SURVEY REPORT
ON
TEXTILE INDUSTRY DEVELOPMENT PROJECT
IN
INDONESIA

May 1971

OVERSEAS TECHNICAL COOPERATION AGENCY

FORWARD

In compliance with the request of the Government of the Republic of Indonesia, the Government of Japan agreed to undertake a general survey of the textile industry in Indonesia and study the feasibility of its expansion, and entrusted this task to the Overseas Technical Cooperation Agency.

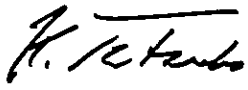
The Agency organized a three-member survey team headed by Mr. Akira Mawatari, President of Toko Textile Engineering Consultants, Inc., and dispatched them to Indonesia for the survey which lasted from February 27 to March 21, 1971.

During their stay in Indonesia, the survey team investigated the textile industry in major areas of Java to clarify its existing condition and to study the future demand for textile products in that country.

After returning from Indonesia, the team's effort was directed to the analysis of the data collected during the survey as well as to some design work. This report is an outcome of these efforts.

It is my sincere hope that this report will prove to be a useful guide for the development of the Indonesian textile industry and serve, at the same time, for the furtherance of amity between Indonesia and Japan.

Availing myself of this opportunity, I wish to express my gratitude to the competent authorities of the Indonesian Government and to the pertinent Japanese government offices including the Ministry of International Trade and Industry, Ministry of Foreign Affairs, Overseas Economic Cooperation Fund and Japan Consulting Firms Association for their unlimited co-operation which was most valuable for the smooth implementation of the survey.



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CONTENTS

CHAPTER I INTRODUCTION

1-1 Objective of the Survey

The survey was conducted mostly in Java in compliance with the request of the Indonesian Government for clarifying the existing condition of Indonesian textile industry with special emphasis placed on her spinning and weaving industries and for forecasting the future supply-demand situation of her textile products. The survey team's activities, which were especially demanded by the Textile General Directrate, Department of Industry of Indonesia, were primarily aimed at providing advice on the nature of the planned spinning expansion program as well as on the scale and location of the new plants to be established under the program.

1-2 Formation of Survey Team

Leader	Akira MAWATARI	President, Toko Textile Engineering Consultants, Inc.
Member	Kazuo SHIOZAWA	President, Chuo Technical Consultants Corporation, Ltd.
"	Kinichi OKABE	Department Manager, Planning and Project Department, Fuji Spinning Company, Ltd.

1-3 Itinerary of Survey Team

Date and Day	Route of Survey Trip	Place of Sojourn	Person or Place Visited	Description
Feb. 27, Sat.	Tokyo - Djakarta	Djakarta		Departure from Tokyo by JAL Flight #711, and arrival at Djakarta
Feb. 28, Sun.		Djakarta	Japanese Embassy	Arrangements on the itinerary and survey activities
Mar. 1, Mon		Djakarta	OTCA's office, Japanese Embassy	Consultation at the Embassy with instructions given by Minister Arita
			Head Office PN-SANDANG	Interview with the president
Mar. 2, Tue.	Djakarta -	Bandung	Textile General Directorate DOI	Discussion with Indonesian officials;

Mar. 2, Tue.	Bandung (By car)			Departure from Djakarta for Bandung in the afternoon
Mar. 3, Wed.		Bandung	Bandjaran Textile Mill	Inspection of the mill
			K. T. S. M. P. T. UNILON, P. T. PANATEX and others (4 companies)	Inspection of the Japanese-Indonesian joint venture companies
				Inspection of fabric finishing mills
Mar. 4, Thu.		Bandung	I. T. T.	Information on the general trend provided by the Chief, Development Department
			Tjpadung Mill	Inspection of the mill
			P. T. NITEX and others (4 companies)	Inspection of fabric finishing mills
Mar. 5, Fri.	Bandung - Tegal	Tegal	Texin Textile Mill	Departure from Bandung in the morning and arrival at Tegal in the afternoon; inspection of Texin Spinning and Weaving Plant
Mar. 6, Sat.	Tegal - Pekalongan-Semarang	Semarang	Texin Textile Mill	Inspection of the finishing mill; inspection of textile plants in Pekalongan District; departure from Tegal by car and arrival at Semarang
Mar. 7, Sun.		Semarang	Holiday	Consultation with the staff of PINDA-SANDANG who visited the team; consolidation of data and materials
Mar. 8, Mon.	Semarang - Magerang - Jogjakarta	Jog-jakarta	Head office of PINDA-SANDANG	Discussion with the managing staff of the head office
			Djantra Textile Mill (Semarang), and Setjang Textile Mill (Magerang)	Inspection of the mills
				Trip from Semarang to Jogjakarta by car

Mar. 9, Tue.	Jogjakarta-Medari-Solo-Jogjakarta	Jog-jakarta	Batik & Hand Craft Inst.	Observation of the institute
			GBKI Textile Mill (Medari)	Inspection of the mill
			Handloom Mill, etc. (3 mills)	Inspection of fabric finishing mills in Djogta and Solo
Mar. 10, Wed.	Jogjakarta-Lawang	Lawang		Departure from Jogjakar in the morning and arrival at Lawang in the evening
Mar. 11, Thu.	Lawang-Pasuran-Lawang	Lawang	Craft Textile Mill	Inspection of the mill
			Kanadjasa Mill	Observation of the fabric finishing mill
Mar. 12, Fri.		Lawang	Lawang Textile Mill	Inspection of the mill
Mar. 13, Sat.	Lawang-Serabaja-Djakarta	Djakarta		Departure from Lawang in the morning; Flight from Serabaja by GIA #816 and arrival at Djakarta at night
Mar. 14, Sun.		Djakarta	Holiday	Consolidation of data and materials
Mar. 15, Mon.		Djakarta	Sanajan Textile Mill	Inspection of the mill
			Head office of PN-SANDANG	Consultation with the staff of the head office, with a request made for the supply of data
Mar. 16, Tue.	Djakarta-Bekasi-Djakarta	Djakarta	Bekasi Textile Mill	Inspection of Bekasi Textile Mill in the morning
			Firms and other concerns	Collection of data for market survey
Mar. 17, Wed.		Djakarta		Preparation of the draft of the report in the morning; visits to firms and other concerns for market survey

Mar. 18, Thu.		Djakarta	OTCA's Office, and Japanese Embassy	Consultation on the summary report of survey; information on the textile industry given by the president of PINDA-SANDANG who visited the team
Mar. 19, Fri.		Djakarta		Conference with the officials of the Textile General Directorate to give a summarized report on the survey; Farewell party held at night for the team by DOI
Mar. 20, Szt.		Djakarta	PN-SANDANG, Japanese Embassy and DOI	Courtesy calls paid.
Mar. 21, Sun.	Djakarta-Tokyo			Departure from Djakarta by JAP Flight #712.

1-4 Acknowledgement

The team wishes to express its gratitude to the competent government offices and private concerns, particularly the DOI and PN-SANDANG and PINDA-SANDANG, whose unlimited co-operation and assistance enabled the team to conduct the survey smoothly as originally scheduled.

The team's appreciation also goes to the following engineers of the Indonesian counterpart party who accompanied the team and offered valuable assistance in the execution of survey activities.

Mr. Trimoeljono	Spinning Engineer, Textile General Directorate, DOI
Mr. Dick Utomo	Spinning Engineer, Head Office of PN-SANDANG
Mr. Rochadi	Spinning Engineer, Head Office of PINDA-SANDANG

CHAPTER II SUMMARY OF THE REPORT

Upon completion of the survey, the team furnished the Textile General Directorate, DOI with an explanation on the outline of its survey activities and submitted a summarized survey report to the Japanese Embassy and the OTCA's Office in Djakarta. However, due to the limited time allowed for the consolidation of data, the team was unable to present a clear, long-range picture of the proposed spinning expansion program in the explanation and report.

Consolidation and compilation of data and materials, therefore, preceded the preparation of this report, edited in such a way that it will contain, on the one hand, a substantially detailed description of a model plant, designed to meet the purpose of the long-range expansion program with a balanced development of the Indonesian textile industry and gives, on the other, an estimate of equipment funds needed by model plants, and further presents proposals for improving Indonesian spinning industry.

Chapter III gives a general description of spinning industry based on the team's survey, whereas Chapters IV and V present the existing conditions of the textile market and also deal with the weaving and knitting industry which consumes yarns supplied by spinning industry, along with the dyeing and printing industry.

With respect to the condition of the textile market, it should be pointed out that the style of dress of respective age groups is still in the transition period and that the consumption of chemical and synthetic fabrics which are making their way into the Indonesian market is limited and unstabilized. It deserves notice that the commercial capital which is provided mostly by Chinese residents and has so far kept a firm hold on the textile market now shows signs of conversion into industrial capital.

The wearing industry consumes more yarns than the country produces, but its structure is in great need of modernization being characterized by many subsistence-level small enterprises. Handlooms still occupy a noticeably large percentage, and the modernization of the industry shows large fluctuation by areas.

The knitting industry is also in need of drastic modernization and is characterized by its concentration in the Djaka ta district.

Facilities for dyeing and printing processes, which are indispensable for practically all of the fabrics consumed by the nation, are rather inefficient with very few exceptions. Input of modern facilities is therefore urgently called for.

