ; the weaving capacity for these fibers is 90 % in Sao Paulo and 70 % in Rio Guanabara.

The diminution in the number of looms for natural fibers is thus offset by the increase in capacity of mills which have reconverted to synthetics and man-made fiber weaving.

The increase in number of looms in the states of Santa Catarina and Parana cannot be explained away in quite the same manner. Actually it corresponds to the increase in spinning capacity. These states are mostly specialized in cotton.

The most spectacular fall concerns the Nord-Este where the number of looms has fallen to 50 % of the 1960 number. The massive elimination of marginal enterprises together with the modernization of the Nord-Este has provoqued a reduction in the relative number of obsolescent looms and an increase of modern and much wider machines.

4.3.2. Hard fibers.

A. The jute and malva industry.

Industrial stock.

In 1967, Brazil had 26 production units, 10 of which were located in the South-East, 8 in the North, 5 in the Nord-Este and 3 in the South. There were also three extension requests and three requests for new implantation authorizations.

At the end of 1967, the installed capacity was synoptically as follows :

## INSTALLED CAPACITY OF PRODUCTION

| Region | Nr of enter-prises | June 1967 T/year | Nominal (+) % | Actual (++) | |
|---|---|---|---|---|---|
| | | | | T/yr | % |
| North | 8 | 38,900 | 31.7 | 30,600 | 38.1 |
| North-East | 5 | 20,400 | 16.6 | 9,200 | 11.5 |
| South-East | 10 | 52,800 | 43,0 | 33,600 | 41.9 |
| Far-South | 3 | 10,700 | 8.7 | 6,800 | 8.5 |
| TOTAL | 26 | 122,800 | 100.0 | 80,200 | 100.0 |

Source BNDE (+) Theoretical capacity of looms operating with 3 teams and 8-hour shifts, 300 days/yr.

(++) Older equipment : 1 or 2 teams only.

## STOCK OF WEAVING LOOMS IN 1970

| TYPE OF LOOM | NUMBER OF LOOMS |
|---|---|
| Shuttle | 2,590 |
| 1940 and older | 2,000 |
| 1940 - 1960 | 490 |
| After 1960 | 100 |
| Shuttle-less | 1,074 |
| 1940 and older | - |
| 1940 - 1960 | 24 |
| After 1960 | 1,050 |
| TOTAL | 3,664 |

More than 70 % of the stock of weaving looms are still of the shuttle type and more than 50 % of these date to before 1940.

From the standpoint of changes in actual capacity, the following table shows the break-down by region from 1967 through 1970.

TOTAL OF THE ACTUAL CAPACITY

| REGIONS | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|
| North | 38 | 43 | 47 | 49 |
| North-East | 11 | 11 | 10 | 9 |
| South-East | 43 | 38 | 36 | 35 |
| Far-South | 8 | 8 | 7 | 7 |
| TOTAL | 100 | 100 | 100 | 100 |

It will be noted that the quota of Amazon has grown sharply and that the increase in nominal capacity is due partly to the renewal of very old machines.

INSTALLED CAPACITY - 1,000 T/YEAR

| AGE OF LOOMS | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|
| Nominal capacity | 122.8 | 125.0 | 125.7 | 132.1 |
| 1940 and older | 62.7 | 58.3 | 53.0 | 53.0 |
| 1940 - 1960 | 23.3 | 23.3 | 23.3 | 23.3 |
| After 1960 | 36.8 | 43.4 | 49.4 | 53.8 |

Assuming that the relative productivity of the various age groups in jute weaving is :

- 85 % for looms constructed after 1960
- 70 % for looms constructed between 1940 and 1960
- 50 % for looms constructed before 1940

Total actual capacity is found to be 84,300 tons in 1970.

Considering the domestic consumption of Brazil in 1970 was only 50,000 tons, there is an over-capacity of 40.7 %.

Accordingly, we believe that any project aimed at the further expansion of installed capacity in this sector should be immediately stopped. On the other hand, the acquistion of new equipment designed primarily to improve quality should be encouraged provided it is justified by a detailed analysis of both the degree of utilization of installed capacity and the actual cost-reduction which it would make, bearing in mind that a new installation must be easily reconvertible.

B. Sisal.

It is practically impossible, with the data at hand and in view of the limitations of our study, to evaluate the installed capacity of the sisal industry with any accuracy in view of the diversity of equipment and the dissemination of production units.

Annual output is around 50 to 60,000 tons. In spite of the fact that installed capacity must be far above these figures, new implantations were in the process of realization in 1970.

4.4. Share in the gross domestic product and comparative evolution of the manufacturing industries.

Share of the textile industry in the G.D.P.

In 1949, the share of the textile industries to gross domestic product was 20.1 % of that of the other manufacturing industries ; in 1956 it had fallen to 16.8 %, and in 1958 to 13.4 %.

This evolution resulted from the relatively fast growth of the durable goods sector, followed by metallurgy, mechanics, electricity, chemicals, transports, etc...

## EVOLUTION OF GROSS NATIONAL PRODUCT

| Year | Manuf. Ind. Ncrs | Text. Ind. Ncrs | % Textile | Relative growth | |
|---|---|---|---|---|---|
| | | | | Manuf.Ind. | Text.Ind. |
| 1958 | 258,201.3 | 34,599.0 | 13.40 (59) | 1.18 | 1.12 |
| 1959 | 344,465.5 | 41,335.8 | 12.00 (62) | 1.33 | 1.19 |
| 1962 | 1,189,625.8 | 223,649.6 | 13.80 (63) | 3.45 | 5.40 |
| 1963 | 2,336,573.3 | 271,042.5 | 11.60 (64) | 1.96 | 1.21 |
| 1964 | 4,191,697.9 | 490,428.6 | 11.70 (66) | 1.78 | 1.44 |
| 1966 | 9,978,927.1 | 1,046,787.3 | 10.50 (67) | 2.38 | 2.13 |
| 1967 | 12,856,849.7 | 1,245,828.6 | 9.69 (68) | 1.28 | 1.19 |
| 1968[x] | 18,454,722.0 | - | - | - | - |

(x) Provisional figure.

Source : National Accounts - Fund. G. Vargas.

In relative value, the position of the textile industries in gross domestic product continues to decrease from 1958 (13.4 %) to 1968 (9.7 %) for the same reasons as previously stated, i.e. the higher rate of growth of the other industrial sectors.

| | 1958 | 1963 | 1968 |
|---|---|---|---|
| Metallurgy | 11.50 | 12.00 | 11.05 |
| Mechanics | 3.00 | 3.20 | 5.22 |
| Electrical equipment and communications | 4.30 | 6.10 | 6.22 |
| Transports | 7.00 | 10.50 | 8.02 |
| Chemicals | 13.10 | 15.50 | 18.77 |

The evolution of the share of the textile industry in the gross national product has remained far below the average for the manufacturing industries, except for the 1959-62 interval: this corresponds to the previous remarks on the quantitative index of production. During this period, chronic inflation encouraged the textile enterprises to produce far in excess of demand so as to accumulate large stocks for speculation.

In sum, from 1958 to 1967, the share of the manufacturing industries in gros national product was increased 50-fold, while that of the textile industries increased only 35-fold.

EVOLUTION OF TURNOVER OF TEXTILE PROCESSING

INDUSTRY AT CONSTANT 1955 RATING (28,800)

| YEAR | TURNOVER (1,000 Ncrs) | ANNUAL VALUE |
|---|---|---|
| 1960 | 35,911 | - |
| 1961 | 38,591 | - |
| 1962 | 39,931 | - |
| 1963 | 38,859 | - |
| 1964 | 40,467 | 757,043 |
| 1965 | 33,767 | - |
| 1966 | 31,891 | 1,715,775 |
| 1967 | 25,760 | 1,892,076 |
| 1968 | 33,630 | 2,992,364 |
| 1970 | 34,800 | 2,227,218 |

# EVOLUTION OF LABOR PRODUCTIVITY =

$$\frac{\text{Turnover of processing}}{\text{Nr workers}}$$

| Year | | Production in Ncrs/1,000 units |
|---|---|---|
| 1960 | $\frac{35,911}{328.29}$ | 109,400 |
| 1961 | 38,591 | |
| 1962 | $\frac{39,931}{365.75}$ | 109,460 |
| 1963 | $\frac{38,859}{342.36}$ | 113,620 |
| 1964 | $\frac{40,467}{342,36}$ | 117,980 |
| 1965 | $\frac{33,767}{311.70}$ | 108,227 |
| 1966 | $\frac{31,891}{324.44}$ | 98,280 |
| 1967 | $\frac{25,760}{350.33}$ | 73,530 |
| 1968 | $\frac{33,630}{353.65}$ | 95,100 |
| 1970 | $\frac{34,800}{297.84}$ | 116,780 |

The processing turnover rose from 35,911 in 1960 to 34,800 in 1970. The ratio steadily diminished in 1965, 66 and 67 but resumed its ascent in 1968. The value of processing turnover being the turnover of all textile industrial operations minus the cost of raw and accessory materials, water, electricity and services, this means either that the sum total or salaries attaching to production has not been increased or that the number of people employed has fallen because amortization and capital services cost are rising faster.

It will be inferred from the table listing the annual variations of the ratio of processing turnover to number of workers that there is a correlation of this ratio with economic efficiency or internal rate of return and that from 1960 to 1970 the overall change was from 109,400 to 116,780 (practically the value of 1964).

4.5. General productivity.

The overall productivity of the textile industry was analysed and discussed in Chapter 2.4.2. In this paragraph we view overall productivity in terms of various directly correlated parameters which provide a general picture of evolution since 1960.

COMPARISON OF PARAMETERS IN 1960 AND 1970

| PARAMETERS | 1960 | 1970 |
|---|---|---|
| Cotton spinning output | 217,260 T. | 264,500 T. |
| Number of cotton spindles | 3,840,000 T. | 2,840,000 T. |
| Hours of operation per annum | 4,800 T. | 5,600 T. |

Overall productivity of cotton spinning in 1960.

Let Productivity be output/number of spindles x hours = 11.2 gr/s/h (A).

In its 1960 survey, CEPAL gave a unit output of :
12.0 gr/s/h (B).
This value (A) can be seen to be correlated to value (B).
Overall productivity of cotton spinning in 1970.

The same calculation gives P = 16.6 g/s/h (A') ; (B') or the unweighted unit output was computed in Chapter 2.3.2. = 14.07 g/s/h.

The discrepancy is due to the fact that we have assumed that the textile industry of the country as a whole had performed for the same number of hours as in the state of Sao Paulo, i.e. 19.05 hours per spindle and per man. According to the studies of SUDENE in 1969 and of INDI (Minas Gerais) the actual unit output is 5 % higher. The standard value adopted by SUDENE in 1969 was 300 days at 23 hours a day, i.e. 6,900 hours.

The rate of 19.05 hours per spindle and per year for Sao Paulo represents 80 % of this standard against 85 % for the country as a whole in 1970. In view of the adjustments, the value of productivity becomes : P (1970) = 15.8 g/s/h and the ratio

$$\frac{P\ 1960}{P\ 1970} = 1.41.$$

These conclusions confirm those of chapter 2.3.2. and it can be said that, in cotton spinning, the weighted unit output is not currently up to the 1960 standards. It will be recalled that the labor productivity in cotton spinning was 3,300 gr. per man and per hour in 1970 against 1,995 g/m/h in 1960, and that the 1960 standard for Latin America was 4,300 gr.

## 4.6. Cost of production.

### 4.6.1. Labor costs.

It is practically impossible to make an overall evaluation of labor costs in view of the enormous spread of salaries as between sectors and regions.

COMPARISON OF MONTHLY SALARIES IN THE TEXTILE INDUSTRY IN 1970

| States | Number of plants | % pf total | Average salary |
|---|---|---|---|
| Minas Gerais | 27 | 50 | 252 |
| Sao Paulo | 96 | 47 | 361 |
| Guanabara | 10 | 74 | 406 |

SALARY SCALE ACCORDING TO JOB TYPES IN MINAS GERAIS IN 1970

| Type of worker | Ncrs/month |
|---|---|
| Weaving personnel | 240 |
| Weaving foreman | 350 |
| Spinner | 220 |
| Printer | 360 |
| Carding personnel | 240 |
| Scutcher operator | 202 |

Social charges.

Social charges currently account for 48 % of the average salary before tax. If paid leave is included these marginal cost amount to 53 % of total wages.

4.6.2. Cost of raw materials.

DOMESTIC COST OF RAW MATERIALS IN 1970

| Materials | Price/Kg (Ncrs) | % of US prices with respect to Brazilian prices |
|---|---|---|
| Average cotton | 0.61 | - |
| Raw wool | 5.09 | - |
| Staple polyester | 9.25 | 40 % |
| Staple acrylics | 12.38 | 52 % |

Broadly speaking, the cost of synthetic materials is twice as high in Brazil as in the United States or Europe.

4.6.3. Cost of labor per Kg of thread in cotton and combed wool spinning systems.

| Thread | Grade | Unit output in 1970 | Cost of labor per Kg of thread |
|---|---|---|---|
| Cotton | Nr 18 | 3.4 Kg | 0.60 Ncrs |
| Combed wool | Nr 32 | 1.2 Kg | 1.66 Ncrs |

The wage standard used for this computation is 260 Ncrs per month and per worker for a monthly average of 200 hours of work, i.e. 1.3 Ncrs per hour, + 53 % of social charges and other charges.

4.6.4. Cost per Kg of Ne 18 cotton thread and Nm 32 combed wool.

| COST COMPONENTS | COTTON THREAD | WOOL THREAD |
|---|---|---|
| Materials | 0.708 Ncr | 10.50 Ncr |
| Labor | 0.600 Ncr | 1.66 Ncr |
| TOTAL | 1.308 Ncr or 0.3 US $ | 12.16 Ncr or 2.7 US $ |

4.6.5. Auxiliary materials, power, etc...

The high diversity of manufactures do not allow us at the present stage in the study, to evaluate with any precision the average auxiliary costs, be it for a single thread type. However, for all intents and purposes it can be assumed that a consumption 3 Kw/h/Kg of thread is close to the norm.

4.6.6. Servicing of capital investments ; current general expenses.

The importance of these costs is also difficult to evaluate globally especially considering that most enterprises in Brazil have fully amortized equipment as well as new investments with high rates of servicing.
Permanent general expenses are highly variable from one enterprise to another.

4.6.7. Selling price of thread.

| TYPE OF THREAD | 1969 PRICE IN US $ PER KILO |
|---|---|
| Coarse cotton thread for bagging | 1.00 |
| Pure cotton Ne 30/40 | 1.60 |
| Very fine cotton | 3.30 |
| Cotton polyester 80/2 | 4.50 |
| Cotton polyester 40/2 | 3.15 |
| Wool yarn 40/2 | 6.90 to 7.80 |
| Acrylic thread 40/2 or 60/2 | 6.45 to 7.80 |
| Wool polyester thread | 4.15 |

We could not carry out here a complete analysis of production costs ; besides there are few enterprises in Brazil which have such complete analyses of their own production costs. This serious lacking in the organization system of many textile enterprises not only does not allow to determine the sections of production or the types of products for which costs are too high, but has a very definite impact on overall efficiency, a fact which does not seem to be known in those enterprises.

The understanding of such key points in production efficiency and profitability would enable these enterprises :

- to apply a flexible sales policy with diversified sales prices corresponding closely to actual cost prices for a given article.
  In practice this means for instance that if a thread or fabric is sold at a loss this has to be compensated by inordinate profits on other more efficiently produced articles. This unbalance is dangerous for the operating efficiency of an enterprise and especially at market level once competition and consumer discrimination have improved.

- to understand the exact costs of each production step and thereby determine which sections bear an excessive share of cost-prices.

- to achieve compatibility between quality, actual production costs and sales prices ; this would also translate government efforts into a stabilisation or even in some cases a decrease of consumers' prices.

# CHAPTER V

## DETAILED RECOMMENDATIONS

## 5.1. PRODUCTION FACTORS.

This paragraph makes a synoptic review of the considerations of Chapter 2.5. Book I.

We made a major discrimination between two quite distinct types of production units : those which can still be considered as crafts or the small and average-sized enterprises which, because of their dispersion and lack of structure, cannot be fitted in the context of a unified aid or reorientation policy and which belong to the spontaneous or unorientable sector, and the other industrial units which belong to the organized or orientable sector.

The spontaneous sector, which is of considerable importance in Brazil includes all workshops and crafts, most of the knitwear sector, specialized or fashion-geared weaving mills.

Among these units, the marginal crafts or minor non-industrial shops which turn out ordinary mass-consumed articles and are therefore direct competitors of the industrial sector proper, are doomed to disappear in the medium-run unless they manage to meet local requirements in areas which cannot be covered by any system of organized distribution.

Tourist crafts can be oriented towards the cooperative system, i.e. groupings and associations in touristic areas (North-East) for the purchase of prime materials or the distribution and marketing of finished products.

This type of cooperative must however be approached warily in view of the wide range of possibilities for the excess profit-making of intermediaries.

The spontaneous knitwear sector should be allowed to evolve at its own tempo, without official encourgaments for new implantations in the short and medium-runs although in the longer run it can be oriented towards more industrial structures, either in vertical or in horizontal associations, geographical concentrations & progressive integration of spinning for the larger ones. A trend is becoming apparent which calls for integration of the spinning sector towards knitwear and of the weaving sector towards spinning.