The traditional discharging and printing techniques of Batik could creat a new export industry if conventional designs, patterns and colours are improved to those which are acceptable on the world market. Efforts must be made to find a way to make best use of Batick techniques.

In Chapter VI, the supply capacity of yarns and the production capacity of weaving and knitting industry are compared, and additional installation of about 335,000 spindles is suggested from the officially available data, while 230,000 spindles are estimated to be required from the actual production records.

From the supply capacity of yarns in respective areas, the spinning expansion program briefed above is recommended to be implemented with priority given to the West Java district for additional installation of 30,000 spindles at Patal Senajan (Djakarta) and at Patal Bandjaran (Bandung). It is also recommended that 20,000 more spindles be installed at Patal Lawang (Lawang) in the East Java district where the expansion of spinning capacity is demanded.

Further, three new spinning plants of 50,000 spindles designed for the production of medium and fine count cotton yarns are proposed to be constructed in West and East Java.

With the completion of all these new installation plans, the textile industry in Java will be brought to a balanced state. It may be added that stress is placed on the medium and fine count spinning in the expansion program for the reason that many of the existing spinning plants produce Ne 20/- coarse and medium count yarns.

Chapter VII presents the design of a model plant having 30,000 spindles and capable of producing T/C blend yarns and combed and carded yarns of medium and fine count, and also provides its machinery layout chart and a detailed description of its labour productivity, production organization and profitability.

The labour productivity expressed in terms of personnel requirements for Ne. 20/- in the above design is 5.1 direct workers/bale or 6.1 total workers/bale. The said design is justifiable from the viewpoint of profitability since the cost, disregarding depreciation, can be calculated as follows:

Rp 96,425/bale for Ne. 45.- T/C blend yarn
Rp 73,925/bale for Ne. 50/2 cotton combed yarn
Rp 53,100/bale for Ne. 40/- cotton carded yarn.

Cost of machinery and equipment to be installed at the said model plant, including air conditioning equipment, is estimated to be US$3,960,000.- (CIF Price). This, however, does not include the cost of diesel power generators. The local currency portion of the cost of the plant construction and appurtenant work is estimated at Rp 400,000,000.-.

Chapter VII also gives the cost of machinery and equipment required for -

a) A medium and fine count cotton spinning plant with 30,000 spindles.
b) A coarse and medium count cotton spinning plant with 20,000 spindles.

The cost for the expansion program outlined above is planned to be disbursed over three years. According to this cost distribution tabulated in Chapter V, foreign currency requirement (mostly for machinery) is as given below.

First Year	30,000 x 2 = 60,000 spindles	$8,000,000.-
Second Year	20,000 + 50,000 = 70,000 spindles	$8,650,000.-
Third Year	50,000 x 2 = 100,000 spindles	$10,500,000.-
Total:		$27,150,000.-

Chapter VIII discusses the improvement of spinning industry to be achieved by the increase in labour productivity and rationalization of production control (particularly through coordinated operation and maintenance) with reference made to the experience gained in Japan, and explains the need for advanced production and control techniques to materialize the improvement. It is argued in this chapter that the installation of new and highly efficient machines and equipment, if not accompanied by a productivity improvement, will not allow the spinning industry to withstand the pressure of imported yarns or compete with joint ventures established by the capital participation of foreign enterprises from Japan and other countries which are advanced in textile industry. Structural improvement of the spinning industry, to reinforce its competitive power to the level of foreign textile enterprises, is urged as the only means to withstand the pressure of foreign products and allows the coexistence with joint ventures without undue competition. Furthermore, it is suggested that technical training be increased to enhance such improvements.

CHAPTER III EXISTING CONDITION OF SPINNING INDUSTRY

As already stated in Chapter I (Introduction), the survey was intended primarily for mapping out a plan for expanding spinning facilities. The team's activity therefore centered on the inspection of spinning mills, and the facilities inspected by the team at 10 mills accounted for about 75% of all the existing spinning facilities.

As shown in Sheet No. 1 (List of Spinning Mills in Indonesia), Indonesia has 18 establishments engaged in cotton spinning equipped with a total of 481,780 spindles.

With the 6,000 spindles of Rami Sintar for ramie spinning subtracted from the total given in Sheet No. 1 and with the 8,000 spindles of I.T.T. Test Plant added, the cotton spinning industry in Indonesia has a total of 483,780 spindles.

The majority of spinning mills is operated under the control of the Government, with only four private companies operating about 70,000 spindles.

Note: One of the four private spinning companies which is located in Bandung is reported to be a rayon spinner. But it is treated as a cotton spinner since the team was unable to confirm the report.

Spinning enterprises in Indonesia can be classified as follows by the type of management.

I.T.T.	1 (test plant)	8,000 spindles
Enterprises in P.N. Sandung Group	9	242,204 "
Enterprises in Pinda Sandung Group	3	128,600 "
G.K.B.I.	1	34,000 "
Private Enterprises	4	70,976 "
	18 enterprises	483,780 spindles

Note: 1. I.T.T. = Institut Teknolog Tekistil
2. P.N. Sandung = Perushaan Negara Industri Sandung (State Operated Textile Industry Corporation)
3. Pinda Sandung = Perushaan Industri Daeran (Pinda) Sandung (Central Java State Government Textile Industry Corporation)
4. G.K.B.I. = Gabungan Koperasi Batik Indonesia (Indonesian Association of Cooperative Unions of Batik Manufacturers)

Distribution of these spinning enterprises by area is tabulated in Sheet No. 2 below.

Sheet No. 1

List of Spinning Mills in Indonesia

Name of Mill	Location	Number of Spindles	Production Capacity
1. T.D. Pardede	Medan	30,000	30,000
2. Rami Siantar	Pematang Siantar	6,000	6,000
3. Patal Palembang	Palembang	30,384	30,384
4. Patal Senajan	Djakarta	30,000	30,000
5. Patal Tjipadung	Bandung	30,132	30,132
6. Patal Bandjaran	Bandung	30,784	30,784
7. Intiteks	Bandung	8,000	8,000
8. Wisma Cesaha	Bandung	10,600	10,600
9. Patal Bekasi	Bekasi	30,240	30,240
10. PPK Tjilatjap	Tjilajap	60,000	60,000
11. Texin	Tegal	37,072	37,072
12. PPKDjantra	Semarang	31,528	31,528
13. Patal, Setjang	Magelang	30,132	30,132
14. G.K.B.I.	Medari	34,000	34,000
15. Patal Grati	Pasuruan	30,132	30,132
16. Patal Lawang	Malang	15,200	15,200
17. P.T. Inbriteks	Pasuruan	22,376	22,376
18. Patal Tohpati	Bali	15,200	15,200
Total		481,780	481,780

Annual production capacity in 3 shifts, calculated on the production of one spindle = one bale (400 LBS)

Sheet No. 2 = Distribution of Spinning Enterprises by Area

Area	No. of Enterprises	No. of Spindles	%	(Distribution by Group) P.N.	PINDA	GKBI	P.T.
Sumatra	2	60,384	12.5	1	1	0	1
West Java	7	147,756	30.5	1+4	0	0	2
(Bandung)	(5)	(87,516)	(18)	(1+2)	0	0	(2)
(Djakarta and other areas)	(2)	(60,240)	(12.5)	(2)	0	0	0
Central Java	5	192,732	40	1	3	1	0
East Java	4	82,908	17	3	0	0	1
(Bali)	(1)	(15,200)	(3)	(1)			
Total:	18	483,780	100	1+9	3	1	4

Notes: 1. P.T. stands for private enterprises.

2. "1+4" given as the number of enterprises in West Java (Bandung) is intended to indicate that one of the five enterprises in West Java is the I.T.T. Test Plant.

3. The ramie spinning plant in Sumatra is excluded.

As will be clear from the above table, spinning mills are concentrated in Bandung and Central Java.

Average number of spindles per enterprise is 27,000 which is large than the average per private enterprise. In the P.N. Group, two enterprises located in East Java have 15,200 spindles each, which is smaller than the group's average.

Spinning machines now installed can be classified as follows by makers.

Japan (Howa, Toyoda and O.M.)	192,400 spindles
Mainland China or People's Republic of China	30,784 "
U.K. (Platt, etc.)	131,924 "
European Countries (inclusive of unconfirmed makers)	128,672 "
Total	483,780 spindles

Japanese made spinning machines account for about 40% of all machines installed. It is unknown, however, if Japanese machines occupy any portion of the 70,000 spindles installed at private enterprises. If 40,000 spindles of these private enterprises are of Japanese make, Japanese machines would cover nearly half of all machines now found in Indonesia.

Machines employed by mills in the Pinda Sandung Group are mostly older types and their year of manufacture dates back to sometime before 1950, excepting those installed at Tjilatjap No. 2 Mill. In contrast with this, most mills in the P.N. Group have machines of a relatively later type manufactured after 1950 like those at Petal Palembang and Petal Bekasi which were both put in operation after 1968. Most of the mills have about 30,000 spindles the only exception being the abovementioned Jjilatjap in the Pinda Sandung Group which is the largest in scale in Indonesia having 60,000 spindles.