Clearly, these trends will have to be organized to avoid depriving knitwear and weaving from their thread supplies.

Spontaneous non-integrated weaving mills are of two sorts : the marginal unspecialized units which will have to associate with similar units to create common services such as finishing and garment manufacturing, and the specialized units which must be supported because they are indispensable.

The organized sector is essentialy composed of industrial units proper. They can be oriented with sectoral and regional policies and programs.

We briefly restate the reasons which advocate in favor of sectoral policies.

The global aid planning applied since 1960 and especially since 1964 resulted in the modernization of the industry i.e. the replacement of obsolescent by more recent equiment, better adapted to new requirements, but in different measure from one region and one sector to another.

The 1960 studies and the ensuing policy generated a "big push" focused essentially on the renewal of obsolete equipment.

If some enterprises immediately grasped the overriding necessity of developing and modernizing their structures and infrastructures (overhead capital) on a par with their equipment, this was not so in the vast majority of cases. In 1970 this is translated in an even greater age spread and equipment disparity than in 1960. Any survey would reveal that the textile industry of Brazil is composed of an extraordinarily wide range in the degree of modernizations and standarditation, from ready-structured modern units, through units at various levels of refashioning, to stagnating, unmotivated units (despite the massive elimination of marginal units). Such hay-wise differentiation is accentuated further by the step-wise implementation of some modernization programs.

How should the private and public sectors go about channeling industrial growth back into the tracks of rationalized progress, as of today ?

The rush to investments associated to a certain euphoria prevailing in the industry; the regional and sectoral pluralism and its strong interactions; multidirectional natural trends; variable adaptation of attendant sectors like fiber production and distribution and the stagnation or actual senility of many enterprises, all combine to advocate a reversal from globalised undiversified aid policies to policies which take into account regional and sectoral differentiation. To this effect we advocate that the government evolve a policy which would assert positive trends and counter or inhibit detrimental ones; strengthen those industries which are already in the process of modernization or which should be encouraged to modernize; organize the secondary sectors of the industry ("up-stream and downstream" activities) so as to achieve the overall equilibirum and self-sufficiency of the textile sector.

How can such policy guide-lines be translated into a concrete program ?

In the first place, it is necessary to visualize the extent of the problem and to establish realistic targets.

Secondly, the systems of information, study and coordination which exist but are neither operational enough nor sufficiently adapted, must be organized and focused on the practical attainment of the established objectives.

With the starting premises of apparent bulk investment requirements weighted on a scale of regional and intersectoral priorities, a detailed medium and long-run program can be evolved.

This program cannot be implemented prior to a thorough complementary study of certain sectors, the necessity of which was repeatedly stressed throughout the present work. In practice this means it will be necessary to await the results of this preliminary study before proceeding further with the allocation of incentives to requesting enterprises.

Direct contact with the promoters of development projects will often prove to be a necessity.

One of our major recommendations is that the projects which are classified as important in the scale of priorities should be fitted in a detailed and coordinated medium-term program, itself viewed in long-term perspective planning. Such a manner of procedure will remedy to the inconsistency and dispersion of current program projects.

In certain instances, minimum quota of intervention will have to be fixed and maximum quota in others. Index-files of interventions will have to be kept if the program is to be conducted in a globally coherent manner.

All the preparatory tasks, analyses and evaluations can only be carried out by a specially created technico-economic team of experts acting in permanent joint consultation with the "agencies for regional development".

The files submitted in this new context will have been subjected to the most thorough and discriminating economic analyses and selected in view of sectoral priorities and regional interferences; they will be classified at central level as in keeping or contrary to the overall program and will be accorded "differentiated" aid as defined in Book I.

<u>Mechanism of aid differentiation.</u>

A few examples of possible differentiated aid allocations will be self-explanatory. It goes understood that this differentiation will be exactly adapted to the peculiarities of each case.

1°) Major integrated cotton enterprises already well ahead in their modernization process.
These units will have to prove that their structures are utilized to capacity and that further modernization increase their industrial efficiency.

Unified and coherent programs will be imposed with comparatively high minimum quota of intervention.
No aid will be accorded for less than these quota.
Aid will be degressive in time, i.e. from one project to another for the same reasons.
Degressive aid for a given project to induce the enterprise to achieve the top utilization of capital investment and to become self-sufficient within the best delays.

2°) Medium-sized cotton units specialized in low-cost articles.
Priority will be accorded to structural reform, associations and maximum specialization.
Projects will have to be presented with complete designs for transformation and re-fashioning and supported with market survey evidence of profitability. Assistance will be afforded for these studies.
Maximum aid will be granted if the project is so presented and meets the above requirements; otherwise minimum or no aid at all.
No time-degression for a project which complies the above requisites.

These two examples illustrate the type of aid titration required, i.e. the modes of differentiation which should be applied to promote favorable and oppose unfavorable trends.

## 5.2. INDUSTRIAL STRUCTURES

### 5.2.1. Structure by sector and by region

The organized sector is integrated to the extent of 85 %; however, the dimension and structures of most enterprises is highly dissemintated and regional differences are striking (see chapter 2.5.1.6.).

-The state of Sao Paulo has the entire range of types of enterprise, with a large number and variety of small weaving mills with less than 100 looms and substantial non integrated spinning mills. The penetration of synthetics is very consequent although unblended cotton still accounts for 1,450,000 spindles.

-The state of Rio and Guanabara have some major modern units whose structure is already well adapted to their capacity and output. The stock of cotton spindles has strongly diminshed since 1960; it is now a mere 52 % of the 1960 capacity. The invasion of synthetics is considerable in cotton-type spinning. The knitting sector is also well represented, with specialization in narrow fabrics, lace, etc, etc...;

-In Minas Gerais, the cotton industry's installed capacity is 400,000 spindles and 13,000 looms, of which two thirds are on automatic machines. The average capacity is 8,000 spindles per spinning unit; the industry remains highly traditional and focused on popular low-cost goods. The penetration of synthetics is insignificant; salaries and productivities are low. There is a concentration of knitting factories in Juiz de Fora.

-The North-East has a capacity of 450,000 spindles and 11,500 looms in the cotton system. The modernization program has made for substantial investment since 1960. At that time there were 54 % spindles of more than 30 years of age; in 1970 this figure has fallen to 19 %. The number of looms of more than 30 was 81 % in 1960 and 31.5 % in 1970.

-The cotton spinning equipment of the state of Santa Catarina-Paranà has increased by approximately 130 % in the ten-year interval. There is a core of dynamic and well organized enterprises whose high productivity contributes significantly to the comparatively high overall output for this state.

The penetration of synthetics is not intensive. Most enterprises are highly specialized. Broadly speaking, it can be said that the integrated units exhibit a disparity in the rate of utilization of their installed capacity : 90 % in spinning against only 75 % in weaving; this disparity was already recorded back in 1960. The causal factors accounting for this may be the low output of integrated spinning mills with respect to their consumers' rate of turnover.
This is understandable considering that in new equipment, the spinning and weaving equivalence makes for 35 spindles per classical shuttle loom measuring from 1.5 m to 2.2 m. This means that 81,400 looms would be required to absorb the production of the existing 2,800,000 spindles when in actual fact there is an installed weaving capacity of 82,700 looms. Moreover, two thirds of these are modern types; a percentage which is far from being matched by the spinning system. Thus there is a redundancy of weaving capacity for current thread production output.

It is worth noting here that the classification of looms according to type of woven fiber should be viewed with reservations in view of the existence of a large proportion of weaving mills which use their looms indiscriminately for all types of fibers according to demand.

But apart from this productivity lag, another major cause of discrepancies in the utilization of installed capacity is the introduction of medium- to wide-span looms the unit output of which is naturally much higher than that of traditional equipment.

- The cotton and cotton blends spinning and weaving sectors will be considered as part of the organized system and therefore fall into the selective aid programs policy which will have to take into account the past evolution of countries at an equivalent stage of industrial development as well as the need for uniformization of the market; it will be centered around the interests of already well installed industrial structures.

  Reservations are made as regards the printing sector in which there has been a rush to investment in the past two years and for which incentive requests are accumulating. However this trend which is geared to an improvement of cotton prints is derived from the greater specification and refinement of demand.

- Non integrated spinning feeds the knitwear and non-integrated sectors; the latter is expanding at the expense of the former. In future, cotton spinning will have to be better tuned to the demands of knitwear : actually, the present trend is for the integration of spinning towards knitting.

Nonetheless, for a long time to come a large number of minor and average hosiery factories will remain in business because they constitue the major market for a large number of non-integrated spinners. It is paradoxical that these thread consumers are fed with the excess production or inadequate thread of the integrated spinning mills. The custom-made thread is of poor quality and ill-adapted while on the other hand knitters sector and even thin thread weaving mills are potential consumers.

The quality of thread is poor and industrial consumers feel that if they reacted and applied pressure on their purveyors they would not get subsequent orders. This alone could be understood to mean unsatisfied domestic demand but certain spinners also export their cotton thread produce.
This could result in the reinforcement of the integration potential of weaving and hosiery thereby depriving the spinning sector of some market outlets. Such compulsory integrations dictated by circumstances should be countered for the integrated factories would be too small to be profitable and perform efficiently.

The cotton spinning sector should therefore be motivated and encouraged to up-date and modernize; this is far from being a dominant trend at present : programs are usually fragmentary and seldom accompanied by up-dating of the infrastructure and structural framework : air-conditioning of spinning rooms, readaptation of lay-out, training of personnel, air-cleansing installations etc...

The unbalance between spinning and weaving structures and unintegrated thread consumers would apparently result from the difficulty of enforcing prescription 1/70.
Indeed, it is practically impossible to compare outputs obtained from obsolescent or obsolete equipments with those obtained from newer stocks unless each enterprise is contacted separately. In reality, production potential is not diminishing; it is increasing and its rate of increase will grow on a par with the increase in productivity.

The range of threads offered by the domestic spinning sector does not meet demands (fashion weaving); the lacks of finer thread qualities is due both to the unavailability of appropriate raw materials and to the inadequacy of processing equipment.

## General Recommendations

1. A substantial fraction of the existing non-integrated spinning mills will have to be maintained in operation in order to supply the highly disseminated knitwear sector and the large number of non-integrated "fashion-fabrics" weaving mills.

2. The modernization program for the above non-integrated spinning sector will have to provide for the demands of the trend calling for maximum diversification of product range to cover the widest market; sufficient flexibility will have to be assured to meet or create consumer demand.

3. This diversification of demand should be kept in check by the spinners who should fix the ranges of thread numbers so as to remain within specific quality brackets, pre-determined according for each end-use.

4. This trend can only be materialized and reinforced with the formation of spinners associations or federations which would establish thread numbers and quality standards in accord with the demands of the market and the availability of raw materials. Strong cohesion is an essential prerequisite for success.

5. These standards should be evolved and debated in conjunction with thread utilizers; they should take stock of market realities, available equipment and materials.

## Non integrated cotton weaving sector

In general, these are low capacity production units which will tend to disappear; the only units which are destined to reamin in business are those devoted to very specialized high-quality items , especially in the fields of fashion fancy and luxury items. The garment industry, which is their main outlet will for its part have to afford the effort of organization and design innovation which is essential for the optimal valorization of the finished product.

Weaving of popular cotton fabrics is a special case; it usually serves out-of-the-way places unattainable by normal distribution channels; however, it is also doomed to be resorbed or eliminated.

The integration of these production units should not be encouraged; their small size and traditional structures would not make it efficient.

Pooling of resources for the creation of common services is the best form of cooperation for these units and could even open up unforeseen development possibilities.

## Integrated cotton units

For the purposes of the present paragraph, we make a distinction between two classes of cotton spinning mills :

### Major units

Although there are few such factories, these are really of considerable size and have a structural framework which is well adapted to their production capacity. However, even so, these structures do not always enable the enterprises to overcome the administrative and managerial complications attaching to the geographical dissemination of their production units; all the more so in Brazil where there is a dire shortage of competent managers. It should be noted that these difficulties could be attenuated by specializing each unit. This makes it easier to run the enterprise and direct its development (individual objectives).

Thus the creation of major groups should only be encouraged if they dispose of the managerial staff and structures necessary for their efficient operation. The impact of enterprise size on the choice of technologies was examined in Appendix 1.
In the major integrated units, the penetration of MMF in cotton blends is already considerable but is called to continue increasing in the near future. In order to keep up with demand evolution, the capacity for such fibers will have to be increased but in so doing the necessity of decentralizing the geographical lay-out of production units will have to be borne in mind. Indeed, it has been noted that in regions which are disconnected from the production centers, there is usually a serious lag in the fields of information, technical assistance and even supply.
This necessity of geographical decentralization also applies to fiber utilizers; their undue concentration, mostly in urban zones, may require great investment in redistribution of factory lay-outs. It should also be noted that there is a world trend towards the disruption of textile metropoles; the proliferation of competitive and antagonistic instead of complementary enterprises in a relatively closed compound, often results in the ageing of structures and equipment, notably because of the exacerbation of entrepreneurial individualism.

Employers' associations in this kind of metropolis rarely attain sufficient efficiency to make for coordinated progress and this finally generates internal dissention, mistrust and finally dislocation.

## General Recommendations

1. The major integrated cotton groups must aim at adapting their structures to their dimensions and achieve a commercial infrastructure capable of improving marketing outlook. Management methods must also be adapted to the demands of the geographical dissemination of production units.

2. Large concentrations should be encouraged, only provided management structures are sound and efficient in the existing enterprise; besides, specialization of new units should be the norm lest the concentration create additional burden instead of additional benefits.

## Medium-sized specialized units

These units specialize in average quality goods for less exacting consumers. The problem for them consists in surviving despite the low profit margins of this type of production. The future orientation of these units lies in the direction of greater specialization and higher quality standards.

However, these firms would be ploughing the same field as the cooperative enterprises with common services; therefore to avoid this harsh competition, top quality specialization is the only way. In any case, their structures are badly in need of overhaul.

The ideal size for this type of enterprise in the future will be in the range of 20,000 spindles and 300 to 400 high-output looms (± 200 strokes/minute, width 1.2 m to 1.5 m, on the basis of the average English number of 20).

## Small units or spontaneous sector.

This sector, which should actually be called a sub-sector, comprises the small-sized, ill-structured, craft-like enterprises for which it is hazardous or impossible to define an orientation program. A fraction of this sector is in marginal competition with average enterprises which produce the same kinds of articles; they are doomed to be wound up or absorbed. Another fraction produces fashion or luxury goods; it is highly consumer-oriented and its very spontaneousness is a factor of success in a business where flexibility is the essential requirement. Stimulation for this sector will come directly from the consumer and fashion; it should therefore be left to itself. Distribution, garment manufactures and fashion promotion should be improved.

Workshops (crafts) : This sector employs some 120,000 people distributed among a host of minor units of 1 to 9 workers. The only recommendations which can be made for this kind of concern are :

- grouping in the most favorable geographical zones by the creation of common services : central purchasing offices for raw materials, sales cooperatives, etc.
- organization of regional distribution or sub-contracting
- implantation of industrial units capable of absorbing workshops which go out of business.

Knitwear : Input soared from 22 to 50,000 tons in three years. The sector comprises a large number of small more or less craft-like enterprises. Investments needed for the implantation of a small knitting workshop are of little consequence; practially no special infrastructure or equipment is needed and the degree of uncertainty is small; this unit can be viewed as a high-powered business motor for equipment manufacturers, spinners and custom finishers.

Another benefit for the textile industry is that the knitting workshops provide an excellent training ground for the future textile personnel of the larger units, up to lower management level.

Some knitting units, both integrated and non-integrated, have developed into full-size industrial units. This is the nucleus of the future knitwear industry; it must be given as much support as it requires. The development plans of these large concerns have already resulted in concrete achievements, including some export targets. The difficult technology of this sector demands that managerial staff be more specialized and skilled than in other sectors.

In response to the knitting factories'trend to integrate towards spinning, the spinning mills will tend to do the same towards knitting. These tendencies may be encouraged.

The integration of certain fiber producers towards the knitting sector is liable to hi-jack some of input destined for this sector. It is therefore essential that those knitting industries which are sufficiently well endowed to have an aggressive outlook, focus their production on high and constant quality goods. Specialization should be pushed as far as profitable. Knitters' associations could be implemental in achieving all these goals.

Knitting production potential is far from utilized with maximum efficiency at present; a knitter usually works seven months in a year at full capacity although the current trend is for nine months of work at full capacity. This is due indirectly to the bi-seasonal pulsation of fashion (collection).

However, in Europe fashion phenomena are much more sophisticated and make for 4 and even 6 collections per year; it is advertized and promoted mostly through fashion magazines sponsored by the industry itself. Naturally under these conditions the impact of seasonal variations on production is much smaller.

The chain-knit sector has been growing at a sharp rate since 1964; it is characterized by critical periods of peak activity. This is a brand new sector with bright prospects for future development and profitability; it is accordingly crowded with inexperienced promoters who in addition usually lack imagination. The rate of implantation should be curbed by imposing minimum investment quota.

Knitwear finishing : This sector includes dyers and custom finishers; it is practically all non-integrated. In the long run, integration is desirable; a host of small workshops cover 50 to 60 % of the market. This trend will be reinforced in the next few years. Indeed, minor finishing shops are much more supple and adaptable than their big brothers and therefore better equiped to meet requirements which are sometims small but varied. The bigger dyers will not accept less than 500 m of cloth and 36 kg for dyeing at albient pressure and 150 kg for high-pressure coloring.

Such requirements cannot be met by a large fraction of knitters.

Naturally, this set up has its technological drawbacks; for instance the smaller shops are hardly ever equiped to effect piece-meal dyes withhout deteriorating the article. The knitters are therefore compelled to resort to yarn-dyeing which is more onerous but safer.

The large dyers are much in demand among the cotton spinning groups which engage in cotton-polyester blends. Their lack of adaptation to new techniques has practically compelled the integrated factories to integrate further by acquiring the necessary equipment.

This sector is obvisouly over-equiped which leads the integrated plants to give their finishing work to contractors to achieve the saturation of their production lines. This procedure is detrimental to the major custom finishers.

Recommendations for the knitwear sector

1. The spontaneous sector must develop freely and allow natural balance to set in at its own pace.

2. Concentrations of knitting factories with their purveyors and consumers are to be encouraged.

3. These concentrations should be guided to achieve the most rational diversification of finished products; this will be done by encouraging specialization but with a uniform level of technique and technology. Such concentrations will make for convergence and complementarity of interests at purchasing as well as marketing levels : a micro-model of the kind of inter-industrial harmony which is aimed for at national level.

4. Common training centers for technicians could also be instored to further reinforce the cohesion and operational efficiency of the sector. Equipment manufacturers might find it interesting to open after-sales offices in such industrial zonings and organize sessions of joint information for all users.

5. Encourage association or complementary integrations such as spinning-knitting, texturing-knitting, knitting-dyeing-finishing, etc...

6. Foster development and modernization of the custom dyeing and finishing sector, especially at the level of small and medium-sized units.

7. In view of the extremely fast development of knitting techniques and technologies, out-dating occurs at an accelerated pace and the efficiency of newer enterprises is naturally much higher.
   It is therefore important to avoid that up-dating enterprises be allowed to market out-dated equipment.

### 5.2.2. Scale of priorities

The scope of this work is not sufficiently extensive to allow us to include a detailed definition of the most appropriate method of weighting priorities on a national interregional and intersectoral scale; to do this we would need an infrastructure of data and economic analyses which can only be obtained through detailed and regionalised studies.
Nevertheless, we can provide the basic guide-lines which govern such a scale of priorities.

5.2.2.1. Regional priorities

We have already discussed this subject in paragraph 2.5.1.6. We shall therefor limit our study to the principles of industrial growth which apply to regional dualism or rather pluralism.

All important projects should be studied and classified in the context of regional and overall imperatives, irrespective of whether it concerns the textile industry directly or indirectly.
The regional problems of Brazil are continental.
The north-south problems of Brazil have been widely discussed by economists but this regional dualism is in fact much more multilateral than that; although some regional lines of force are not very far-reaching geographically their impact is great at regional economy level.

To upset the precarious balance of a regional economy without gradual support or reconversion would create turmoil in the entire economic and social structure of the region and would probably have repercussions at higher and wider levels; expercience has shown how difficult it is to restore the balance of such economies.

Accordingly in addition to the employers' associations and textile syndicates and federations, agencies for regional economic development should be created; their role would be advisory, though they could subsequently be vested with other attributions.

These agencies would have to be perfectly informed of the past present and prospective economic situation of the region and its internal trends and interactions with other regions; the main economic and industrial sectors would be represented by special commissions. These agencies would have to act as guides to the planning coordinators at government level and no unified development plan should be evolved without their previous consultation.

Isolated efforts have already been made in this direction (SUDENE, INDI, etc...) but it is mandatory that this principle be generalized and rendered operational if the coordination of all industrial sectors and the textile sector in particular is to become effective.

5.2.2.2. Sectoral peculiarities and interactions

It is difficult to make a clear-cut distinction of sectors for there are no immutable criteria of classification. We have however divided the sector in two, namely the organized and the spontaneous sub-sectors.

Spontanous sector : highly dismembered and disseminated and difficult to influence because of its constant evolution and changes of orientation. A more detailed definition of both sub-sectors was given in the preceeding chapter.
In another part of this report we arbitrarily defined it as the unindustrialized units and those employing less than 10 workers.

Organized or orientable sector. This sector includes all enterprises which can be termed as industrial properly speaking.

- Non-integrated spinning mills which supply the non-integrated weaving and knitting mills :

  1. favorable trends :

     - diversification and specialization of production
     - integration towards knitting
     - polyvalent equipment well adapted to synthetics
     - infrastructures such as air-conditioning, air-cleansing, handling equipment;
     - adequate quality-control equipment
     - flexible preparation at spinning level
     - uniformity of spinning equipment
     - investment in structural improvement

  2. Trends which should be curtailed

     - integration towards weaving
     - automation or sophisticated equipment
     - advanced or peak technologies
     - integration towards bleaching in the wool sector

- Non-integrated weaving mills other than specialized or engaged in the fashion/fancy trade

  1. Favorable trends :

     - association with finishing or garment
     - utmost specialization
     - reconversion to cotton bagging for some small and medium-size enterprises
     - modern and conventional equipment
     - infrastructure

2. Unfavorable trends

- integration towards spinning or finishing
- exaggerated growth of output
- diversification of production
- automation

- Fashion/fancy non-integrated weaving

1. Favorable trends

- conventional and flexible equipment
- air-conditioning
- sampling
- associations with spinning or finishing

2. Unfavorable trends

- integration
- diversification of production

Integrated spinning and weaving

a. Spinning + weaving (no finishing)

1. Favorable trends

- in popular-type cotton : expansion (20 to 25,000 spindles)
- highest specialization
- quality control
- flexibility of cotton spinning preparation
- can be automated in case of specialisation
- extra-wide fabrics
- preparation for weaving of blends
- integration towards finishing is not recommended association is preferable.
- the position of the major units is to be reviewed
- priority to structural and infrastructural investment.

2. Unfavorable trends

- diversification of production
- integration of finishing
- mergers with similar units
- sophisticated equipment.

b. Spinning and weaving and finishing

1. Favorable trends

- expansion
- greater concentration of production units
- diversification of production
- structural investment for spinning
- infrastructural investments such as conditioning, cleansing, quality control, handling, etc...
- associations with garment manufacturers
- industrial items.

2. Unfavorable trends

- implantation of small or medium-sized houses
- modernization of finishing plants equiped with less than 30,000 spindles
- irrational geographical dissemination of production units
- advanced technologies

Medium sized integrated units (15 to 20,000 spindles and 430 to 570 looms

a. Articles for middle- and higher-classes (i.e. same quality as immediately above)

1. Favorable trends

- utmost specialization in high-quality goods
- extra-wide fabrics
- structural and infrastructural investments (lay-out, etc.)
- programming of investments on the basis of the type of specialization and results of market surveys
- up-to-date spinning equipment
- classical weaving equipment

2. Unfavorable trends

- diversification of production
- investments in finishing not in keeping with the chosen specialization
- geographical dispersion of production units

b. Popular articles

1. Favorable trends

- expansion and specialization
- design innovation and readaptation

- associations with common finishing and garment manufacturing plants;
- investment planning.

2°) Unfavorable trends :

- diversification;
- premature invasion of synthetics;
- investments for finishing;
- further automation;
- geographical dissemination of units.

Integrated cotton dyeing and finishing plants.

A) Major units and groups.

1°) Favorable trends.

- continous or semi-continous lines for extra-wide fabrics;
- frame-printing;
- dyeing of synthetic yarn;
- preparation lines which allow diversification of production;
- coloring.

2°) Unfavorable trends.

- machinery and equipment geared to narrow fabrics;
- non-polyvalent equipment.

B) Small and medium-sized units.

1°) Favorable trends.

- specialization for average enterprises and no continuous lines for the smaller ones;
- no investments in finishing plants without sound economic analyses;
- common preparation lines between smaller units.

2°) Unfavorable trends.

- discontinuous equipment for the average enterprises which have to specialize;
- investments in the preparation lines of minor units;
- disseminated and diversified facilities.

Custom dyeing and finishing.

- large units which are ill-adjusted to the demands of integrated suppliers and consumers. Overcapacity : further investments have to be previously analysed in depth.
- overcapacity of integrated factories which accept contract work.
- associations with non-integrated units should be encouraged;
- the small units are necessary to supply the knitwear and fashion-weaving markets; adaptation to pannel and synthetic fiber dyeing techniques.

Maximum polyvalence and flexibility of equipment - horizontal associations and partnerships are to be encouraged.

Knitwear industry.

The existing factories are the core of tomorrow's knitwear industry.

- no constraints or limitations
- modern machinery
- diversification of production
- the geographical dissemination of production units must be avoided;
- integration towards finishing is also a favorable trend;
- quality control;
- structure and infrastructure development

Jute, malva, etc..

- limitation of investments and preservation of existing facilities;

- preparation of the polypropylene invasion in the larger enterprises;
- polyvalence of weaving;
- reconversion towards coated fabrics or rug frames should be encouraged and planned at central level;
- state of latency is advised.

Sisal

- must be maintained and protected as being of regional importance;
- no new implantations;
- preservation of facilities.

We have only tried to define general trends and to evaluate their impact on the sector; we could not hope to make an exhaustive of survey of all the subtleties of each sub-sector; this would have required detailled complementary studies which were quite beyond the scope of the present work.

Besides, it is rather dangerous in such a diversified and inter-related domain as the textile industry to make clear-cut immutable separations between favorable and unfavorable changes or to fix selective needs a priori. Such a one-track approach could not fail to be detrimental to the harmonious sustained development of the industry, which must constantly seek its new orientations in view of changing circumstances.

5.2.3. Role of syndicates.

We are compelled, for the sake of maximum efficiency to make the somewhat arbitrary distinction between sectoral syndicates, i.e. those which should represent the sector and promote it, and regional syndicates, i.e. those which should fight for the economic interests of the region. These two objectives are usually identitied and the two associations viewed as a whole (except in such cases as knitwear, etc...)

We would rather have the region defended in future by the regional agencies for economic development defined in paragraph 5.2.2.1. while the syndicates would be divided into sectoral commissions.

This means grouping representatives of regional enterprises into different work commissions, within the syndicate, for each sub-sector :

- non-integrated spinning and weaving;
- cotton and other knittings;
- cotton weaving and spinning;
- custom dyers and finishers;
- wool and wool blends;
- man-made and synthetics;
- etc...

In actual fact, a commission would be an informal grouping of inter-dependent enterprises. For example : non-integrated spinning and weaving mills, custom dyers and finishers and non-integrated knitting.

These commissions would be summoned impromptu and help whenever the need was felt to resolve common problems. Such joint consultation can but enhance goodwill, mutual understanding, mergers, partnerships, common services and other fruitful concentrations of resources; it would also provide an effective counter-measure to the dispersion of economic potential, the conflict of interests and the inefficiency which result from the rigid rules of formal gatherings; especially, when they include sectors or enterprises which are not involved.

To summarize our first recommendations relating to the structure of syndicates :

- regional economic interests would be protected by the regional agency for economic development, the executive commission of the textile sector, in particular, (the agency would be composed of regional commissions),
- The textile syndicates would be entitled to summon all the commissions of sectoral affinity whenever it is necessary to find a solution to concrete problems affecting the sector,
- the commission chairmen would be appointed by the relevant enterprises,
- the syndicate's general services would deal with routine matters and public services in general.

These structures would achieve :

- increased efficiency and results,
- a limitation of the number of enterprises which defect because they do not feel concerned,
- better understanding and coordination of intrasectoral efforts.

This sectoral structuring should be accompanied by regional decentralization ; indeed, we believe that some syndicates like that of Sao Paulo have a range of action which is quite beyond their means this decentralization would take the form of reorganization into sub-regional syndicates which are much more likely to appeal to those enterprises which feel left out or not involved.

The considerable industrial concentration of some regions may lead to private "para-syndicate" organizations which would cease to be the spokesmen of an entire sector and become a minority grouping at the service of private interests.

The activities of textile industrial organizations should be oriented towards more concrete domains, which are closer common interests; these could include : compilation and permanent updating of industrial inventories , on the basis of the economic parameters which are not supplied by the governmental agencies; thus, by pooling the results obtained in this way with those obtained by such agencies as C.D.I., B.N.D.E., etc ··· it would be possible to dispose of highly updated and comprehensive statistics and general information.

Such activities are naturally possible only if there is mutual trust and understanding as well as common interests among all participants this is far from being the case at present.

Once the enterprises become aware of the effectiveness of the new structures and once they begin to feel involved and part of the movement, there is no doubt that they will feel more inclined to afford substantial financial support to the syndicates as a contribution to the services it renders.

## 5.3. DISTRIBUTION FACTORS.

### 5.3.1. Structure of distribution.

We find that the present position of distribution structures in the textile sector of Brazil can be epitomized as follows :

1) High degree of parcellation of the sector and limited number of large selling units.
2) Development of chain-stores.
3) Gradual disappearance of wholesalers.
4) Interference of marginal distribution units.
5) Development of "boutiques" and "fashion shops".
6) Sales through independent agents rather than via the firms'own salesmen.
7) Relative decline of yard goods.
8) Advent of the garment industry.

These features constitute the crux of situation and of our recommendations for the improvement of future distribution structures.

#### 5.3.1.1. Large sales units.

The first recommendation we shall make is : to anticipate future requirements in marketing infrastructure and act accordingly namely by evolving a development plan suited to the predicted growth of consumer demand.

It is a proven fact that at their present rate of evolution, the major urban centers of Brazil will require large sales areas. These macro-shopping complexes can be conceived in three major designs :

1) department stores selling a wide range of goods and which meet consumer requirements for a grouping of purchases;

2) the marketing complex specialized in garments and/or home furnishing;

3) the Shopping Center.

We advocate the first alternative in medium-sized towns and the last two in major urban centers like Sao Paulo and Rio. Such complexes will be designed primarily to satisfy demand for quality goods at average prices.

Entrepreneurship - as defined by Schumpeter - must be allowed to develop in this domain and every possible means must be deployed to encourage free enterprise and free competition and in general to promote the creation and development of supermarketing units. Such units are already appearing in Sao Paulo.

Take-off will be facilitated, among other things, by affording favorable financing conditions to the promoters and by providing for such major surfaces in future town-planning.

Some textile industrialists are already planning the creation of their own major shopping units. Such go-getter initiatives must be fostered and encouraged for they achieve the short-circuiting of go-betweens and, thereby, an overall cutting of selling prices as well as large-scale and therefore cheaper marketing media.

A manner of promoting the creation of major marketing units is by enticing the present distributors, and even industrialists and wholesalers, to engage in large-scale marketing methods. Governmental contacts with such potential macro-distributors would probably achieve their motivation and accelerate the process which has thus far been much too bashful. This governmental influence would attain its maximum effectiveness if a national congress of major textile distributors were organized on the subject of "Textile Marketing in 1980".

5.3.1.2. Rehabilitation of wholesalers.

The importance of wholesalers in the textile production cycle is by way of disappearing. Many wholesalers are envisaging their readjustment, either by moving into the garment manufacturing industry or by creating a retail chainstore or again by creating a transportation network of wholesaler-distributors operating in the country.

All three reconversions will meet future demands and can therefore be encouraged. The last two are especially geared to small-town marketing and the hinterland.

Any investments allowed for the reconversion of dynamic wholesalers in any of these new directions will achieve the overall improvement of distribution and accordingly should be promoted by whatever fiscal, financial or cash encouragements the Government can afford. In any case aid and encouragements in this field should take the form of priorities in the allocation of credits.

5.3.1.3. Teams of salesmen.

Sales methods must become more aggressive and dynamic than they are at present with the system of autonomous agents. To these ends it is essential that each enterprise be endowed with its own group of fully motivated salesmen.

This is a fundamental part of modern marketing outlook which must necessarily integrate intermediate and top management training in special management institutes or on the enterprises'own training set-up as well as the training of sales personnel in special schools.

5.3.2. Garment Industry.

The garment industry is right in the middle of a major expansion boom which by definition, takes place by random accretion and results in the situation where a small number of industrial-sized houses are surrounded by a plethora of minor manufacturing shops.

Now, according to our prognosis for the next 5 or 10 years, there will be spectacular increases in consumer demand (Cfr chapter on "consumption forecast"). It appears even now that the garment industry is finding it difficult to keep up with the evolution of demand. We could not overemphasize the future importance of the garment industry as a consumer of textile materials. Our very first recommendation is therefore for an increase of production capacity in the field of garment manufacture.

5.3.2.1. Size of production units.

When we advocate the creation of major garment factories we refer to factories capable of turning out, say, 12 to 15,000 shirts a day. The initial investment required for a garment factory is comparatively small i.e. production is more labor-intensive than capital-intensive : a major advantage in Brazil where manpower is cheap and usually readily available; also, the promotion of this industry will offset undermployment and unemployment as well as increasing average per capita income.

5.3.2.2. Concentration of production units.

In view of the currently high parcellation and dissemination of production units in this sector we recommend the encouragement of concentrations, associations and outright mergers. This will enable the mass-oriented enterprises to reap the benefits of mass-production methods.

The smaller garment manufacturers will remain in business for theirs is the most suitable set-up for the manufacture of fashion or luxury articles; indeed, a high degree of flexibility is required to follow the intricate ways of the luxury trade and fashion phenomena.

For standardized mass-production of average-priced goods, macro-factories are the only efficient means of achievement. These factories will be the main purveyors of super-marketing complexes. (Cfr 5.3.1.1.)