For a modern spinning enterprise, the economically suitable scale is said to be 50,000 spindles. Though the plant scale of Indonesian spinning industry is lower than this level, it is by no means small when compared with that of the newly developed spinning industries of other countries which came into existence after the termination of the World War II. However, expansion of the plant scale to the optimum level is an imperative for the planned modernization of the Indonesian spinning industry.

The existing condition of the mills which were covered by the team's inspection can be summarized as follows:

Production Capacity and Productivity

When compared with the level recorded in 1968, when the First Textile Industry Development Program was put into practice, the present production capacity is considerably larger.

The average output recorded in 1968, converted into Ne. 20/-, is as shown below.

Approx. 80 kg 175 lbs/spindle/year

At the time of embarking upon the Five Year Development Program, the Government enforced the 3-shift 4-group system in place of the previous 3-shift 3-group system as a means to increase production.

Working hours under the 3-shift system was

144 hours per week (24 hours x 6 days) (annual number of working days - 300 days)

Under the newly adopted 3-shift 4-group system, both working hours and working days are increased as shown below.

168 hours per week (24 hours x 7 days) (annual number of working days - 365 days)

The new system does not entail any labour intensification for workers since each group of workers work continuously for six days in three shifts and then take two days off.

Implementation of this new system has realized a production increase of about 190% at the spinning mills of the P.N. Sandung Group as shown below:

1968	175 lbs	80 kgs/spindle/year
1969	220 lbs	100 kgs/spindle/year
1970 Approx.	330 lbs	150 kgs/spindle/year

Mills of the P.N. Sandung Group are given the production target of "One Bale/Spindle/Year in Three Shifts" and they make efforts to achieve this goal.

This target value is not unreasonable since it is based on the calculation below. As a matter of fact, this target value was attained and surpassed in the latter half of 1970 at two mills located in Senajan and Bandjaran.

$$\frac{10,000 \text{ sp. rpm} \times 60 \times 168 \text{ hrs} \times 52 \text{ weeks} \times 80\%}{17.5 \text{ (t/inch)} \times 36'' \times 840 \text{ yds} \times 20} = 400 \text{ lbs}$$

The team noted, however, that the production at mills other than the above two has not reached even 350 lbs 160 kgs/sp/year in the latter half of 1970.

The number of direct employees in each shift was observed to be the least at Senajan with 139, whereas 150 to 160 employees were noted to be required for each shift at Bandjaran and other mills, each equipped with 30,000 spindles. The team noted that the mill at Lawang which has only 15,200 spindles required manpower of about 110 employees for each shift. (It is to be pointed out that the super hi-draft system installed at Lawang serves to reduce the labour force).

The direct personnel requirement per shift at Japanese mills containing 30,000 spindles is approximately 100 workers in the case when the labour saving system is introduced, and about 140 workers where no such system is available. Operation of Japanese spinning mills is conducted under a 2-shift system for 16 working hours per day. Assuming that 120 workers are required per shift on the average, Japanese mills are run by about 80% of the total labour force.

The average output observed in the Japanese spinning industry in terms of Ne. 20/- is 550 g/spindle/16 hours at major mills equipped with efficient and rationalized production facilities, and 450 g/spindle/16 hours at smaller mills with 10,000 to 20,000 spindles.

If the production capacity of a small scale Japanese mill, which is 450 g/16 hours (= 28 g/spindle/hour) as given above, is applied to 168 hrs/week x 52 weeks per year which is enforced under the aforementioned new 3-shift 4-group system, the following equation can be established.

$$28 \text{ g} \times 168 \times 52 \quad 245 \text{ kgs/spindle/year}$$

The yearly output of 245 kgs shown in theabove equation is about 135% of 400 lbs = 180 kgs/spindle/year which is the production target set under the said 3-shift 4-group system.

Further, personnel requirement per bale (400 lbs) of cotton yarn in terms of Ne. 20/- in Japan and Indonesia is as given below.

Japan -	About 3.5 to 4.0 workers
Indonesia -	About 6.0 to 6.3 workers

Though the present productivity is thus rather low in Indonesia, it is possible to raise it close to the Japanese level if rationalization is applied to the plant operation.

Yarn Quality

There exists a gap in productivity between two groups of mills observed, the Senajan and Bandjaran group and the group of Tjipadung, Setjang and Garti. The three mills belonging to the latter group have identical layouts, and machines of identical type and specifications, being put into operation at the same time.

Production at these mills averages 350 lbs/spindle/year, though there are some differences, and the largest output is recorded by Setjang, followed by Garti and then Tjipadung.

Yarns produced at these three mills are inferior in quality to those turned out by Senajan and Bandjaran which have a larger production capacity.

The team tried to detect the cause of such dfferences in yarn quality through on the spot observations and judgement by the sense of touch and noticed the following faults.

Yarn breakage occurred frequently in the ring spinning, and many idle spindles were observed.

As examined, the lap contained many tangled tufts, indicating insufficient opening. There were twists and knots in the cotton.

And also, the card web was found neppy and clouded, and the flat strips contained a relatively large amount of lint or spinable fibers.

These phenomena are attributable to irregular gauge settings between rollers, and it is probable that the yarn breaking and poor appearance of yarn are caused by the irregular draft. Besides, it was noticed that the bobbin top levels of the ring frames are not uniform and the rings are not good. Yarn breaking cannot be avoided if the rove sliver is uneven and the traveller motion is subjected to slight deflective movements which is suspected that the inner surface of the rings is deteriorated by scars. Under such conditions, a large production capacity or good yarn quality cannot be expected.

Besides these above-mentioned causes, production conditions such as the maintenance work also affect the yarn quality. The team noticed athat the maintenance work is not carried out satisfactorily at any of the mills inspected. Maintenance activity at most mills is limited to breakdown maintenance. Hence machines are kept in continuous use until they break down, and repair or adjustment is made only when a defect actually develops.

A spinning machine is composed of several hundred parts of many different kinds, and its efficiency cannot be maintained unless each of its component parts is in perfect condition.

It should be emphasized that yarn quality declines by the defect of a single spindle or a single ring, and the spinning condition changes if the roller gearing has a distortion.

Productive maintenance intended to keep the entire production facilities in perfect working condition should never be dispensed with in the spinning industry. Breakdown maintenance cannot prevent changes in yarn quality of output occurring before the development of a fault.

Satisfactory spinning operation can never be achieved without the co-operation between the operation staff and the maintenance staff. Though the production organization of the mills inspected incorporates a maintenance section, the poor maintenance conditions observed at most of them induced the team to feel dubious as to whether such sections are fulfilling their duties.

If a spinning machine is put in continuous operation for production increase, it accelerates the wear or damage of important parts. Full-scale productive maintenance including inspection and adjustment of parts must be implemented under a continuous operation system to prevent the rapid wear of parts which leads to production drop. The team noticed that machines inspected are already subjected to a noticeable wear of parts. Particularly noticeable was the wear of roller shaft, and rings, and slight vibrations were often felt when these parts were touched by hand. At all the mills inspected, the team never failed to find machines whose condition is such that they would be subjected to breakdown maintenance very soon.

For satisfactory maintenance service, quality control is indispensable since its data serve to point out defects of machines and enable productive mainte maintenance to be carried out satisfactorily.

It is hoped that productive maintenance will be fully employed so as to ensure the production increase under a continuous operation system. An organization of productive maintenance must be established at all mills in the P.N. Sandung Group, Pinda Sandung Group as well as at G.K.B.I. plant, with the responsibility of the maintenance staff clearly set forth.

Drop Waste and Cotton Fly

A large quantity of drop waste and cotton fly was observed at all mills. Though travelling cleaners were employed in the ring spinning section at some mills, cotton fly and drop waste were found on the floor. Particularly conspicuous were cotton fly and sweeper waste in the carding process.

The team was informed that about 1.2 bales can be produced from 500 lbs of raw cotton. This indicates a yield percentage of 94%, but this appears rather high considering the large quantity of drop waste and cotton fly.

The above yield percentage is too high even if the admixture of roving waste is taken into consideration. Since the yield percentage obtainable from 450 lbs of supplying cotton weight is about 88% in case of Ne. 20/-, the team considers that the actual yield percentage ranges from 80 to 85%.

For the economical consumption of raw cotton, it is naturally advisable to attain a high yield percentage. However, since uniformity in quality must be maintained, the yield percentage should be set at an adequate level, with measures also taken against the development of drop waste and cotton fly.

Synthetic Fibre Spinning

A strong desire for introdı cing polyester/cotton blend spinning was expressed by all mills inspected as well as by the Head Office of P.N. Sandung.

Synthetic fibre spinning and blended spinning are a step forward which must be taken by the Indonesian spinning industry in the near future and will be described in detail later in this report. However, description will be limited to the team's observation of the existing conditions in relation to the desired introduction of these new types of spinning.

The team observed that synthetic fibre spinning and blended spinning had already been introduced at Bandjaran on a trial basis. It also noted that a few other mills have installed or ordered for combers, mixing drawing frames and

other machines. Howevef, it is unknown and rather doubtful that studies on synthetic fibres and blending techniques have been made at these mills.