5.3.2.3. Fiscal and quality control of garment workshops.

The garment industry also suffers from the interference of the marginal sector, composed of small, often home - working manufacturers who manage to cut their prices by tax evasion (no invoices for their fabrics) and black - market employment. This unwholesome situation is naturally detrimental to the garment industry as a whole. More severe control is therefore called for in this sector.

5.3.2.4. **Standardization of size.**

Several factors advocate the standardization of size at national level notably the multiplication of production series, and price-cutting requirements. This stadardization must comply with the conditions of morphological distribution of the domestic market and presupposes a comprehensive survey of the situation, possibly financed jointly by the Government and the industry.

# 5.4. HUMAN FACTORS.

## 5.4.1. Qualitative requirements.

The present paragraph discusses the qualitative requirements in terms of facilities at all stages of production and in terms of manpower at all levels of administrative, commercial and technical hierarchy.

Non-specialist manpower.

In the continuing context of our selective recommendations we shall only discuss the non-specialist manpower requirements of the organized or "orientable" sector, it being understood that the spontaneous or non-industrial sectors are not concerned with organized training techniques. This class of worker is actually far too dominant in the textile industry of Brazil. Training methods vary from father-to-son transfer of know-how through total immersion in a team of old hands and direct contact with routine work, to training centers either incorporated in the enterprise or common to several factories. Workers who have to be trained to the operation of new machinery are usually selected from the mass and trained by machine supervisors during the breaking-in period which is usually too short and quite inadequate to provide a sufficient level of training. The number of workers assigned to a given section should be determined by their skill and competence; they are usually redundant, except when remodelled or new equipment is installed : then the number of trained operators is too small and the degree of training insufficient. There follows a relatively long period during which yield is below standard and quality hazardous.

Recommendations :

The large and medium-sized production units should be endowed with personnel services working in close relation with the production management and designed to evolve and apply training programs for non specialist personnel incorporating the most suitable techniques; providing for separate training equipment identical to the real thing and specialized instructors. If there are no training departments, more straightforward techniques will be employed, such as in-factory training under the supervision of old hands or specially assigned instructors.

According to the size and structural organization of the enterprise the following arrangements can be made :

- The personnel and production managers jointly evolve training cycles which will be applied on identical machines as those of the production-lines under the supervision of previously trained instructors who do not necessarily have to possess a formal education and in a special department isolated from the production proper.

Theory will alternate with practice during the course. Afterwards, follow-up is essential. The instructors with formal education will largely be of the younger generation, easy to motivate and enthuse; their more theoretical training means they are free of inscrusted habits. On the other hand they will be more demanding in terms of salary.
The selection of instructors from the mass of factory labor will rely on psycho-technical tests to find the candidate with the right personality profile as determined by the personnel manager; contrary to their younger counterparts, these old hands will be handicaped by their bad professional habits. In addition to skill and sense of duty, the choice criteria will be ease of adjustment and sociability to cope with the problem posed by fellow workers which the instructor will have to retrain.

-If the enterprise does not include a training department or cannot afford one, training will have to be carried out directly on production machinery; it will be assured by workers selected from the most competent and especially trained as instructors. The personnel manager himself will effect this selection and training. Training and follow-up will overlap.

This second method seems to be the easiest to apply in Brazil in the medium-run. The major and the newly implanted enterprises will however have to set up special training departments; in a first training phase, the instructors will be picked from the mass as specified above but in a second phase they will have to be formally educated and trained technicians from specialized schools.

## Permanent training cycles.

Retraining of the labor force will have to be periodically afforded, at pre-determined time intervals; these cycles will be designed to correct any departures from the codes of good perfomance which might be spotted by the management.
Special attention will be given to lectures for all production personnel to inform them of any manufacturing defects with concrete evidence of same (cloth defects, flaws in thread samples, etc...). The causal factors and all their possible effects and consequences will be clearly demonstrated.

## Specialist manpower.

Specialization in a textile or other industrial function can only be achieved after long years of practices or formal training. Formally trained specialist personnel will, after a breaking-in stage, tend to aim at foreman positions at the lowest.

However, the factories also need supervisors assigned to sub-sections or night-shift teams; these subordinate managers might be recruited from the stock of specialist manpower of the first category, i.e. those issuing from the mass of factory workers after many years of practical training topped with a short term of special in-factory training or after-hours training (evening classes). The enterprises ought to encourage such initiatives by allowing these trainees to leave the factory one or two hours before time, without wage reduction, not only to provide an incentive but to make class attendance easier. The great shortage of specialist manpower would thus be somewhat mitigated.

Specialist manpower and subordinate managers also must attend the permanent training or retraining sessions given by the personnel department of the enterprise.

## Technicians.

After a quite advanced technical education, graduate technicians will have to be assigned successively to all essential jobs of the sections they will be called to manage. This gradual practical training will take them from specialist jobs to section manager, through supervisor and foreman positions. In the major and medium-sized enterprises, the positions of section or department manager will be given to specialized engineers; at present, the output of engineers is far below present and even farther below projected requirements; this means that the jobs of section or department manager, even in major enterprises, will have to be entrusted to technicians.

These technicians will be assisted by one or several supervisors, depending on the scope and importance of the section, i.e. according to the difficulties and complications which arise during routine operations and also according to the number of men it comprises. If the supervisors are sufficiently competent and numerous the section managers can be assigned for day-time work and the supervisors for (night) shifts. If this were not the case, the section managers would also have to be assigned to team-work; the advantage to the enterprise of affording the type of training for supervisors as described in the preceding paragraph becomes apparent here not only in terms of efficiency but also in terms of wages, the supervisors naturally have lower salaries than section managers or foreman.

## Engineers.

The quantitative and qualitative requirements for engineers clearly depend on the degree of technical and technological complexity of the enterprise.

Because of the increasing complexity of textile techniques, technologies and quality standards, the textile enterprises require an increasing number of higher-education engineers and technicians.

The size of the enterprises, their traditionalism, low profit margins due to their ill-adjustment, short-sighted cost-benefit analyses and other factors combine to make these enterprises reluctant to hire the right number of engineers and specialists; these hesitations are further exaggerated by the centralization of management which often prevails in Brazil, a trend which is partially explained by the fear of the traditionalist top managers to delegate powers to younger surbordinates who poissibly know more about modern techniques than they do. To these unfavorable premises should be added the fact that most enterprises are hardly informed about the country's educational infrastructure and the possibilities in terms of management training or formal higher education. In Europe and the United States, the textile firms do not hesitate to hire graduate engineers and technicians and assign them directly to the head of their various sections and departments or to positions such as manager of technico-commercial services, quality control services, etc... Brazil must realize these necessities; to this effect, the industry must be informed of the educational potential offered by existing and projected structures and institutions and the young workers or students must be given a clear and appealing picture of the careers offered by the textile industry; in turn, the industry must make the effort to become appealing and to offer real possibilities for fulfillment both in the professional and in the social fields.

## 5.4.2. Training program.

### 1° Technicians.

The technical training institutes are of two kinds : full-time curriculum schools and evening or part-time schools. In general the day-time courses for technicians are well structured although the type and quality of training varies strongly from one region to another. A global nation-wide educational policy should prevail throughout technical institutes making allowances for special needs of certain regions by evolving specialization programs. The number of class hours is usually too low and should be at least 38 to 40 hours per week. Certain subjects such as applied statistics for quality control, are overlooked. The curriculum should not include such general education subjects as civicism and ethics which belong in earlier stages of education.
The planning of courses throughout the program should be such that the student begins his professional life with the most important practical knowledge still fresh in his mind; to this effect the more general subjects should be taught in the early stages and the more technical subjects in the latter years. Finally, the programs will have to be periodically adjusted to technological evolution. The teachers will therefore also have to attend retraining or up-dating courses, congresses, lectures, information conferences etc, in agreement with the heads of the educational institutes who should encourage and facilitate, this movement.

The time interval for these periodic refresher courses should be two years.

Part-time or evening classes should be preferentially reserved to specialist manpower and supervisors; their daily contact with the practical aspects of their profession makes them less vulnerable to the obsolescence of programs; in any case, a revision of these programs at 5-year intervals appears appropriate.

2° Textile engineers.

We do not have an in depth knowledge of the training problem at engineering level although there is wide-spread criticism of engineering study programs among textile industrialists.

The most usual comment concerns the lack of practical preparation and technological updating of graduates who themselves contend that the majority of university professors are taken from the industry and do not devote enough time to their secondary occupation. If it is true that this proximity to the industry should be an asset, it does not appear to be so in terms of results. These professors are consciously or sub-consciously reluctant to teach their potential competitors the tricks of the trade and the more advanced technologies.

Another disenchantment of the industry with higher textile education is the geographical concentration of institutes; this is a severe handicap to both the industry and potential students, considering the nearly continental scale of the country. In J.P. for instance, there is a large concentration of laboratories, workshops and institutes which are far from being utilized to capacity. In Brazil a state school is liable to become a school at the service of a regional industry, the costs of higher education being quite above the possibilities of most families. A second handicap is the lack of information of both the public and the industry on career possibilities and on the possibilities of the existing educational infrastructure. This state of unawareness goes as far as total ignorance of the very existence of certain institutes of higher education; 10 % of the industrialists based in Minas Gerais had not heard of the existence of a higher institute in Sao Paulo.

To sum up, it will be necessary : to start planning a more rational distribution of higher and intermediate textile schools, taking into account regional as well as national needs; to inform the industry of existing possibilities of scholarization; to inform youth about career opportunities in the textile industry; to adapt study programs as much as possible to the actual needs of the industry.

For its part, the industry must prepare to offer young people adequate opportunities for professional as well as social fulfillment and achievement. Actually, there is a drastic shortage of qualified staff but the industry is not even able to offer adequate positions to what little offer there is.

An adequate teaching force will have to be constituted in the medium and long-runs and concrete programs for the implantation of satellite educational institutes will have to be evolved. This teaching force could be produced either by the national educational system or abroad. Scholarships should be offered by the industry and/or the government to the most promising elements to the extent demanded by the urgency of the situation. We have estimated that the student output which will be required from the textile schools will be 120 technicians and 40 engineers per annum in order to achieve a balanced situation in 1980. Now, in view of the present infrastructure of scholarization, we are inclined to assert that these results are impossible to achieve in the short-run. A joint all-out effort will have to be afforded by the industry and the government to face up to the situation.

3. Training of non-specialist labor.

The training program for non-specialist labor devolves entirely to the enterprise; their means vary widely according to size and degree of structural organization. Several major textile industries have realized the importance of labor training and have developed effective and sizeable structures, including well organized personnel services; training programs are elaborated jointly by the personnel and technical managements.

Personnel selection and hiring techniques are variously rigorous; psycho-technical tests and personality profiles are usually applied for top functions.

Small and medium-sized enterprises, on the other hand, usually shy away from such onerous techniques which in themselves require specialist personnel and solid structural organization. We believe that such units should make more general use of autonomoss specialists or management consultants who could either apply these techniques or teach the managers to do so. In the case of new implantations or extensions, where massive recruitment is necessary, these specialists can be entrusted with the entire selection process and the training of instructors. The instructors would train the new labor force, under the supervision of the specialists. The recruitment campaign can however be launched by the enterprise itself.

Another means of training for the smaller enterprise is to pool their resources for the creation of common personnel recruitment and selection services in the major textile zonings; this could include hiring the services of specialists who would perform successively in each of the associated factories. We also believe that the role of syndicates in this sector could be increased for the benefit of all parties. They could be implemental in creating efficient recruitment offices.

The requirements of the brazilian textile industry for in-factory trained personnel are great, especially in the current modernization phase which demands that old hans completely change their habits and readapt to new equipment and techniques; this often implies catching up at once, with several decades of technological progress. Besides, modernization usually means reduction of labor force (because of more efficient but also more complicated machinery), a fact which makes the task of remaining personnel all the more difficult.

This situation entails poor craftsmanship, lower productivity, accelerated rotations and bad working habits which will be difficult to change later on. Consequently the industrialists will be well advised to give all their attention to the proper manning of their enterprises.

4. General management.

The bigger, the more complex and the more disseminated an enterprise, the larger and more specialized its general management will have to be. The general management includes top technical, administrative and commercial executives. The technical staff was discussed above.

The size of commercial services will depend on the size and complexity of the market. The larger units will be organized as follows : Marketing Director acting as motivator of the sales teams and in constant relation with the technico-commercial or after-sales services, study and settlement of disputes, research and development of new or more market-oriented products. The departments of studies, forecasting and planning evolve medium- to long-term programs in keeping with marketing policies. A cost-pricing service for each article will allow the commercial management to determine the target profit margins and the tolerable latitude for negociations in view of the magnitude of orders,etc..

The smaller enterprises do not have any commercial service at all; they usually have a centralized management for commercial, financial, administrative and even technical control. If the enterprise is highly specialized, it should have an independent technical management or else the boss is likely to get early ulcers.

The medium-sized enterprise will find it easier to meet the requirements of marketing competition if it specializes, concentrates on its specialties' markets and if it achieves a reconciliation of high quality and highly competitive prices. Commercial services will in this case consist of the part-time attention and joint-consultation of the head of the enterprise, the sales managers and the technical managers. Product specialization leaves each of these managers with enough spare time for these activities, provided all secondary tasks can be entrusted to subordinate personnel who are capable, both of carrying them out efficiently and of taking their responsibilities. This principle of delegatio of authority is essential lest the managers waste precious time on minor problems of execution at the expense of the more important and general decisions of policy.

The textile industry will be adequately supplied in top management personnel with the output of national higher institutes and universities. The only specialty for which there is more demand than offer is specialists in modern sales and marketing techniques. Economists are not necessarily trained to handle marketing problems at industrial level.

### 5.4.3. Principles and necessity of quality control.

#### 1. Introduction

For routine production quality control to be effective, it must necessarily be followed with regular and precise records of flaws and production defects.

Unfortunately, this not a self-evidence to all textile manufacturers. In fact technical procedures are often neglected in favor of less precise and therefore unreliable practices. What is the purpose of striving to improve technical standards and rate of output if production is insufficiently supervised and control information is not exploited to improve efficiency ?

For the sake of rationality of production, it is of capital importance to ascertain whether for instance a given item of production could be fashioned better, faster, with less flaws, more uniformity of shade, etc... with thread from purveyor A rather than purveyor B.

Differences in quality could also be detected with respect to the technical and mechanical characteristics of plant machinery. In a given factory, some items are turned out better on some machines than others. A fact which is particularly striking when machines of different makes or of the same make but varying degree of obsolescence, operate in the same premises.

The statistical method of assessing flaw frequencies and their causes effectively substitutes hard fact to intuition. Actually this is the only way of barring usually vague qualifications such as "rather inadequate" or "somewhat better" and instoring motivated quality control prescriptions which can, provided statistical methods of procedure are properly applied, be as specific as dictated by the premises of computation. These prescriptions can be either palliatory or anticipatory.

The utilization of statistics for quality control techniques must not be an end in itself but rather the basis of technical or economic production policies or their improvement. Such improvements imply that quality control be viewed in the context of its specific range of application rather than as a universal solution.

Dissemination of manufactured products, often limited production time and rising demands for high-quality standards should entice the wary industrialist to ponder on the following problems :

- How can he guarantee the quality standards demanded by the consumer such as thread resistance, flaw frequency, colorfastness, etc... while remaining within adequate the limits of profitability and occuracy ?

- Should a control laboratory be implanted ? If so, where ?, How much should be invested therefor ?

- What should the frequency of contro be ?

- What methods of control should be applied ?

- Who should be entrusted with control operations ?

The thorough knowledge of the actual quality standards of a product provides satisfaction and peace of mind to the two most interested parties, namely : the manufacturer and his clientele. For this to be a reality, the following pre-requisites must be complied with :

- for the client (for instance)
  a written guarantee with the certificate of origin, stating the quality standards within a reasonable margin of accuracy;

- for the manufacturer :
  a periodically up-dated log-book recording quality standard and illustrated by a straight-forward evolution graph.
  Thus, the last term of the classical triangle of price-delay-quality is itself the flagpole of three criteria : conformity - regularity - guarantee.

## 2. General and technical factors influencing quality.

The first and most important of these factors is tradition of quality which must be promoted throughout the enterprise and "brain-washed" into the minds of its personnel by all means of psychological suggestion and broadcast.

Next comes the selection and training of operating personnel by means of up-to-date and efficient methods with stress on the appointment of the manager of control operations the actual pilot of quality promotion.

Among the technical factors pertaining to the textile industry in general, the following list is representative :

- Physical and chemical state of raw materials (index of fatty content, humidity, etc...).
- Temperature and humidity of work-rooms (air conditioning)
- Water (degree of hydrotimetry, iron traces,...).
- Disposability of utilized fats and oils.
- Maintenance and cleansing of equipment.
- Temperature and soaking ratio (its variation with dyes; ratio of solvent to solute, etc...).
- Type of material.
- Rate of turnover.

An exhaustive review of factors would be much more extensive, mostly because of the fact that quality control is sectorial, i. e. dependent on the circumstances peculiar to each case as stated above.

A law, well known to statisticians, reveals that a handful of causes are responsible for the majority of "deviations" (Pareto-Lopez 20/80 % law).
The technician knows that in practice only one or two factors can be incriminated for a defectuous product spotted a specific section of production.

Finally, a proper organization of production lines, with appropriate planning charts, can influence quality by avoiding excessive storage time between two consecutive processing operations.

## 3. The industrial quality control and statistics.

### 1°) Definition.

The concept of control incorporates the following steps :

- determination of quality standards compatible with the technical norms of plant equipment, the inherent quality of the material, as well as consumer demands;

- measurement of this specific quality standard on samples;

- stabilization of these standards in the course of production processes by acting on the technical quality factors;

- record of evolution trends (preferably with graphic representation);

- inquiring into the causes of deviations.

### 2°) Means.

- Specialized technical agent, responsible for timely control, either partial or comprehensive;

- Control laboratory within or without the plant.

- Methods of measurement, recording and interpretation of results.

- Planning of control (what, how much, when and where to control).

### 3°) Alternative control techniques.

Three modes of technical control can be distinguished :

- Sustained or continuous control :
  - with recording and automatic control devices
  - sampling (onerous)
- Haphazard sampling control : statistical control operated either in the production process or at the end of the production line.

- Haphazard sampling in a randomly chozen lot with tables of statistical sampling.

These control processes must often be complemented with a control section dealing with customer complaints.

4°) Statistical quality control.

Instead of making systematic controls over the entire production, which would be unduly expensive, or, at the opposite extreme, not making any control at all for lack of time or money, this procedure calls for soundings and random sampling. Samples are tested in the laboratory and the mean value and range of results (difference between extreme values) is calculated. These figures are enlisted in a graphical representation showing, in chronological order, daily sampling results.
After recording a score of results over a period of at least two weeks, the required range of control and supervision can be defined. In the graphic illustration, these limits also stand for the limits of normal variation of the quality index under the joint effect of a wide variety of minor factors having limited isolated effect. Thus, if two consecutive points fall outside the supervision zone, a "quality deviation investigation" is immediately undertaken.

The practical difficulty consists in determining the frequency of random controls which should be high at first to fall progressively dawn to the level of stabilization depending on the effectiveless of technical investigations and corresponding improvements. Whatever the quality standard finally attained, periodic controls must be maintained at reasonable intervals.

The higher the number (N) of control samples, the more accurate the graphic representation of quality evolution will be. Thus with a few samples from each sounding it is possible to get a general estimate of the average quality of the sampled series. It is found to be quite economic once the straightforward methods of computation are studied.

5°) Status of the control services.

The control services stand, in the modern enterprise as :

- an organizational function on the same footing as that of methods;
- the accountant of quality standards and, provisionally, their manager;
- the switch-board of quality in which the records act as meters.

In situating these services in the framework of the overall organization chart of the enterprise, the following principles should be observed :

a) the control service measures and reports quality standards; it is not responsible for them. Only the production services can, on the grounds of the information supplied by the quality control services, decide on the temporary halt of deviating machines.

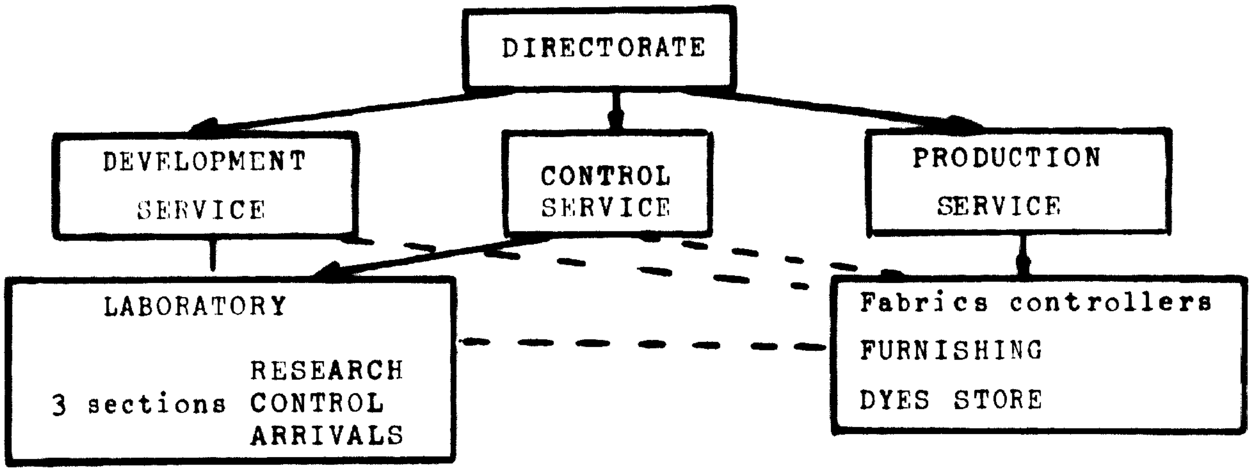
b) the service manager will be directly responsible to the general management of technical services. He will however be functionally linked to the production services.

If an enterprise is composed of several geographically distinct factories, the control services of each one preferably run by a control manager will be directly responsible to the local manager but will be functionally linked with the central quality control service.

Control must, like the other organization functions, be run by a manager fully broken and trained to the job. It can be the boss of a minor enterprise or again the technical manager of a large non-integrated plant (engineering degree).
In the case of minor factories, the director may, for instance, entrust the methods and quality control functions to a technician working in conjunction with, say, the head of the coloring department.

As for major enterprises, the central laboratory will be dependent preferably on the development service but could work for the central control service which has most of its tests performed in the plant laboratory (see example of organization chart of a coloring department).

- direct link.
- functional link.



## 4. The cost of control.

1°) Advocation of quality control

When questioned on the matter, many industrialists answer either that control is too costly or that their quality is bound to be quite up to standards considering they have no customer complaints.

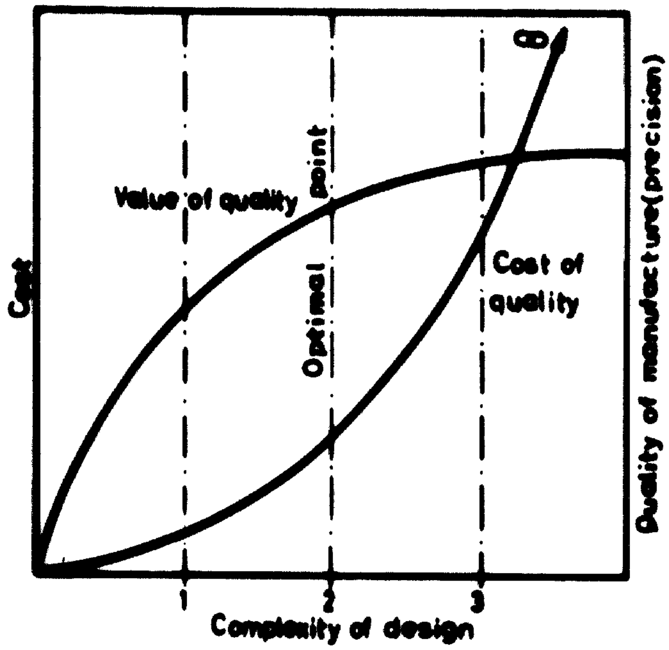
- In our opinion one cannot talk of the cost of control prior to having made the calculation for a specific enterprise (per kilo, meter of fabric, etc...). This calculation is based in the first place on the optimal volume of control, i.e. the balance between the cost or (poor) quality and the cost of control, in view of current and predicted consumer demands.

- To this should be added that the fast development of worldwide competition among makes in the fields of woman's apparel, knitwear, or even yard, will lead wholesale buyers to become increasingly discriminating in order to preserve the reputation of their makes. This applies both to the couturier's label and to the marketing labels of major stores and retailers in general. In fact, in Europe they are hastily installing laboratories designed to meet the requirements of the consumer, although also to justify in the consumer's eyes their corresponding price rises.

2°) Cost against quality

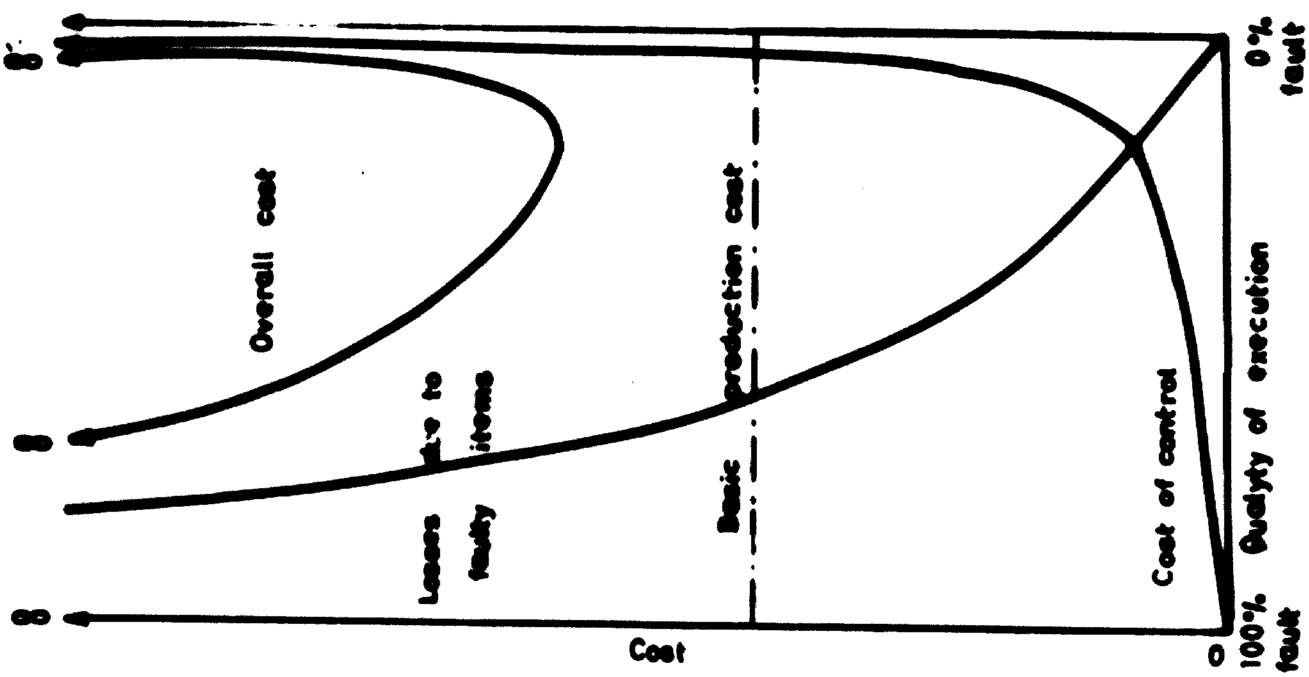
The graph functions given below, which were drawn from the "Quality Control Handbook" by Juran, illustrate the evolution of quality of the finished garment and its control against the quality of execution and the percentage of rejected items.

First graph.




The cost of quality rises at a sharper rate than the increase resulting from the improvement of processing efficiency (value of quality) when moving from a simple design (point 1) to a more elaborate one (point 3). Point 2 stands as the economic balance or compromise.

Second graph.



The cost of control rises at an ever increasing rate above a specific optimum of faulty items, peculiar to the enterprise the kind of items, manufacturing equipment, etc...
Indeed, the reduction in the percentage of rejected items, after control, entails the elimination of many sampling and other control costs.

## 5. A few suggestions.

The answer to the question of whether or not a given enterprise should construct its own laboratory boils down to a matter of costs computation. Actually, the problem lies in the determination of economic efficiency of investments and the amortization of relatively expensive equipment which can usually operate only in the daytime. This in turn depends on the frequency of controls imposed by quality standards; it can be determined by the analysis of each individual case. However, whether it be for a calibration of existing equipment or to avoid the purchase of expensive new equipment, the services of an outside lab can always be resorted to.

Actually even the minor enterprise can get started with laboratory activities with a first set of quite simple and inexpensive equipment.

The crux of the problem lies in the choice and training of the control manager and the elaboration of an adequate control program.

## 6. Conclusions.

In this general survey, we have tried to define a few guidelines regarding the organization of quality control in general. Thus the industrialist, in order to be justified in offering written (or other) quality guarantees, must :

- Suit his quality standards to consumer demands, at the outset, i.e. as of the reception of raw materials.
- As regards the manufacturing process proper : he must evolve a control program adapted to the range of his products.

- Keep well abreast of new statistical methods of control and informed on the practical aspects of normalization tests.
- Develop a quality "switch-board" translating the result of periodic overall measurements.
- Foster and promote the concept of high-quality standards among his personnel.

## 5.5. ROLE OF THE GOVERNMENT

### 5.5.1. Textile institute of Brazil.

The importance of the sector and the scale of the problems which afflict it justify the creation of a Brazilian textile institute ; this must not be understood to mean a centralized government agency but rather an organization which groups entities or agencies designed to study the textile industry as a whole. Its scope would cover primarily the scientific and technical fields.

It will consist of a polyvalent grouping of specialized techno-economic commissions such as : institute of advanced technological studies where the latest techniques would be tested to prepare future evolution and personalize the experiments of Brazil in new fields of endeavor ; the institute of applied and fundamental research in which would be carried out studies and tests on the development of man-made fibers, dyes, chemical processing agents... ; the institute of industrial productivity and psychology ; the institute of statistics which would centralize all information stemming from the industry and its attendant sectors : raw materials, distribution, etc...
This enumeration is by no means restrictive and other branches of study could be created if the need were to arise.

The institute would neither be the vassal of the industry nor of the public sector but on the contrary would be vested with considerable working autonomy.

The chairman, who is chosen from the most outstanding and objective personalities of the industry, would be called to harmonize relations between the industry, the institute and the public sector.

The actual direction of operations would be entrusted to a technical engineer and an economist, to cover the principal domains of endeavor.

The specialized satellite institutes, would be composed of research scientists and technicians, directed by highly qualified commission directors ; these institutes will also enjoy a large measure of working autonomy.

Operating budgets and work plannings would be elaborated for each institute.

Their instoration would have to be progressive ; it is a medium and long-term task. However, once the principle is approved, the first and most urgent step will be the assignment of a techno-economic coordination team to make all preparatory arrangements, to survey and contact the existing organizations and institutes which are most likely to offer constructive contribution after adequate restructuration...

The first tasks of the coordination team would be, for instance :

1) to prepare and organize a campaign of general information at all levels concerned in order to lay the ground for the success of subsequent, more concrete contacts.

2) to get in touch with national and other statistical institutes (IBGE), foundations (Getulio Vargas) etc... so as to coordinate the various data required by the textile industry and national economic interests.
This relationship is of major importance as it will provide the complement of data for the statistical institute. It would be irrational not to make full use of ready-collected information ; the ideal arrangement is to create a fact-finding organization which could complete the overall picture of the country's textile industry and fill the gaps left by the existing organizations.

3) Finally, to inventorize and get in touch with those existing organizations which could, after restructuring be brought into the institute.

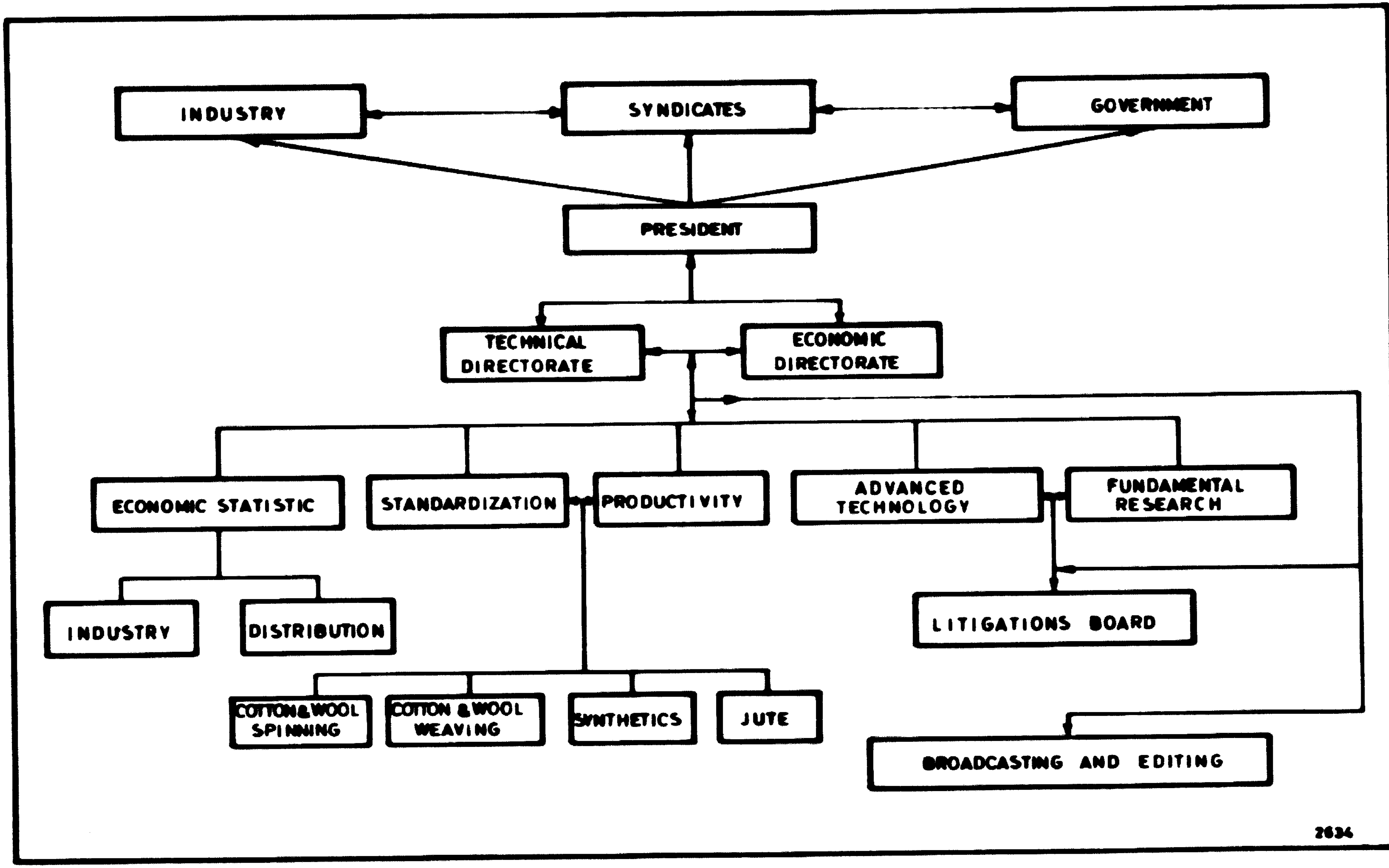
The following table gives an outline of the structures of the institute and the interactions and relations between its various component members.