Machines designed specifically for cotton spinning and their operation techniques cannot be directly applied to synthetic fibre spinning, and this point was noted to have been overlooked by the Bandjaran mill. This mill used polyester fibre having a courses denier with comparatively short length in its trial operation, but the result obtained was unsatisfactory, which indicates that insufficient studies had been made in advance on the techniques of polyester/cotton blend spinning. Polyester fibre to be used for blended spinning with cotton must have a long staple length if its denier is fine to that of cotton, or else no suitable blending composition can be secured. It may be added that the team noted that this mill was not equipped with a steam twist setter.

Integrated Plant

The Head Office of P. N. Sandung expressed the hope for integrating the production process of its affiliated mills, and explained that the establishment of an integrated production system is planned for its future expansion.

Among a number of mills inspected, only two have an integrated production system. One of them is G. K. B. I. 's Medari Plant and the other is Texin Plant (whose finishing process is not fully integrated). G. K. B. I. 's Medari Plant is managed on a firm cooperative basis, but it must be taken into consideration that the smooth operation of its integrated production system calls for the balan balance and coordination of its spinning section, weaving section and finishing section. Care must be taken to maintain the capacity balance of the finishing machinery because of its large capacity. Further, it is to be borne in mind that the capital input in the finishing machinery could prove less effective than anticipated for the same reason.

Integration of the production process will demand a close affiliation of spinning enterprises and textile enterprises. Hence, the integration must be planned with careful attention given to all these factors.

Effect of Technical Training

During its observations and inspections of various mills, the team was impressed by the fact that the spinning techniques provided by technical training prior to the operation commencement are being fully applied at each mill.

It was noted that the productivity is high and yarn quality excellent at those mills whose engineers received thorough training on the operation of the machines as well as production control techniques. At these mills, the working standards, daily working routines and quality control techniques have become steadfast habits of workers to realize an efficient work control.

It may be generally said that techniques offered by Japanese spinners covered more details than European spinners and are still effectively employed. Inspection of spinning mills convinced the team of the significance of technical training and its effect on the capacity of these respective mills.

In this chapter, the existing condition of the Indonesian spinning industry has been briefly described in a straightforward and candid manner exactly as the team felt or discovered through its observations and inspections. It is to be pointed out that the spinning expansion program contained in this report is based on the findings of such observations and inspections.

CHAPTER IV TEXTILE MARKET IN INDONESIA

One of the factors to be considered in planning a spinning expansion program is a general trend of the textile marketable condition throughout the existing and future perspective under the reasonable and statistical measure.

From this viewpoint, the team made an attempt to obtain the present and future trend of textile industry from the analysis of statistical and other data. This attempt, however, ended in failure because of the lack of data and the divergence of information provided by textile importers and wholesalers approached by the team.

Accordingly, the team had no choice but to resort to an objective judgement of data obtained by inference. The market conditions outlined in this chapter therefore are not free from erratic judgement because of the absence of accurate data.

With respect to the future demand-supply situation of textile products, it deserves mention that the First Textile Industry Development Program, reflecting the policy of the Indonesian Government, envisages the increase in per capita supply of textile products from 7.30 m to 10.0 m.

Sheet No. 3 - Demand-Supply Situation of Textile Products Envisaged in Five-Year Development Program

(Per Capita Consumption)

Year	Domestic		Population	Home	Imported	
	Production (million m)	Imports (million m)	(million persons)	Products (m)	Products (m)	Total (m)
1968 (actual record)	316.5	522.9	115.13	2.75	4.55	7.30
1969/70	450.0	446.8	118.0	3.78	3.78	7.6
1970/71	575.0	417.2	121.1	4.75	3.45	8.2
1971/72	675.0	418.0	124.2	5.53	3.37	8.8
1972/73	775.0	423.5	127.5	6.10	3.30	9.4
1973/74	900.0	409.0	130.9	6.88	3.12	10.0

It is considered reasonable to assume that the domestic production of textile products ranges from 450 million m to 500 million m, and the volume of imported textile products is in the neighbourhood of 450 million m at present.

80% to 85% of domestic output is occupied by woven fabrics, with knitted goods covering a very small percentage. Consumption centers on clothing and textile goods for home use, and the outlet of industrial textiles is quite limited.

Percentages of different kinds of textile products turned out in Indonesia in 1970 are as shown below.

Drill	32%	Weaving pattern, twill weaving pattern
Shirting	30%	
Salong	10%	
Knitted Goods	15%	
Sheeting	8%	
Towels, etc.	5%	

During the survey, it was noticed that drill, shirting and salong covered a dominantly large percentage of materials used for clothing.

Males in the middle and higher age groups mostly wear dyed shirts made from shirting and dyed trousers made also from shirting, whereas females in the same age groups are dressed in dyed or printed blouses or a salong made from Batik or woven colour strips.

In the younger age group, however, colourfully printed western style shirts and blouses and trousers prevail throughout the country, clearly indicating the transition in the style of dress.

Military and police uniforms, which are similar to ordinary male clothing are all in dark khaki colour.

Difference in the style of dress is noticeable between cities and rural districts. In cities, western style is gradually penetrating into the middle age group, whereas in rural districts, conventional Indonesian styles can be observed even among young people. Differences in style can be observed not only between age groups but also between West Java and Central and East Java.

In East Java, people wear Batik blouses and Batik salong, the traditional Indonesian style, in their daily life and work.

Changes in the style of dress are subject to the principle of gradual transition and do not take place suddenly. Such transitions are necessarily accompanied by changes in fabrics, fibre construction, pattern and yarn count.

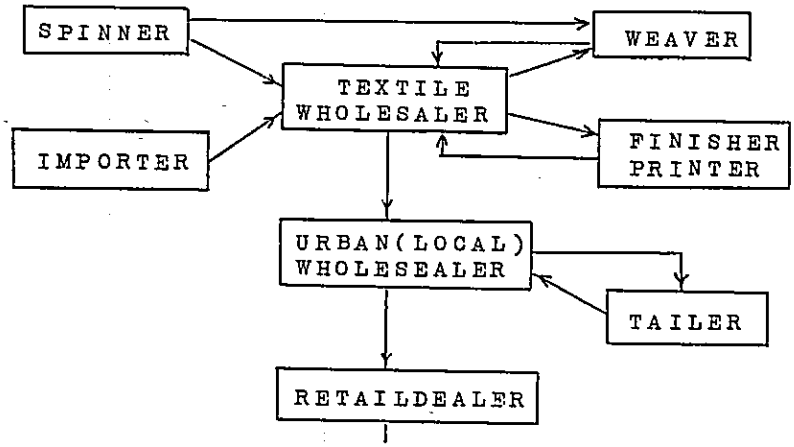
Most Indonesians wear clothes of dyed or printed fabrics, and few people dress in clothes of white or bleached fabrics. However, Salong for females is made from the so-called Salong fabrics which are in most cases dyed yarn fabrics with check patterns.

In the cities, however, clothing made of synthetic fibre textiles and knitted textiles can be frequently seen. Formal wear used by females are made from synthetic filament fabrics or crepe desin.

The team noted that substantial quantities of presumably imported synthetic fibre textiles and knitted textiles are displayed at retail shops.

According to the information obtained from textile importers and wholesalers, the distribution system of textile products is as illustrated below.

Foreign textile products are supplied by textile importers who receive orders from big wholesalers. Textile products so imported are distributed by



urban wholesalers to retail dealers through local wholesalers.

Distribution of home made textile products is as follows.

Urban wholesalers purchase yarns from spinning enterprises and have them woven into fabrics at their affiliated weaving plants, or purchase fabrics manufactured by textile manufacturers who purchase yarns from spinning enterprises.

Urban wholesalers then have these fabrics processe by finishers and printers into dyed or printed textiles on a commission basis, and distribute them to retail dealers through local wholesalers.

Grey clothes are dyed or printed at weaving plants equipped with necessary facilities, or sold directly to urban or local wholesalers as grey clothes.

Fabrics are tailored into dresses by tailers who work on a commission basis with the fabrics provided by wholesalers.

As can be seen from the above description, distribution of textile products on the Indonesian textile market is controlled by the wholesalers.

Production of textile goods is not controlled by the trend of demand but by the search for commercial profit. It is occasionally the case that the supply of textile goods is controlled solely by speculative transactions on the part of wholesalers and other commercial organizations. It can be said without exaggeration that the production of processed textiles is controlled by commercial capital.

The distribution route of textile goods involving urban wholesalers, local wholesalers and retail dealers is in the hands of Chinese capital. In other words, the Indonesian textile market is under the control of Chinese capital.

It also deserves mention that the input of Chinese capital in weaving, dyeing and finishing industries has been on the increase in recent years. Many of the weaving plants in Bandung Area which are equipped with dyeing and finishing facilities are now run by Chinese capital.

Thus, there is a clear trend for conversion from commercial capital to industrial capital, but speculative distribution controlled by commercial capital is still prevalent.

One example of such speculation is the abnormal popularity of polyester/cotton blend fabrics (hereafter called T/C blend fabrics).

Transition from conventional fabrics to synthetic fibre fabrics is a well-known global trend, and it is also a fact that their consumption is rapidly increasing.

At present, however, Indonesia has neither synthetic fibre making plants nor T/C blend yarn spinning mills. Hence, she must resort/to imports for the supply of all such fibre materials. With the limited spinning capacity of T/C blend fabrics, practically all T/C blend fabrics consumed in the country are imported from abroad, mainly from Japan.