General operating principles and aims.

The chairman would have the role of coordinator and harmonizer between the industry, the syndicates and the Government.

Links would be in the direction : institute enterprises-syndicates-government, and not vice-versa, so as to ensure the institute's independence.

We have consciously separated the industry (enterprises) from the syndicates so as to make it clear that the contacts with the industry do not necessarily have to pass through the syndicates ; i.e. the latter are not, in the present context, the spokesmen of the enterprises.


INDUSTRY
SYNDICATES
GOVERNMENT
PRESIDENT
TECHNICAL DIRECTORATE
ECONOMIC DIRECTORATE
ECONOMIC STATISTIC
STANDARDIZATION
PRODUCTIVITY
ADVANCED TECHNOLOGY
FUNDAMENTAL RESEARCH
INDUSTRY
DISTRIBUTION
LITIGATIONS BOARD
COTTON & WOOL SPINNING
COTTON & WOOL WEAVING
SYNTHETICS
JUTE
BROADCASTING AND EDITING
2634

The Commission, composed of the chairman, the techno-economic team and the executives of the various specialized sections, would meet annually or bi-annually with a government representative to establish operating budgets and programs for the following fiscal year and to make the balance of the expiring year.

The team of techno-economic directors and the directors of the specialized sections would enjoy large working autonomy and latitude to enable them to carry out their research work without constraints.

The aim of this institute is to give the industry the means and opportunity of participating to the studies and research operations which are designed for them.

We have found that numbers of laboratories and model workshops in various schools or local industrial groups are operating at only a fraction of their capacity. This anomaly makes for the most irrational utilization of investments in the field of research.

The institute would be financed partly by the industry, by way of shares and subscriptions, by the government in the form of subsidies and by itself with contractor works such as publications, special research, studies for third parties, arbitration in conflicts or claims between purveyors or between enterprises, etc...

We restate one of our previous comments : the main difficulty for the implantation of this institute is of a phsychological nature.

The industry must first understand the interest and necessity of such an institution, of its autonomy ; it must also understand that the financial contribution of the government does not constitute an interference and does not entail any reciprocal obligations for the enterprise.

One last possibility which we would mention is that of basing certain specialized satellite commissions in the existing or future technical and higher education institutes to make the most of research facilities.

5.5.2. Aids to investments.

In volume I we have already made a general discussion of this title. We emphasized the necessity of shifting from a global approach of the problem to selective aid by sector and by region.

We also stressed the need to diversify government aid by helping the enterprises to make the necessary investments for the improvement of their structures and infrastructure rather than restricting aid to investments in production equipment and machinery. Finally, we recommended the differentiation of interventions, i.e. the apportioning of incentives in such a way as to encourage favorable trends and discourage unfavorable ones.

Quite apart from this sectoral and regional policy, we feel that the public authorities should strive to restore or instore the regularity and harmony of contacts between the industry and official or private lending agencies so as to lay a term to the current lending set-up in which the sources are sometimes too interested in large returns instead of improved efficiency.

From another angle, we have been led to observe that many enterprises are suffering from dwindling financial resources or even absence of operating funds ; we believe that the authorities would do well to examine the requests for such investments and to allocate operating funds to the most deserving and promising.

Such a policy could take the form of financing the acquisition of raw materials or allocating credits at exceptional servicing rates.

The enterprises which are in such a situation could also be required to lay-away a quota of reserve funds at the end of each business year until a normal operating budget is achieved ; this reinvestment could be compensated by credits for the financing of stocks or the acquisition of auxiliary materials.

Another means of assisting such treasury poor enterprises would be the standardization of payment delays. We have frequently found that purchases were payable within the month whereas supplies are payable within 120 days ; this disparity is highly detrimental to the enterprises which have limited operating funds.

We might also restate the importance of encouraging infrastructural investments : for instance to improve factory layout, that is when the projects are supported by well motivated and detailed studies.

Important subsidies should also be accorded to restructuration or association projects as defined in Book I. An example would be associations between factories specialized in popular goods which pool their resources to form a cooperative with common services like finishing, dyeing and garment manufacturing.

Another association would be between knitters and dyers or finishers, cooperatives of concentrated tourist or floklore crafts with common laboratories, information departments, budget prognosis departments, etc...

5.5.3. Aid to developing management techniques.

Although the major and fully modernized enterprises have developed adequate management structures, there is a host of small, average and even large Brazilian enterprises which do not seem to realize that modern management techniques and structures are essential for efficient overall operation.

The public authorities could encourage the creation of information centers, higher management training, lectures, etc... for the heads of textile enterprises.

Scholarships or prizes could also be allocated for the perfecting and updating of management techniques ; it is essential that these innovations be previously publicized by an information campaign on the possibilities and advantages offered by the program.

# A P P E N D I X

# APPENDIX I - PRINCIPLES AND METHODOLOGICAL APPROACH OF REGRESSION AND CORRELATIONS

## 1.1. Introduction

When the analysis of the components of a set of statistical data reveals a variety of properties characterising the components, it may be useful to determine any possible correlations or relationships between them.

For any given value of a parameter there is a set or sub-group of values whose distribution is said to be conditional or correlated to the chosen value. To this functional distribution corresponds mean values and conditional ranges of the correlated values.

Let X and Y be the two variables :

To any given value of X there corresponds a distribution (range) of $n_x$ value of Y which we will call $Y_x$; the mean value of the range will be $\overline{Y}x$ and the correlated range will be determined by the function $S(Y - \overline{Y}_x)^2/n$. To each value of X there is a mean value of $Y(\overline{Y}_x)$ of the sub-group so defined. The line $\overline{Y}_x = f(X)$ is called the <u>graphical estimative respresentation of Y as a function of X</u>. It can also be called the <u>line of regression of Y with respect to X</u>.

The term <u>regression</u> was first employed by F. Galton (1822-1911). He had discovered in his studies of hereditary correlations that as a rule a man which was above average height would have sons who were also above average but shorter than he : he called it hereditary <u>regression</u>.

For certain fields of application it was found that one of the variables was independent with the other related to it on a functional basis; for instance, the weight of children is directly related to their age but the converse is untrue. In other fields, the two variables can be parameters; this means that two regression curves have to be confronted :

$$\overline{Y}x = f(X) \quad \text{and} \quad \overline{X}y = f'(Y).$$

In time-series, the parameter must naturally be the time factor (to cite G.W.Snedecor : if the growth of a geranium is measured above a reference level at eight-day intervals, no-one in his right mind would use a geranium as a time meter).
Thus, <u>Y will be said to be statistically related or correlated to X</u> if the mean value Yx for a given value of X is a function of X.

To this mean-value function can be added a range function. This functional relationship is not usually gone into; instead of making this study, one usually determines an average and therefore constant value of the f(X) range.

Were the conditional range to be zero, there would also be a functional relationship of Y with respect to X, i.e. $X = f(Y)$ as well as $Y = g(X)$. It is essential to comprehend that the notion of functional relationship is the limit, when $S(Y - \overline{Y}x)2/nx$ (range) tends towards zero, of the much wider notion of statistical relationship. In this general context, the choice of an X value does not determine a value of Y : only a value of $\overline{Y}x$. The degree or intensity of correlation between X and Y is inversely proportional to the range, i.e. rises when the value of $Y - \overline{Y}\,x$ decreases.

In this study of correlation we shall endeavor to :

1) formulate the law of variation of the average value of one variable as a function of the other or, in other terms, adjust the average variation curve, which translates the law, to factual observations.

   This problem of the empirical evaluation of one variable with relation to another is often come across in laboratory work (gauging of instruments, use of indirect methods of measurement, laws relating two physical parameters) and in industrial practice (impact of machinery adjustments on finished products, description of phenomena in terms of a given factor...);

2) qualify the degree or intensity of correlation by an absolute numerical coefficient, i.e. unrelated to the units of the two variables.

   The terms regression and correlation are theoretically equivalent. Correlation is preferred if the conditional relationship is the focus of interest; this is usually the case in industry.

   It should be noted that the law can be extended to three or more variables.

## 1.2. The notion of adjustment

The numerical data at our disposal to describe a phenomenon inevitably result in discontinuous graphic representations, exhibiting betrays irregularities and amosphousness stemming from various factors : sample variations, erroneous observations, unreliability of measuring instruments, accidental mistakes.

There irregularities are not in keeping with the mathematical knowledge of the phenomenon's continuity, at any rate in certain specific fields. This condition of continuity is complied with by making the data of observation be convergent with a series of "adjusted" figures. This is the concept of adjustment of a model or a theoretical law, to actual observations. This adjustment can either be graphical, mechanical or analytical.

Let X and Y be cartesian coordinates. The observed values are found to be laid out according to a nebulous but usually relatively well defined pattern which provides a guide-line for the determination of the most rational adjustment function : straight line, parabola, etc...

The graphic method consists in making a free-hand drawing of the line of probability density, which must be continuous and as regular as possible and must be the approximate axis of gravity of the mass of observed points; this is the process of re-grouping (also called slimming) of values.

This straightforward and rapid method has only limited precision and is as reliable as its degree of precision. However, it is flexible and provides information outside the field of observation, by simple extrapolation. It is not as arbitrary as it might seem on first blush and can be quite useful in practice.

The mechanical method of adjustment consists in "adjusting" a curve to a set of values (Yk, Xk) (k= ...n) in such a way that to any given value of Xk there is a corresponding value of Yk, itself a function of the pattern of concentration of ordinate values in the vicinity of the f (Xk). The chosen adjustment function will depend on the assumption made as to the actual variation of Y in the vicinity f(Xk) and on the number of observed values of Y which are afforded. The methods applied are called respectively of fixed-interval averages and random-average pointing. They cannot be discussed here.

The analytical method of adjustment consists in finding a function $y = f(x)$ which reconciles the theoretical variation of the phenomenon to the actual set of values. This method is inevitably subjective as to the choice of function and the procedure of reciprocal adjustment. True, it has the advantage of offering an analytical representation of the phenomenon allowing interpolation and, with caution, extrapolation.

## Analytical adjustment

1) Choice of function

It is advisable to chose an uninvolved function, depending on as few parameters as possible. One is usually guided in this choice by the general pattern or polygonal aspect of a preliminary graphic adjustment. The whole range of function types can be tried, starting with those depending on a smaller number of parameters (straight line, parabola, exponential, etc...). The physical features of the law of variation can also be used. If necessary a change of variable can previously be operated (see for case in point M.R. SPIEGEL, page 218).

2) Procedures of adjustment

Once the function has been determined, there remains to make a choice among the various methods of procedure for the determination of the numerical values of the functional coefficients, most suitable for adjustment to observations. The least-squares method will be envisaged in this context together with the method of orthogonal polynomials which is particularly recommended.

## 1.3. Precision of the adjustment

The precision of the adjustment is measured by the set of discrepancies or residual values $R = Y - \hat{Y}$ between observed values of Y and their adjusted values $\hat{Y}$. By definition of the adjustment, the sum-total of these residual values is nill.

Precision is measured by the average range of R, noted $\sigma_{YX}$ or its square, i.e. the average conditional variance : $S\ (Y - \hat{Y})^2/n$.

The sum of products :

$$S\ (Y-\hat{Y})(\hat{Y}-Y) = S\ (Y-\hat{Y})(X-\bar{X})\ a_1$$

$$= -\ a_1\ \bar{X}\ S\ (Y-\hat{Y}) + a_1\ S\ X\ (Y-a_0-a_1\ X) = 0$$

is nill.

Besides, the identity : $(Y-\bar{Y}) = (\hat{Y}-\bar{Y}) + (Y-\hat{Y})$ gives after squaring and summing :

$$S\ (Y-\bar{Y})^2 = S\ (\hat{Y}-\bar{Y})^2 + S\ (Y-\hat{Y})^2$$

the sum of double products being zero by virtue of the above relation.

This last relation shows that the sum of the squares of the differences of Y with respect to $\hat{Y}$ can be broken down into the following squared sums :

the squared sum of discrepancies due to regression : $S(\hat{Y}-\bar{Y})^2$

the squared sum of discrepancies with respect to regression : $S\ (Y-\hat{Y})^2$.

The formula can therefore be restated as follows :

$S\ (Y-\hat{Y})^2 = S(Y-\bar{Y})2 - S(\hat{Y}-\bar{Y})^2 \quad = \quad S(Y-\bar{Y})^2 - a_1{}^2\ S\ (X-\bar{X})^2$

which show that there is a reduction in the range of Y values when d screpancies are calculated with respect to $\hat{Y}$ rather than with respect to its mean value $\bar{Y}$.

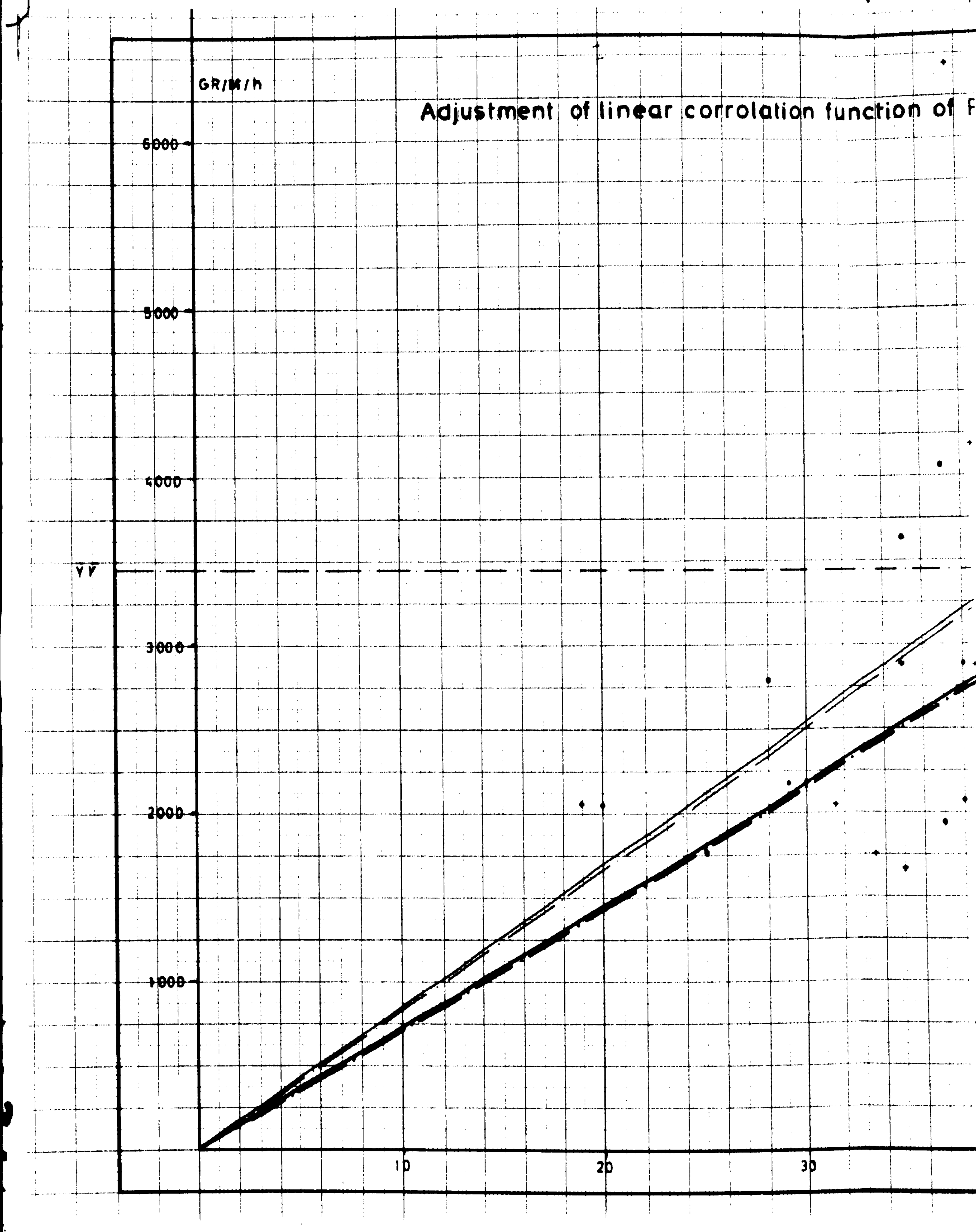
The expression of this reduction can be worked down to :

$$r^2 = 1 - \frac{S(Y-\hat{Y})^2}{S(Y-\bar{Y})^2} = \frac{S(\hat{Y} - \bar{Y})^2}{S(Y - \bar{Y})^2}$$

To say that $r = 0.9$ is equivalent to saying that 91 % of the range of observed values of Y is attributable to the conditional variation of Y.

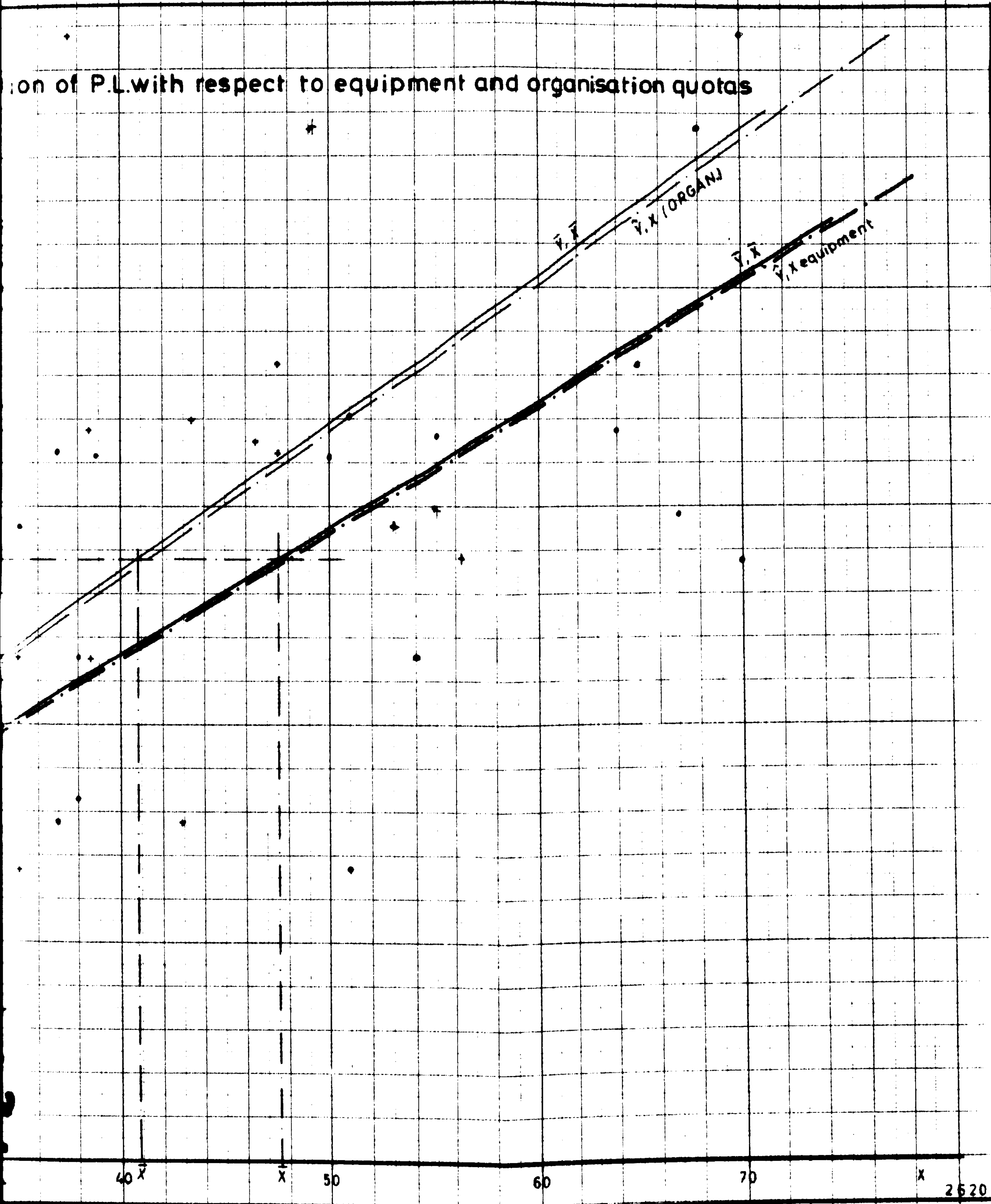
o

o o

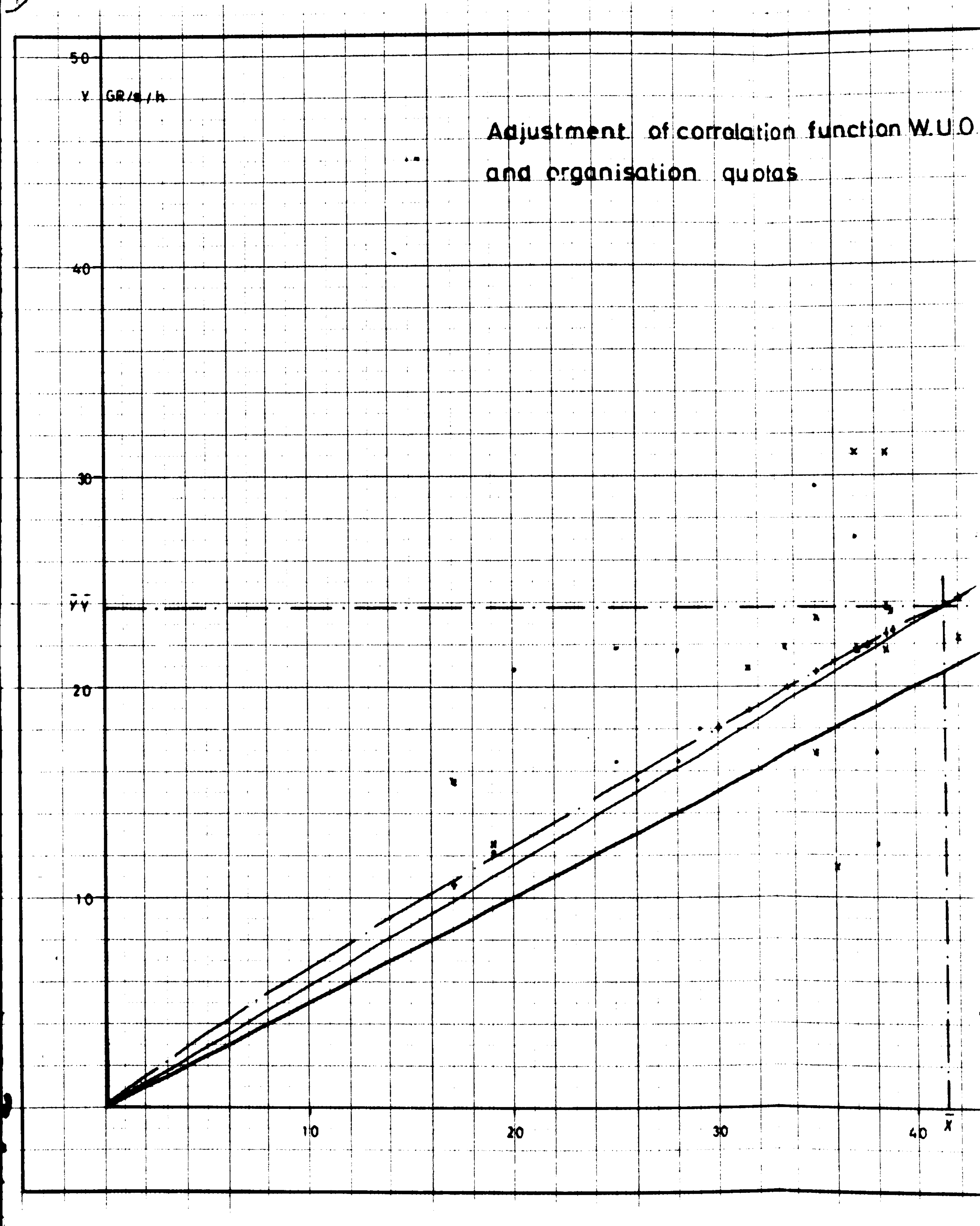


GR/M/h
Adjustment of linear corrolation function of
6000
5000
4000
YY
3000
2000
1000
10
20
30

:on of P.L.with respect to equipment and organisation quotas



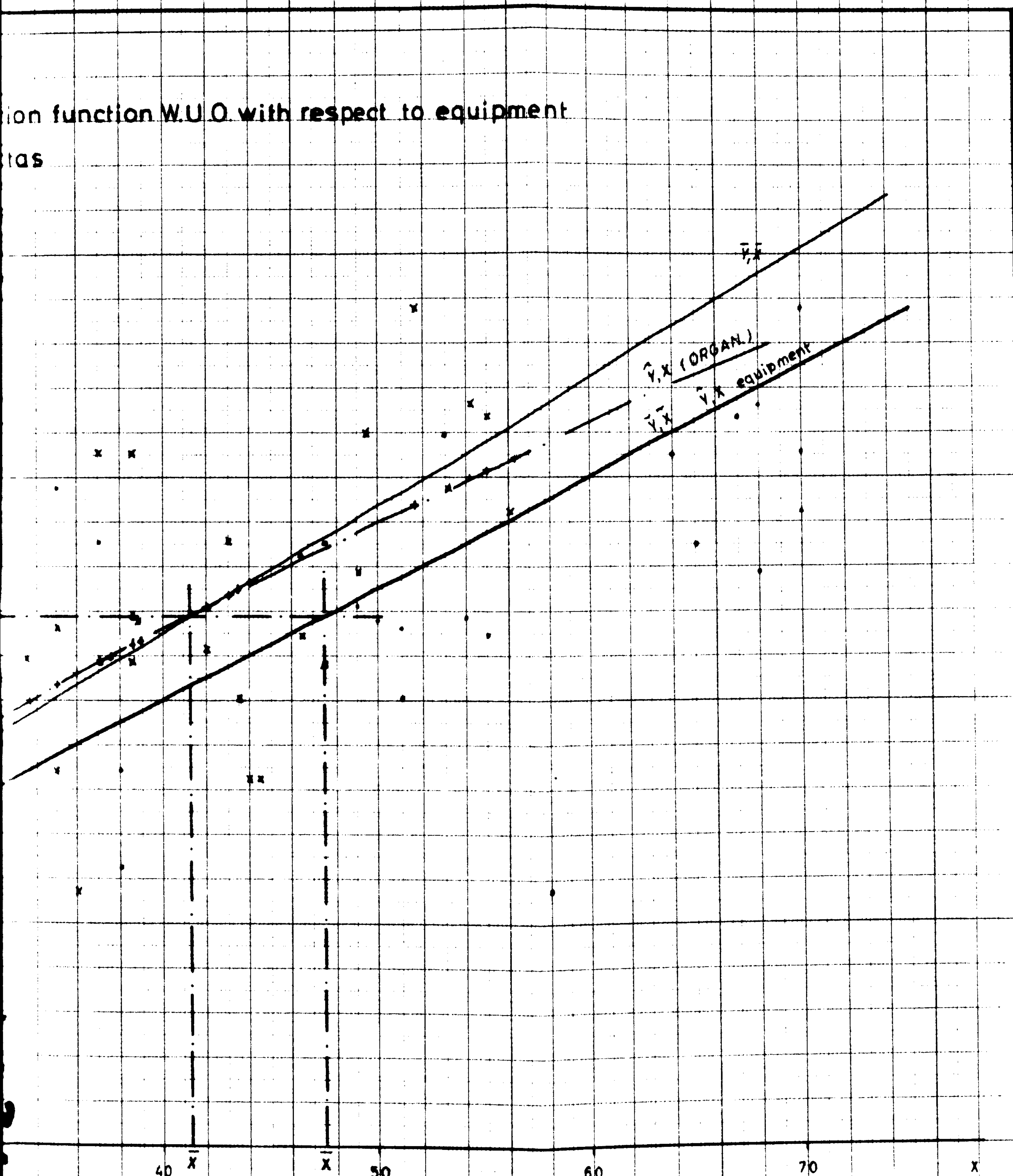

2620



Adjustment of corralation function W.U.O
and organisation quotas
Y GR/s/h
50
40
30
$\bar{Y}$ Y
20
10
10
20
30
40
$\bar{X}$

ion function W.U.O. with respect to equipment

tas




2619

# APPENDIX II - METHODOLOGICAL APPROACH

## 2.1. Introduction

By constructing tables of equipment and organization cotes of the factories in our survey we undertook to establish whether or not there was some law which could correlate these cotes to labor and machinery productivity. For this process of adjustment, we rejected those productivities which were too high with respect to the general standards prevailing in Brazil.

2.2. 1. Adjustment of the equipment cote to labor productivity.

2. Adjustment of the organization cote to labor productivity.

1)

| Y Gr/H/h | X equipment | $\hat{Y} = a_1 x$ | $Y - \hat{Y}$ |
|---|---|---|---|
| 6,450 | 70 | 5,047 | |
| 4,140 | 55 | 3,965,5 | |
| 4,572 | 65 | 4,686,5 | |
| 2,780 | 28 | 2,019 | |
| 2,069 | 38 | 2,740 | |
| 2,900 | 38 | 2,740 | |
| 2,177 | 29 | 2,091 | |
| 4,028 | 50 | 3,605 | |
| 3,647 | 35 | 2,523.5 | |
| 1,761 | 25 | 1,802.5 | |
| 2,885 | 54 | 3,893.5 | |
| 2,050 | 20 | 1,442 | |
| 5,920 | 68 | 4,903 | |
| 4,255 | 51 | 3,677 | |
| 4,070 | 37 | 2,667 | |
| 1,941 | 37 | 2,667 | |
| 1,676 | 51 | 3,677 | |
| 4,185 | 64 | 4,615 | |
| 3,719 | 67 | 4,831.5 | |
| 3,450 | 70 | 5,047 | |
| $\Sigma Y = 68,675$ | $\Sigma x = 952$ | $\Sigma \hat{Y} = 68,640$ | + 35 |

$$a_1 = \frac{SY}{SX} = \frac{68,675}{952} = 72.1 \qquad \boxed{\hat{Y} = 72.1\ X}$$

$$\bar{Y} = \frac{68,675}{20} = 3,434; \quad \bar{X} = \frac{952}{20} = 47.6$$

$$\Sigma (Y - \hat{Y})^2 = 35^2 = 1,225$$

$$r^2 = \frac{\Sigma(\hat{Y} - \bar{Y})^2}{\Sigma(Y - \bar{Y})^2} = \frac{(68,640 - 3,434)^2}{(68,675 - 3,434)^2} = 0.99$$

$$r = 0.996$$

2)

| Y Gr/M/h | X equipment | $\hat{Y} = a_1 x$ | $Y - \hat{Y}$ |
|---|---|---|---|
| 3,450 | 56.2 | 4,721 | |
| 3,717 | 55 | 4,620 | |
| 4,185 | 38.5 | 3,234 | |
| 1,676 | 35 | 2,940 | |
| 1,941 | 43 | 3,612 | |
| 4,070 | 47.5 | 3,990 | |
| 4,255 | 43.5 | 3,654 | |
| 5,920 | 49.1 | 4,124 | |
| 2,050 | 31.5 | 2,646 | |
| 2,885 | 38.5 | 3,234 | |
| 1,761 | 33.5 | 2,814 | |
| 3,647 | 53.1 | 4,460 | |
| 4,028 | 38.8 | 3,259 | |
| 2,177 | 30 | 2,520 | |
| 2,900 | 35 | 2,940 | |
| 2,069 | 19 | 1,596 | |
| 2,780 | 38.5 | 3,234 | |
| 4,572 | 47.5 | 3,990 | |
| 4,140 | 46.5 | 3,906 | |
| 6,450 | 37.5 | 3,150 | |
| $\Sigma Y$=68,675 | $\Sigma X$= 817.2 | $\Sigma \hat{Y}$=68,644 | + 31 |

$$a_1 = \frac{SY}{SX} = \frac{68,675}{817.2} = 84 \qquad \boxed{\hat{Y} = 84.X}$$

$$\bar{Y} = \frac{68,675}{20} = 3,434; \quad \bar{X} = \frac{817.2}{20} = 40.86$$

$$\Sigma(Y - \hat{Y})^2 = 31^2 = 961$$

$$r^2 = \frac{\Sigma(\hat{Y} - \bar{Y})^2}{\Sigma(Y - \bar{Y})^2} = \frac{(68,644 - 3,434)^2}{(68,675 - 3,434)^2} = 0.99$$

$$r = 0.996$$

The reduction being very small and discrepancies minor, we have drawn the most straightforward adjustment line, i.e. the linear function. On the graph, the straight lines $\bar{Y}$, $\bar{X}$ consist of the mean values and $\hat{Y}$, X of the adjusted values.

2.3.

1) Adjustment between cote equipment and machine productivity.

2) Adjustment between the cote organisation and machine productivity.