In the absence of reliable import statistics, import of fabrics is estimated on the basis of expoet statistics of Japan. (See Sheet No. 4 below.)

Sheet No. 4 (A) - Export of Fabrics to Indonesia

Unit: 1000 yds^2

Item	1968	1969	1970
Cotton Fabrics	48,888	27,846	9,819
Synthetic Filament Fabrics	5,763	3,700	13,851
Spun Synthetic Fabrics	19,562	3,699	23,891

Sheet No. 4 (B) - Export of Fabrics to Singapore

Unit: 1000 yds^2

Item	1968	1969	1970
Cotton Fabrics	23,026	14,623	19,746
Synthetic Filament Fabrics	45,775	94,386	116,571
Spun Synthetic Fabrics	67,944	107,665	112,524

Spun synthetic fabrics are mostly T/C blend fabrics.

Sheet No. 4 (A) above indicates that Indonesia imported about 24 million yds^2 of spun sysnthetic fabrics in 1970. The team learned, however, that T/C blend fabrics available on the Indonesian market in the same year ranged from 60 to 80 million yds^2. The difference was reportedly covered by imports via Singapore.

Since the average amount in 1968/1969 was about 23 million yds^2, the import volume in 1970 is not too small. However, if about 60% of T/C blend fabrics exported to Singapore was supplied to the Indonesian market as re-export, additional imports amount to about 60 million yds^2.

This indicates that a total of 84 million yds^2 (24 million + 60 million yds^2 of T/C blend fabrics was imported in 1970, surpassing the 60 million yds^2 level which is considered to be the normal demand in Indonesia.

As a matter of fact, the market price of the said fabrics which registered Rp 250/- in 1968 dropped to Rp 200/-. This is considered attributable to the excessive stock acquired by the speculative buying of traders. During its visit to a weaving and finishing plant of T/C blend fabrics which had already been put into operation under the joint investment of Indonesian and Japanes concerns, the team was told that this new company was embarassed by this extreme price fluctuation. The company stated that Rp 200/yd was below the prime cost.

This drastic price drop was also noted with polyester/rayon blend fabrics (hereafter called T/R blend fabrics).

T/R yarns were reported to be manufactured at a private spinning company in Bandung, but the team noted that the demand for T/R blend fabrics is met mostly by imported T/R yanrs and fabrics.

Both T/C and T/R blend fabrics are imported in the unprocessed state and supplied to the market after they are dyed or printed in Indonesia.

It is rarely the case that even the comparatively well equipped dyeing and finishing plants in Bandung are provided with necessary facilities for processing synthetic fibre fabrics, particularly T/C blend fabrics. Synthetic fibre fabrics including T/R blend fabrics are processed by the existing poor facilities so that their finish lacks softness, but this lack of softness is accepted on the market as one of their natural features. However, they should be finished so as to have a softer touch, and this spplies particularly to T/R.

Due to the shortage of dyeing and finishing facilities, dyeing plants have a huge stock of fabrics brought in for processing on a commission basis. These fabrics will flood the market with increased installation of dyeing facilities, inviting another price fluctuation because of speculative market manipulation.

It is expected, however, that the increasing investment of Chinese capital in textile manufacturing industry and the operation of Indonesian-Japanese joint ventures (including those established with the participation of Chinese capital) will eventually bring about a smoother flow of commodities and stabilize the market, whereby synthetic fibre products will enjoy a higher evaluation because of an increase in the actual demand.

The team is the opinion that the conditions described above should be given due consideration in mapping out the spining expansion program.

Though the total import volume of cotton fabrics is on the decline as is clear in Sheet No. 4 (A) above, high class cotton fabrics are still being imported. Consideration, therefore must, also be given to the production of such high class fabrics in Indonesia.

A substantially large quantity of synthetic filament fabrics is imported to meet the demand for fine fabrics for formal wear of females as well as to satisfy the new demad for fabrics suited for jersey sweaters and suits.

The team felt that the home production of fine fabrics and knitted goods should be initiated soon on a larger scale than at present.

It was learned that there is demand for synthetic filament yarns and machines for their production were imported by some plants.

The description given above does not provide accurate information on the Indonesian textile market because of the limited survey period and lack of reliable data made it unavoidable that the team resort to its own objective judgement. In the future, the market conditions must be studied from a scientific viewpoint based on the analysis of sufficient data collected over a long period of time. In that way, the business planning may be made on the basis of a long-range supply-demand forecast.

The condition of Indonesian textile market may be summarized by the following three features. -

1. Transition of demand (mostly for dresses) is causing changes in yarn count.
2. Synthetic fibre fabrics have been to penetrate the Indonesian textile market, but their demand-supply situation is still unstable.
3. Dyeing and printing finish is still poor due to the absence of necessary facilities, but will, before long, be improved.

As for Batik, a special product of Indonesia, a detailed description will be given later.

CHAPTER V OUTLINE OF INDONESIAN TEXTILE INDUSTRRY

Cotton fabric is virtually the only product of the Indonesian textile industry. Textile enterprises dealing in woolen and silk fabrics are extremely few, and the production of synthetic fibre fabrics has just gotten afoot by a few joint venture companies.

The history of the Indonesian spinning industry is not very long. It came into existence in the 1940's in Central Java, and it was after 1950 that spinning enterprises worthy of the name were established.

No detailed description of the spinning industry is given here because it is discussed in Chapter III. It may as well be mentioned, however, that 483,780 spindles were in operation in 1970 and approximately 400,000 bales are estimated to have been produced in the same year against the production target of about 480,000 bales.

In mapping out the spinning expansion program, the production capacity of weaving and knitting enterprises and the condition of dyeing and finishing plants must be clarified in relation to the above-mentioned figures.

During the survey, the team visited only about 10 plants engaged in weaving, knitting, dyeing and finishing. Further, these plants differed from each other in both scale and facilities. Inspection of these 10 plants did not, therefore, provide information that could be used to reach a composite judgement of Indonesia's fabric making and dyeing enterprises.

It must also be added that the survey was conducted only in Japan. Hence, the condition of the textile industry in other areas such as Sumatra, Sulawesi and Bali could not be studied.

Due to such limited scope of the survey, the team finds it practically impossible to discuss the Indonesian textile industry as a whole. The following description is, therefore, based on the study of data made available by DOI and the condition of some 10 plants inspected.

3-1 Weaving Industry

Indonesian weaving industry still embraces many small enterprises whose facilities are unsatisfactory and superannuated. While the majority of spinning mills are operated under the control of the Government and similar public organizations, all weaving mills are operated on a private basis with a few exceptions.

As shown in Sheet No. 5 (Weaving Equipment List), the number of power looms and handlooms is as given below.

Power-looms:	No. of Enterprises	-	362
	No. of Looms	-	35,835
Hand-looms:	No. of Enterprises	-	2,425
	No. of Looms	-	166,056

Figures given above represent registered looms only. Number of non-registered looms, which is reported to be substantially large, is unknown.

With the exception of a (limited number of) joint stock companies, most weaving mills are operated at a subsistence-level under private management with the number of power-looms averaging 41.5 looms per plant.

Weaving industry is concentrated in Bandung District (about 60%), and t the rest is found in Pekalongan, Jogjakarta and Solo in Central Java as well as in Serabaja in East Java.

Apart from the Texin mill where 1,200 looms are installed, tthere are few equipped with more than 200 looms. About 62% of the power looms are "double width" looms of 52" R/S or wider which are classified as ATM_1, and 38% are "single width" looms of 50" R/S or narrower which are classified as ATM_2.

Number of automatic looms is rapidly increasing, but it is not considered to have reached 8,000. Further, many automatic looms are not fully functioning. (During the inspection of the weaving mills, the team noticed that many weaving mills whose weft pirns were not fitted securely in the battery magazine. Some were noted to have had no weft pirn at all in the battery magazine.

About 2,000 looms of ATM_1 type and about 4,000 looms of ATM_2 type are old types manufactured before 1940, and they are all superannuated. A considerable number of idle looms were found, though all the mills inspected were fairly well equipped. Defective looms were mostly of ATM_2 type.

Sheet No. 5

WEAVING MILLS EQUIPMENTS and ITS CAPACITY

Mill Location	Power Loom					Hand Loom			Weaving Capacity (1,000M)
	No. of Mill	ATM 1 (Double)	ATM 2 (Single)	Total No.	Weaving Capacity (1,000M)	No. of Mill	No. of Looms	Weaving Capacity (1,000M)	
Sumatra	66	1,037	542	1,579	28,281	292	7,417	11,681.5	39,962.5
West Java (Djakarta)	613 (41)	16,914 (807)	6,163 (1,056)	23,077 (1,863)	429,150 (29,617)	176	59,211	93,257.2	522;407.2
Central Java Jogjakarta)	120 (15)	2,823 (711)	4,059 (280)	6,882 (1,056)	107,991 (19,611)	631	34,351	54,102.7	162,093.7
East Java	52	944	2,608	3,552	51,120	513	45,913	72,312.9	123,432.9
Sulawasi (Bali)	10 (5)	76 (-)	163 (77)	239 (77)	3,552	792	18,363	28,921.6	32,473.6
Kalimantan Others	1	1	5	6	81	21	801	1,346.0	1,427.0
Total	862	21,795	13,540	35,835	620,175	2,425	166,056	261,537.3	881,712.3

ATM.1 (Double width loom), production capacity 35M/shift, 300days/year, 2 shift/day

ATM.2 (Single width loom), " " 20M/shift "

Hand Loom, Production capacity 7M/shift, 300days/year, 3/4 shift/day

In Central Java and East Java, ATM_1 type looms there are fewer than ATM2 type looms, indicating that the weaving enterprises in these areas are in need of modernization. The percentage of handlooms is large in these two areas, also suggesting that weaving industry still remains on a low level in both areas.

Apart from Java, Sumatra has a few weaving enterprises but they are on a level even lower than that observed in Japan and their scale is a small industry or the same as cottage industry.

The weaving capacity shown in the data of DOI is as given below.

Power-looms:	620 million m
Hand-looms:	261 million m
Total	881 million m

It is estimated, however, that the actual capacity is about a half of the above value. This estimate, the team believes, can be substantiated by the following calculation.

If a loom of ATM_1 type has a speed of 3"/inch (50 picks/inch at 150 rpm on the average), its weaving capacity can be calculated as follows:

3" x 60 x 8 x 80%/36" 32 yds 29 m/shift

This capacity is about 83% of the design capacity of 35 m/shift. If, again, 20% of looms are assumed to be left idle, then the actual capacity would be about 60% of the value given above.

Hence, it is assumed that about 500 million m was actually produced by power looms in 1970.

The actual number of hand-looms installed is not known. It may be added, however, that the team's attention was directed more to the large number of idle looms than to the capacity per loom at the weaving mills it visited. But assuming that handlooms can be continuously operated without limit to working hours, it is possible to estimate the production by handlooms in 1970 at about 100 million m.

Accordingly, it is estimated that the actual total weaving capacity is as shown below.

Power-looms:	500 million m
Hand-looms:	100 million m
Total	600 million m

At some of the mills inspected, the team noted that hand-looms were employed for weaving Salong fabrics which had an exellent texture and touch. When a fabric is woven with care taken not to ruin the yarn characteristics, it is given a fine texture and touch. It was felt that studies should be made to produce such texture and touch with power-looms. The team also noted that the pedal type hand-looms with a beating mechanism developed by I. T. T. had already been put into actual use.

Excluding a few weaving mills operated by spinning enterprises and a number of large-scale enterprises in Bandung District, most weaving enterprises are backward in their management and operation. Elevation of the level of the weaving industry calls for the rationalization and structural improvement of these backward enterprises. For this purpose, it is essential to group them by district or by affiliation so as to ensure their mutual cooperation and co-existence, and avoid unnecessary competition, otherwise their economic indepndence will be endangered and they will eventually be controlled by commercial capital. Mention must be made here of the G. K. B. I. 's organization which is a fine example of grouping enterprises.

It was noted that preparing machines were not in good condition at many of the mills inspected. Improvement of the preparing facilities should be effected with emphasis placed on the consolidation of principal mills for perfect sizing and warping operations. Efforts must also be directed towards the scrapping of superannuated machines and the replacement of hand-looms with power-looms. Since this will demand a considerable amount of capital, weaving enterprises should be organized into cooperative associations to find a way to finance the necessary improvements.

The operating looms is only 2 sets per operator at present. This can be increased to more than 4 if the sizing and warping operation is carried out satisfactorily and looms are maintained in good working condition. Judging from the efficiency of workers observed at various mills, the team believes that this increase is quire feasible.

Economic independence of weaving enterprises can never be achieved without such structural improvements and co-operation which will lead to the automation of their production facilities, production increase and attainment of of the standard weaving capacity stated above. It must be noted that the rationalization and modernization of the weaving industry is an indispensable factor for the desired development of the Indonesian textile industry.

The team observed an Indonesian-Japanese joint venture company engaged in the weaving business. The company is capable of manufacturing fabrics at a low cost and its productivity is very high. The visit to this company convinced the team of the urgent need for the structural improvement of Indonesian weaving enterprises which, as things stand now, will not be able to compete with it when its products begin to be supplied to the market.

3-2 Knitting Industry

As shown in Sheet No. 6 (Knitting Equipment List), the Indonesian knitting industry is still at a very low level and concentrated in the Djakarta district.

All machines installed at present are circular machines with the exception of 10 units of tricot machines (warp knitting).

Actual production of knitted goods in Indonesia is smaller than the value shown in Sheet No. 6 since the figure given in the same table includes the production of wicks for lamps. It is probable that the demand for underwear, socks and stockings is not fully met by domestic production and there is a sizable import of these goods.

When the production of high class knitted goods becomes possible in the future, the penetration of knitted goods into the market of woven fabrics, which is the global trend in the textile industry, will be realized in Indonesia because of the high productivity and low production cost of the knitting industry. With the existing knitting facilities, however, such development cannot be expected in the near future.

The team observed a good deal of knitted synthetic fibre goods displayed at retail shops and noted there is a sizeable demand justifying the promotion of knitting industry.

SHEET No.6

KNITTING EQUIPMENT and ITS CAPACITY

MILL LOCATION	No.of MILL	TRICOT' M/C	FLAT M/C	CIRCULAR M/C		SOCKS & STOCKINGS	THE OTHERS	CAPACITY (1,000M)
				MECHANICAL	HAND			
SUMATERA	7	0	0	107	11	122	15	6,549.1
EAST JAVA (JAKARTA)	259 (110)	10 (10)	40 (40)	2,078 (1,068)	2,240 (220)	1,530 (1,478)	199 (104)	118,586.4 (52,777.4)
CENTRAL JAVA (JOGJAKARTA)	22 (4)	-	-	205 (10)	85 (22)	334 (57)	101 (-)	11,150.8 (632.8)
EAST JAVE	43	-	-	576	220	397	39	27,367.2
SULAWESI	4	-	-	46	-	-	-	2,160.0
TOTAL	335	10	40	3,016	2,546	2,383	354	165,812.5

PRODUCTION CAPACITY,AVER. 125M/SHIFT, 300 DAYS/YEAR, 2 SHIFT/DAY

3-3 Dyeing and Finishing Industry

Indonesian dresses are mostly made from dyed and printed fabrics. Like the weaving industry, the dyeing and finishing industry in Indonesia is concentrated in the Bandung district. However, the printing mills are found mostly in Central Java.

The dyeing and printing capacities shown in the data of DOI are as follows:

Dyeing Capacity (Batch Dyeing):	85 million m
Printing Capacity:	90 million m

It is believed that the actual dyeing capacity exceeds the above value since the bat dyeing system is employed.

At a dyeing and finishing mill inspected in Bandung, the team noted that continuous dyeing machines were put in operation for the dyeing and resin treatment of T/R blend fabrics. However, due to the lack of necessary facilities, machines were employed in a rather irration 1 way at this mill, with the dyeing machines employed in the scouring and bleaching process and the continuous dyeing machines employed again after the thermo-sole treatment. It was learned that the mill is not yet provided with sufficient facilities for processing synthetic fibre fabrics, but will soon have a large processing capacity with the arrival of newly ordered machines. The team noted, however, that the installation of additional machines are planned without any definite layout at these mills, which are liable to result in an excess of equipment. About nine units of costly rotary screen printing machines are expected to be installed in near by future.. The mill now has three such printing machines in operation, but they are used for pigment printing because of the lack of related processing machines.

The uncontrolled planning of equipment installation was noted to be causing the shortage of printing and dyeing facilities and their poor functions. The low technical level invited by such imprudent planning makes it an urgent need to study textile chemists.

The dyeing and finishing process demands an abundant supply of high purity water. It also entails the problem of draining an equally large quantity of water, and is prone to cause public nuisance if the drain water is not properly disposed of. The locations of mills must therefore be investigated so that they will be established at most suitable places creating the least public nuisance and other problems.

The team made a survey on Batik which is a special product of Indonesia. The aforementioned co-operative association called G.K.B.I. purchases Batik fabrics from its members weavers and have them processed on a commission basis. The finished Batik is collected by G.K.B.I. and distributed to selling agents. G.K.B.I. has a membership of about 15,000 weavers who are scattered all over Java.

As many as 892 Batik processing enterprises are found in Jogjakarta a area alone, and they possess 5,326 tables. It was learned, however, that tables in constant operation range from 1,000 to 1,500.

Batik is made from three different kinds of fabrics, i.e., Biru (Ne. 20/-class), Prima (Ne. 40/-class) and Primissima (Ne. 60/- combed yarn). The former two are produced in Indonesia, but the supply of Primissima is still dependent on import.

Dyeing and printing of Batik is carried out manually using Indonesia's own traditional method and devices. Its design and patterns have a taste which is peculiar to Indonesia. Besides being tailored into women's home wear,

Batik is used to make men's sport shirts and interior textile goods.

Production of Batik is said to be 60 million m/year, but it is hoped this will be raised to 100 million m/year. However, unless some improvements are made in its pattern and design, the desired production increase cannot be expected partly because of changes now taking place in the style of dress. In this connection, it deserves mention that the Batik and Handcraft Institute in Jogjakarta is manufacturing, on a trial basis, the so-called "Modern Batik" which is divergent from the conventional Batik in both colour and pattern. During its visit to the Institute, the team observed pieces of such "Modern Batik" displayed for demonstration.