1)

| Y Gr/g/h | X cote machinery | $\hat{Y} = a_1 x$ | $Y - \hat{Y}$ |
|---|---|---|---|
| 28.4 | 70 | 35.05 | |
| 16.8 | 38 | 19.03 | |
| 32.7 | 67 | 33.55 | |
| 12.5 | 38 | 19.03 | |
| 16.4 | 28 | 14.02 | |
| 21.7 | 28 | 14.02 | |
| 31 | 64 | 32.05 | |
| 27 | 65 | 32.54 | |
| 23.2 | 51 | 25.53 | |
| 15.5 | 26 | 13.02 | |
| 31.9 | 53 | 26.54 | |
| 11.4 | 58 | 29.04 | |
| 27.1 | 37 | 18.52 | |
| 22.9 | 55 | 27.54 | |
| 21.6 | 37 | 18.52 | |
| 33.2 | 68 | 34.05 | |
| 20.1 | 51 | 25.53 | |
| 24.2 | 49 | 24.53 | |
| 25.7 | 68 | 34.05 | |
| 16.4 | 25 | 12.52 | |
| 20.8 | 20 | 10.01 | |
| 31.1 | 70 | 35.05 | |
| 23.7 | 54 | 27.04 | |
| 37.5 | 70 | 35.05 | |
| 21.8 | 25 | 12.52 | |
| 29.5 | 35 | 17.52 | |
| 23.5 | 50 | 25.03 | |
| 18 | 29 | 14.52 | |
| $\Sigma$ Y=665.65 | $\Sigma$X=1329 | $\hat{Y}$=665.4 | 0.21 |

$$a_1 = \frac{SY}{SX} = \frac{665.65}{1,329} = 0.5007 \qquad \underline{Y = 0.5007.X}$$

$$\bar{Y} = \frac{665.65}{28} = 23.77 \; ; \quad \bar{X} = \frac{1,329}{28} = 47.0$$

$$(Y - Y)^2 = 0.21 = 0.044$$

$$r^2 = \frac{(Y - \bar{Y})^2}{(Y - \bar{Y})^2} = \frac{(665.4 - 23.77)^2}{(665.65 - 23.77)^2} = 0.99$$

$$r = 0.996$$

The adjustment is linear.

2)

| Y<br>Gr/b/h | x<br>cote organiza-tion | $\hat{Y}$<br>$= a_1.X +$<br>$a_1.X^2$ | Y - $\hat{Y}$ |
|---|---|---|---|
| 31.1 | 37.5 | 21.9 | |
| 16.4 | 44 | 25.2 | |
| 24.2 | 42 | 24.2 | |
| 33.2 | 54.2 | 29.9 | |
| 22.95 | 46.5 | 26.4 | |
| 11.4 | 36 | 21.2 | |
| 15.5 | 17 | 10.6 | |
| 27 | 47.5 | 26.8 | |
| 21.7 | 38.5 | 22.5 | |
| 12.5 | 19 | 12.1 | |
| 16.8 | 35 | 20.7 | |
| 18 | 30 | 18 | |
| 23.5 | 38.8 | 22.6 | |
| 29.5 | 53.1 | 29.4 | |
| 21.8 | 33.5 | 19.9 | |
| 37.5 | 51.6 | 28.7 | |
| 23.7 | 38.5 | 22.5 | |
| 20,8 | 31.5 | 18.8 | |
| 25.7 | 49.1 | 27.6 | |
| 20.1 | 43.5 | 24.9 | |
| 21.6 | 47.5 | 26.8 | |
| 27.1 | 43 | 24.7 | |
| 31.9 | 49.5 | 27.8 | |
| 23.2 | 35 | 20.6 | |
| 31 | 38.5 | 22.5 | |
| 16.4 | 44.5 | 25.4 | |
| 32.7 | 55 | 30.2 | |
| 28.4 | 56.2 | 30.8 | |
| $\Sigma$ Y=665.65 | $\Sigma$ X=1156 | $\Sigma$ $\hat{Y}$=662.7 | 2.9 |

The adjustment function is $\hat{Y}$ : $\boxed{\hat{Y} = a_1X + a_2X^2}$

SXY = 18,676

$SX^2$ = 50,329

$SX^3$ = 2,276,331

$SX^4$ = 106,038,985

$SYX^2$ = 1,291,241

The set of equations is :

$$\begin{cases} SX^2a_1 + SX^3a_2 = SYX \\ SX^3a_1 + SX^4a_2 = SYX^2 \end{cases}$$

Which gives :

$$\begin{cases} a_1 = 0.66 \\ a_2 = -\ 0.002 \end{cases}$$

$$Y = a_1 X + a_2X^2$$

therefore :

$$Y = 0.66\ X - 0.002X^2$$

$$r = 0.996$$

The linear adjustment function was also tried in this context but descrepancies being too great we opted for a parabolical adjustment.

# APPENDIX 3 - ADOPTED METHODOLOGY OF PROJECTION

## 3.1. Choice of procedure.

A choice from several alternative forecasting procedures had to be made regarding the 1975-80 projections :

### 1° Projection of fiber development.

The easiest and most usual procedure consists in projecting the development trend of each fiber type separately, by applying an adequate mathematical formula, measurement units being the tonnage of apparent consumption of each type. The draw-backs of this method are :

a) that the basic data on which it relies is provided exclusively by previously recorded evolutionary trends, without taking stock of the interchangeability of the products, nor of any external factors of influence ;

b) it is highly sensitive to errors of information, mainly those pertaining to the most recently collected data, the exactitude of which is usually known a posteriori ;

c) it fails to incorporate consumer behavior elements and cannot provide for unpredictable events, likewise, hypothetical changes in economic policies cannot be made appareat ;

d) in order to be valid, such a method of procedure must be based on a precise prognosis of the marginal rates of interchageability of the products, itself based on an analysis of behavior patterns in Brazil and other countries having attained a level of development in the textile sector similer to that foreseen for the 1975-80 pericd.

The above arguments are, in themselves, enough justification for our declining to integrate as such the existing projections on Brazilian economy in the field of textiles.

Point b) especially, has been corroborated by the most recent data collected by the consultants, which tend to disprove a number of projections relating to major product categories bearing on 1969 and 1970, when confronted with the projected situation.

2° Econometric procedure.

A second method of procedure consists in projecting the quantitative evolution of consumption by end-uses or by econometric models showing the influence of factors such as prices, average income, rates of interchangeability, etc... which can be determined independently.

However, this effective method had to be rejected simply because the historical evolution of consumptions by end-use is not known, so that the influence of the above mentioned factors cannot be assessed by such a formalistic method.

Besides, the method of projection must have sufficient flexibility to provide for the effects of the Government's economic policy and other external "events" unpredictable as yet. The econometric equations of demand yield a structural projection, i.e. they pre-suppose the future stability of the functions incorporated in the formula. These assumptions of stability of functions can soon become invalidated in a country such as Brazil having an active government program. It would seem more appropriate to bank on the most likely program at the outset and provide for the revision of those parameters which would be affected by subsequent changes in the overall economy of the country, such as severe anti-inflationary measures, stress on the development of specific regions or income-bracket markets etc...

In view of above discussion (which merely outlines the problem), the study group has preferred to evolve its own method of procedure leaving global comparisons per type of fibre for a subsequent stage.

3.2. Principles_of the methodology applied.

The method used for our projections relies to a limited extent on previous evolution and trends for the reasons set forth above ; it is based primarily on considerations regarding potential valuated consumer demands. This obviously implies the availability of accurate data on overall demand for 1970 or at least for a very recent year or period. It should be noted that these data, even in their most comprehensive form are provided by none of the documents submitted to the study group ; it was therefore obligated to evaluate the total textile expenditure which will be listed in the national balance of payments for 1970. With these elements in hand and on the basis of the theory of proven preferences (P. Samuelson's "Foundations of Economics") and Slutzquy's equation, (a foundation of demand theory), the procedure which is set forth below was construed. Let us first discuss its premises.

1) The first essential problem consists in determining the quota of available revenues which will be dedicated to textile expenditures, under the hypothesis of the abovementioned evolution of average income.

Our approach in resolving this problem consisted in utilizing revenue eslasticities for the purchase of textile products ; without the necessary time-series, our estimation had to be limited to the static elasticity (i.e. by separate income bracket) instead of the dynamic elasticity (i.e. taking into account the susceptibility to variations of income in time). This static elasticity is of significance for projection purposes when and if the income brackets undergo a translation in time ; thus the projection bore essentially on the distribution of revenues by category (and region). This projection is therefore subjected to subsequent changes resulting from the economic policy of the country, an exogenous factor of influence.

The specific static elasticity applied to each income bracket leads to the determination of the textile expenditures of each income bracket and for the horizon of projection under consideration.

We should also mention that this method is so construed as to avoid any autonomous projection of internal demand, which could well be absorbed by the private sector, because of budget limitations.

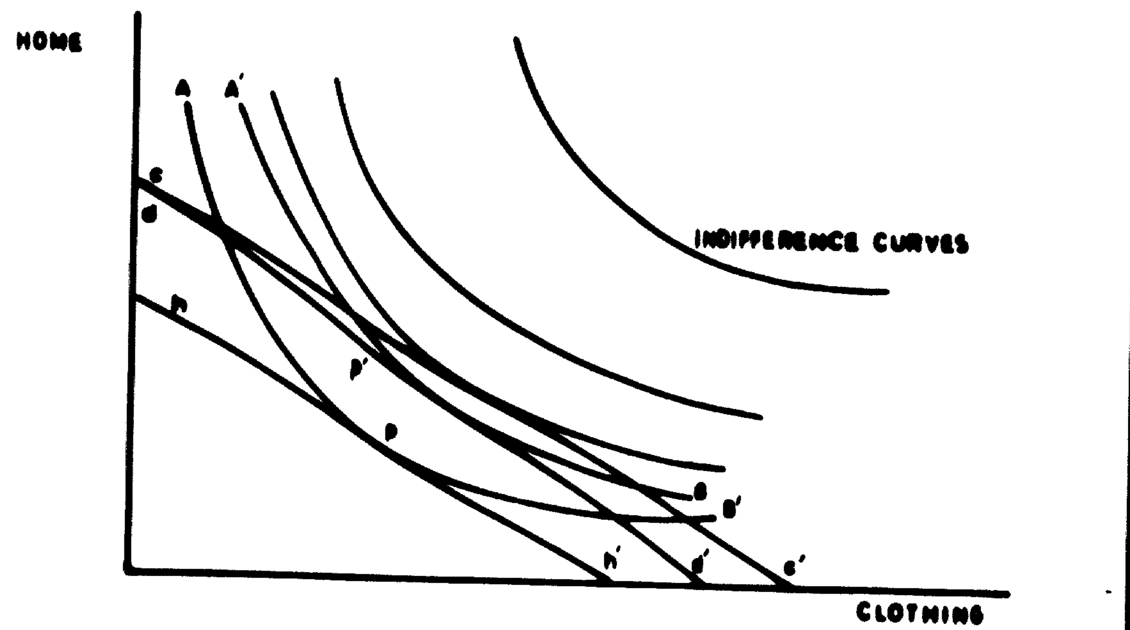
2) The second problem which corresponds to the next stage of procedure, concerns the allocation of budget resources available for such purposes to the various categories of consumers and end-uses. (For the time being we do not include industrial uses as they have no place in the current discussion).

From the standpoint of consumer choices, which must conform with limited budget resources, a distinction should be made between complementary and interchangeable products.

In the latter instance, the interchangeability may bear on:the intrinsic nature of the product (in this case the type of fiber) in which the marketing structure plays a major role ; the form which suits the consumer's requirements best (for instance ready-made or tailor-made garments) in which the manner of display or marketing is also significant ; and the kind of requirement which the product meets. We shall first concentrate on this last aspect because the manner in which a product is offered can be instored or changed subsequently.

In general, the choice under financial constraint necessarily entails the selective rejection of some commodities in favor of others more urgently needed. We have classified requirements, for the purpose of the present chapter, into "home" and "apparel" ; the indifference curve, for which urgency of need for both categories is identical, is illustrated in Graph. 2.1., below, by line A-B ; the straight line standing for the budgetary constraint is designated by bb' ; its gradient clearly depends on the relative prices of "home" and "apparel" commodities.

Graph.2.1. CHART OF PROVEN PREFERENCES




Going from A to B along the indifference curve means giving preference to "apparel" comodities and sacrificing the correspon-ding value of "home" items, the overall con-sumption for home & apparel remaining un-changed. The "rate of sacrifice" required corresponds to the "marginal rate of inter-changeability" between categories. Whenever income increases, curve hh' translates to-wards cc' ; when, in addition, the relating prices change, hh' could move to, say, posi-tion dd'. Therefore bracket translation in time leads to different function of consump-tion between the two categories. The func-tion value which corresponds to point P (re-corded in 1970), is the <u>proven consumer pre-ference</u>. Our method of projection consists in anticipating this rate of preference for 1975 and therefore boils down to determining point P' on curve A'B' corresponding to 1975. For the econometric method of projection to be applied to all consumer goods would re-quire the existence of a series of precise facts and figures on preference rates ; such data are not available as yet.

As regards the so-called "complementary" products we have ample data in support of the assumption that they will be called to develop on a par with the two categories discussed in the last paragraph. Complementary products are discussed under the heading "Miscellaneous". Actually, the goods referred to under this heading are so heterogenous and unrelated (bands, zippers, etc...) that few facts can reasonable be predicted about them although they can be classified as complementary to the two main categories.

Finally, as regards the sub-categories, no major change has occurred to justify the re-distribution of headings with respect to the 1970 classification. Such an analysis would require a specific market survey, itself based on a series of premises which are not currently available. In view of the existence in Brazil of a craftsman-like sector in the textile industry, we are justified in banking on the adaptability of this sector to implement the progressive compatibility between offer and elasticity of demand for special sub-categories.

3) The third essential problem is the conversion from valuated previsions (with constant 1970 price ratings) to quantitative previsions. This requires the succour of Slutzky's equation which deals with this important problem. We shall spare the reader the involved mathematical analyses we had to make and proceed immediately to the exploitation of results.

The salient finding is that the change in value of consumed goods results from the interplay of two causal factors, namely revenue and quality changes. The revenue effect was discussed above. The quality effect must now be taken into account. The prognosis of consumer expenditures implicitly <u>incorporates</u> the improvement of qualitative discrimination on a par with the improvement of standards of living.

Now, as proved in Chapter 2, the increase of overall income and, thence, of overall textile consumption is based especially on the increase of purchasing potential of the five top income classes (only the lowest having a minor influence in the increase - not the volume - of consumption). There results a hearked quality effect. This might be viewed as confirming the theory of the ever-increasing role of middle-classes in economic evolution ; but it may only be a view of the spirit.

The quality-effect is therefore a percentage increment which must be substracted from the global value increment in order to correctly evaluate the quantitative change. For the coming five-year period, the quality-effect as a whole was estimated at 14 %. It is not a haphazardly fixed parameter : it was based on the study of elasticity rates and consumer choices. However, it is difficult to forecast it with a better margin of accuracy than ± 4 %.

The second stage in estimating the quantities (in fiber ton equivalents) is the adjustment in view of the substitution of lighter fibers (artificial, synthetic) to their heavier, natural counterparts. It implies reduction of overall tonnages for an identical satisfaction of requirements. The combination of both effects (the latter being more precisely evaluated because it relates to physical facts) gives an overall tonnage increment of 32 % over the five-year period, against 59 % by value (at constant 1970 price ratings). The consultants' assessment of fibre substitutions was complemented with data from documentary sources (stated in chapter 5). An essential phenomenon such as the rapid increase of synthetic fibers, for instance, leads to a very generalized concensus.

4) The results obtained by this quite independent manner, for the quantitative projections, were naturally confronted and compared with those resulting from simplistic extrapolation of current and past trends for each fiber type. This point is delved into more thoroughly in chapter 2.

We shall limit ourselves here to specifying that for cotton, artificial and synthetic fibres as well as wool, there is a very reasuring agreement between the "simplistic" projection of recent development trends of each fibre and the above independent procedure. It should, however, be specified that such an agreement can always be achieved : it suffices to this effect to chose the adequate formula of extrapolation. Besides in forecasting substitution of interchangeability of fiber types, one is always influenced by the prevision of their respective, individual evolutions, a fact which diminishes the significance of the agreement ; to avoid subjective biases, we have resorted to extrapolation data supplied by published documentary sources.

As regards hard fibers, the study group has taken upon itself to anticipate a drastically different evolution to that proposed by documentary sources as reviewed in chapter 2. In short, the consultants foresee a regression of hard fiber end-uses. The arguments in support of this position are steadfast, if somewhat difficult to quantify, (namely : their sharp demise in recent years, the example of other countries having passed through a similar stage of evolution, changes of end-uses), which means that the proposed previsions have a fairly large margin of reliability.

This problem of the assignment of fiber types to specific end-uses includes the serious difficulties encountered by the study group in forecasting industrial uses. The absence of statistical data in this field precludes the evolvement of projections having some measure of precision. A few uses, such as tyres, could be individually projected and the importance of coffee and fertilizer sacks (where PVC replaces fiber) is also well known. However, broadly speaking, we consider that the main purpose of this previsional test in the field of industrial uses, is to stress the importance of evolving an effective system of data collection and analysis.

The comprehensive method of projection discussed in this section lays the grounds for the 1980 projections. In fact, they will be construed on the basis of 1975 as terminal point, in order to avoid the usual bias induced by the incompatibility of evolution paths towards two fairly distant horizons of projection.

The manner of procedure is, perforce, less precise and the incidence of more general behavior patterns is greater. Thus, such phenomena as the stagnation of natural fibers counterbalanced by the sustained development of synthetics will be more clearly emphasized. Actually, the accuracy of these previsions will also rely on a specific study of industrial uses. The tables of results show, however, that the rates of increase for the 1975-80 period will be smaller than those of the 1970-75 period. This is partially due to the incidence of hard fibers. It is also explained by the situation depicted in the introductory section, namely that the development of Brazil's overall economy might have to be stalled, in favor of a more anti-inflationary policy based on monetary considerations.