Though Batik enjoys high appraisal abroad, the scope of its application for clothing is still limited because of its conventional pattern. However, if its colour and pattern are modernized to the common tastes of the world market, it may eventually come to be used for western style clothing. If Batik comes to thus accepted on the world market, the demand by young people will also be increased to some extent. If this is realized, production will be increased and Batik may well become one of major export items of Indonesia.

As described above, the Indonesian textile industry has not yet emerged from its backward state. However, if the expansion of spinning industry and the rationalization of weaving industry are promoted together with the improvement of the dyeing and finishing facilities so that enterprises in each field of the industry will have a balanced and stabilized form of business, it will follow as steady course of development into a modern industry.

Much expectation can be placed on the future of the Indonesian textile industry since it involves a large potential demand for textile products, and the growth of the Indonesian textile industry will be enhanced by the modernization of its respective textile enterprises.

Sheet No. 7

DYEING, FINISHING and PRINTING EQUIPMENT DETAILS

Mill Location	No. of Unit (D.F.)	Dyeing, Finishing Machine Unit							No. of Unit (Print)	Printing M/C	
		Drying	Calender	Jigger	Padder	Winch	Batch Dyeing	Hand Dyeing		Hand Unit	Machine M/C
Sumatra	8	9	11	21	1	22	-	1	-	-	-
West Java	46	44	56	174	2	3	226	1	31	105	7 AS-3 RU-2 RT-2
Central Java	22	8	23	33	1	44	85	5	55	389	3 AS-1 RU-1 FLOCK-1
East Java	4	3	4	11	-	-	-	-	3	4	4 RU-3 AS-1
Sulawasi	2	1	2	5	-	3	4	-	-	-	-
Total	82	66	96	233	4	32	315	7	89	489	14 ROLLER-6 SCREEN-7 FLOCK-7

Production capacity:-

Drying unit	1,800,000 m/year	of 300 days/shift
Calender unit	1,080,000 m/year	"
Jigger unit	540,000 m/year	"
Padder unit	540,000 m/year	"
Winch unit	450,000 m/year	"
Batch dyeing unit	90,000 m/year	"

A.S=Auto-Flat Screen Pringing M/C
R.U=Roller Printing Machine
R.T=Rotary Screen Printing M/C

Yarn dyeing unit	360,000 m/year	of 300 days/shift
Hand screen print	12,000 m/year	"
Roller print	4,000,000 m/year	"
Auto-Flat screen print	2,000,000 m/year	"

CHAPTER VI SPINNING EXPANSION PROGRAM

The descriptions in the preceding chapters dealt with the existing conditions of spinning industry and an outline of the textile market, the fabric making industry and the dyeing and finishing industry.

In this chapter, the spinning expansion program will be discussed with all factors previously described taken into consideration.

As is clear from Sheet No. 8 (Comparative Table of Yarn Supply and Demand Condition), Indoneis'a spinning industry can satisfy only 60% of the yarn demand at present. Sheet No. 8 was prepared on the basis of data made available by Textile General Directorate (DOI). The yarn demand shown in this table was calculated from the figures given in Sheet No. 2 (Spinning Enterprises by Area) which is included in Chapter III as well as from the figures shown in Sheets No. 5 and 6 included in Chapter V.

The supply-demand ratio of yarns varies by area. In Java and Sulawesi (Bali inclusive), yarn supply is deficient as shown in Sheet No. 8, and in Bandung where weaving enterprises are clsutered, yarn supply is rendered particularly unsmooth.

SEET NO.8

COMPARATIVE TABLE of YARN SUPPLY and DEMAND CONDITION

LOCATION	YARN SUPPLY		YARN DEMAND(WEAVING)		YARN DEMAND(KNITTING)		YARN DEMAND (B)	A/B x 100
	SPINNING SPINDLES	YARN PRODUCTION (A)	WOVEN CLOTH PRODUCTION	YARN DEMAND	KNITTED GOODS	YARN DEMAND		
—		BALES	x 1000M	BALES	x 1000M	BALES	BALES	
SUMATERA	60,384	60,300	39,968	32,000	6,549	4,500	36,500	16
WEST JAVA	147,756	147,750	522,429	418,000	118,586	81,500	499,500	30
CENTRAL JAVA	192,732	192,700	162,094	130,000	111,151	7,500	137,500	140
EAST JAVA	67,908	68,000	123,433	98,500	27,369	19,000	117,500	58
SULAWASI BALI	15,200	15,000	83,900	27,500	2,160	1,500	291000	52
			x 1000M		x 1000M			
TOTAL	483,780	483,750	881,796	706,000	165,813	114,900	820,000	59

YARN PRODUCTIN : 400 LBS(BALES)/SP/YEAR

YARN DEMAND : for WOVEN CLOTH, 400 LBS(BALE) for 1250 M of WOVEN CLOTH
for KNITTED GOODS, 400 LBS(BALE) for 1454 M of KNITTED GOODS

At present, weaving enterprises purchase yarns from nearby spinning enterprises since the time and high freight charges incurred by the poor traffic condition make it impracticable to obtain them from far places. Hence, the areal supply coverage of spinners is inevitably limited.

Assuming that yarn distribution becomes smooth in the future, it still will not solve the problem of the 60% supply rate. To increase this rate to 100%, about 335,000 spindles must be additionally installed. This value is based on the design supply and demand.

Additional requirements of spindles based on the present yarn consumption is as estimated below.

Estimated supply of yarn from spinners is (ref. Chapter III)-

40,000 bales

and the estimated yarn consumption by weaving industry is -

Approx. 660 million m

If 100 million m consumed by knitting industry is added to the above value, the total yarn consumption at present turns out to be -

700 million m = approx. 630,000 bales (ref. Chapter V)

When this consumption of 630,000 bales is compared to the present supply of 400,000 bales, the yarn supply rate is no more than 64%. If this percentage is to be increased to 100% the additional installation required is -

Approx. 230,000 spindles.

Notes: 1. Above estimation is based on cotton consumption only. Consumption of sysnthetic filament yarns observed in the weaving and knitting industry is disregarded as negligible.

2. Total yarn consumption of 700 million m is adopted since the planned domestic fabric production for 1971/1972 is 675 million m.

Priority is given to the expansion of the spinning industry over other sectors of the textile industry because of this low supply rate of 60%.

It is unknown what spinning expansion plans are being drawn up by private enterprises. It is known, however, that all Indonesian-Japanese joint ventures were given approval on condition that they install integrated production facilities from spinning to dyeing and finishing. Two of such joint venture companies, K.T.S.M. and Unilon, have already started the dyeing and finishing operation, but the construction of their spinning facilities has not even entered the stage of preparation. If the operation of these joint vlenture companies is carried out according to the conditions to which they are subjected, about 40,000 spindles will be additionally installed. But since all these spindles are intended to produce yarns for their own concumption, they do not serve to alleviate the existing shortage of supply.

The reason private enterprises take little interest in the weaving industry may be explained by the difficulty in securing the huge equipment funds for one thing, and the technical difficulties involved in the operation of weaving mills for another.

It might be reasonable to expect that weaving enterprises would establish their own spinning mills with the consolidation of the weaving industry which must be accompanied by a smooth supply of yarn, but in fact this is not the case. It is more probable that they woudl prefer to use imported yarns rather than secure loans at a high interest rate for the construction of weaving mills because the import duties levied on yarns are extremely low when compared to those imposed on textile goods (less than 10% for all yarns). Unless profit assuring incentive measures are taken, private enterprises will continue to shy away from the installation of their own spinning facilities, and if so, the only means left is to reinforce Government controlled spinning enterprises.

Basic considerations to be taken in planning the reinforcement of Government controlled spinning enterprises are as follows:

(a) Priority should be given to those areas where the yarn supply is deficient or unsmooth.

(b) There should be good prospects that facilities additionally installed at existing mills can be immediately put into full and efficient operation.

(c) Expansion of existing small-scale mills should guarantee their economic stabilization.

On the basis of these fundamental considerations, the reinforcement efforts should be directed to the following areas and enterprises.

(a) West Java where the yarn supply rate is particularly low.

(b) Existing spinning plants in West Java which are fairly well consolidated and are on a higher level than average mills in both productivity and techniques.

(c) Enterprises whose deficient facilities are inviting management instability but whose technical level is high.

Details of Items (a), (b) and (c) above are given below:

(a) West Java embraces the following four spinning enterprises.

Patal Senaja, Djakarta
Patal Bekasi, Bekasi, NR. Djakarta
Patal Bandjaran, Bandung
Patal Tjipadung, Bandung
(I. T. T. is excluded since it is a private enterprise)

(b) Patal Bekasi, commissioned in 1968, has not yet entered the stage of of full operation. Excluding this enterprise, there are three spinning enterprises to be expanded.

Bandjaran in Bandung was originally equipped with machines imported from Mainland China which were later replaced by Japanese machines. Since the company was remodelled with Japanese machines, its operation has been satisfactory and its production has increased close to the target value. Yarn quality is also acceptable.

Tjipadung is equipped with machines imported from Platt, U.K. which are identical in specification and layout to those installed at Patal Setjang and Patal Garti. Although the three enterprises started operation at exactly the same time, Tjipandung's productivity is somewhat lower than that of the other two for unknown reasons.

Senajan is the most well consolidated and has a high productivity. Quality of yarns produced by this enterprise is also satisfactory.

If the above three enterprises are to be graded by priority order, Senajan comes first, followed by Bandjaran and then Tjipadung. Hence, the following two enterprises should be selected for expansion.

Djakarta District - Senajan
Bandung District - Bandjaran

(c) Patal Lawang deserves to be expanded because its productivity is comparatively high reflecting its high technical level in spite of its small scale (15,200 spindles). Since the yarn supply rate is low in East Java, spinning expansion in this area must be given due c consideration.

Patal Tohpati in Bali is also a small plant equipped with only 15,200 spindles. However, even though it was covered by the survey, nothing definite can be said as to whether or not it should be given expansion priority.

PRK Djantra in Semarang must be improved since its facilities are superannuated and operation is in bad condition. However, it is excluded from the expansion program because there is a plan to move its existing facilities to a newly aquired site for expansion.

Texin's facilities are not only old but composed of machines by three different makers, Howard (U.K.), Reiter (Switzerland) and Ingolstat (Germany). Though it has an integrated production system for spinning weaving and finishing operation, merits of integrated production cannot be assured unless the operation of these three sections is balanced with each other. Its spinning section is in need of repair and additional installation of machines for systematic production control. Hence, rehabilitation rather than expansion is required at this mill.

On the basis of the above explanation, it is recommended to implement the spinning expansion in two phases as described below:

First Phase Expansion Program

The first phase expansion program, which is for the existing mills, is to be implemented according to the following priority order.

Patal Senajan
Patal Bandjaran
Patal Lawang

As for Patal Senajan and Patal Bandjaran which are both equipped with 30,000 spindles, it is advisable that their expansion plants be also provided with 30,000 spindles each to secure uniformity in scale which will facilitate the operation control of old and new plants.

At Lawang where 15,200 spindles are now installed, its super high draft system is retarding the smooth handling of machines. It is therefore recommended that this inconvenience be remedied and that the new expansion plant be equipped with 20,000 spindles to be operated under the ordinary spinning system for high speed high production.

Second Phase Expansion Program

The second phase expansion program is to be implemented not for the expansion of the existing mills but for the establishment of new mills whose scale will be that of a typical modern spinning mill, i.e., 50,000 spindles. Two such mills are to be constructed at suitable sites in West Java and one in East Java.

The number of spindles which are proposed to be newly installed during the two phases of spinning expansion program is as given below.

First Phase	:	30,000 + 30,000 + 20,000 = 80,000 spindles
Second Phase	:	50,000 x 3 = 150,000 spindles
Total	:	230,000 spindles

Installation of new spindles is to be effected over three years for financial reasons. It is expected that the future demand for yarns will naturally surpass the aforementioned figure (approx. 630,000 bales estimated on the basis of the present supply-demand condition) with the improvement in productivity and the expansion of the weaving and knitting industry. On the other hand, production of the existing mills is also expected to follow an upward trend. Hence, it is considered that the aforementioned supply rate will increase to maintain the supply-demand balance.

The following detailed plans are proposed for plant expansion.

First Phase Expansion Program

Senajan - Operation of the existing 30,000 spindles, which are primarily employed for the production of Ne. 20 - 30/- yarns, is to be continued in future for the supply, if possible, of Ne. 20 - 30/- yarns for underwears and other knitted goods since the Djakarta district is the centre of Indonesia's knitting industry. The 30,000 spindles to be installed at the new mill are to be used for the production of medium and fine count yarns of Ne. 40/- and Ne. 60/-, and fitted with devices for spinning T/C blend yarns. About 10,000 of the said 30,000 spindles should be so designed that they can be used for spinning Ne. 60/- comed yarns.

Bandjaran - Since about 30,000 spindles now installed include some which are fitted with the device for T/C blend yarn spinning, such devices should be increased (about 12,000 spindles). Spindles for cotton spinning should also be adjusted for coarse and medium count cotton yarns.

The 30,000 spindles to be newly installed should be capable of spinning Ne. 40/- carded yarns and Ne. 60/- combed yarns, and should also be used for the production of Ne. 40/2 - 60/2 twisted yarns. Bandjaran is expected to specialize in the production of yarns for sale and play the role of elevating the

quality of cotton fabrics in close co-operation with weaving enterprises in the Bandung district.

Note: An alternative, conceivable for the existing mills is to remodel the cotton spinning spindles into rayon spinning spindles to make the production of T/C and T/R blend yarns possible. This must be given consideration during the feasibility study.

Lawang - At the existing mill, the super high draft system should be improved by replacing its drawing frame with a simplex frame so as to ensure a satisfactory spinning operation.

The 20,000 spindles to be installed at the new mill are to serve for the production of coarse and medium count (Ne. 20 - 30) yarns which are in heavy demand in East Java district, hence the economic stability of Lawang will be established.

Second Phase Expansion Program

The three 50,000 spindle mills are to produce medium count yarns of about Ne. 40/-.

Two of the three mills are to specialize in yarn production and will closely co-operate with weaving enterprises. The remaining one mill will be equipped with an integrated production system so that weaving, dyeing and finishing and printing operations may be systematically carried out in addition to the spinning operation.

All the existing spinning mills excepting the three to be reinforced under the expantion program should be controlled in such a way that they will be specialized in the production of yarns for sale of as many different counts as possible.

At present, 60% of all yarns consumed is occupied by Ne. 20 - 30/- yarns and 30% by Ne. 40— 42/- yarns. It is believed that this ratio will remain unchanged by the transition of style of dress, but that the consumption now centering on Ne. 40/- yarns will eventually cover a wider scope of yarn count ranging from Ne. 40/- to Ne. 60/-. Production of fine count yarns should therefore be fostered under the expansion program.

With respect to synthetic fibre/cotton blend yarns, it deserves mention that most joint venture companies aim at the production of T/C blend yarns and fabrics and are expected to soon embark on yarn production with a total of about 40,000 spindles. Since the installation of 10,000 spindles is planned for Tjilatjap, the total number of spindles planned reaches 50,000. (The standard count and blending ratio of T/C blend fabrics: Ne. 45/-, T = 65%, C = 35%)

Assuming that the consumption of synthetic fibre/cotton blend fabrics will be stabilized on the 60 million m level and will not exceed 120 million m by the gradual increase which will take place thereafter, the yarn demand can be estimated to amount to 10,000 bales and this will necessitate the installation of 100,000 to 120,000 spindles. When the above-mentioned 50,000 spindles are subtracted, the total number of spindles required to be newly installed turns out to be 50,000 to 70,000. Selective improvement and consolidation should therefore be effected at the existing mills, and the expansion program should incorporate such considerations for selective consolidation.

The following two spinning systems are now given attention as being rational and productive.

1. Continuous automatic spinning system
2. Open end spinning system

The former system, intended primarily for reducing the labour force, assures a high productivity but has the demerit of necessitating a huge initial capital input. Its high spinning efficiency is therefore displayed only when it is used for the production of yarn of a certain fixed count and if the yarn count must be changed, its use cannot be recommended. However, it should be studied since the partial employment of a continuous spinning system deserves to be considered under the expansion program.

The latter system also promises a high productivity since it enables a single machine to perform both ring spinning and winding operation. However, the system cannot be recommended for use in the immediate future because, for one thing, it is still in the experimental stage and for another, cannot be used for the production of medium count yarns. Futher, yarns produced by this system are weaker than those turned out by the ring spinning systems, but it still deserves to be studied for application to special purposes (such as the spinning of yarns for knitted goods) because yarns produced by this system have a touch resembling that of mule yarns.

Expansion plants should be equipped with large package, high production, high speed machines.

In the following chapter, a plan of a model plant designed for the expansion program will be presented together with an estimate of equipment funds required for the program.

CHAPTER VII MODEL PLAN FOR SPINNING EXPANSION PROGRAM AND COST ESTIMATE FOR EXPANSION PROGRAM

7-1 Model Plan for Spinning Expansion Program

Expansion of existing mills and construction of new mills proposed in the preceding chapter may be summarized as follows:

Expansion of existing mills:	30,000 spindle mills - 2
	20,000 spindle mill - 1
Construction of new mills:	50,000 spindle mills - 3
Total	230,000 spindles

In the absence of the necessary data, the team found it impossible to prepare a detailed construction design for each of these six mills. A model plan of a 30,000 spindle expansion plant is therefore given in this chapter without designating its location. In the following items, specifications and layout of machines and equipment, and production conditions including operating hours and personnel requirements are presented for this model plant which is assumed to be a medium and fine count yarn spinning plant operating under a combined spinning system for the production of -

1. Ne. 45/- polyester/cotton blend yarns
2. Ne. 40 - 60/2 combed yarn and Ne. 40- carded yarns (both 100% cotton)

With respect to the three expansion plants (two 30,000 spindle plants and one 20,000 spindle plant, both for 100% cotton spinning) whose construction is actually envisaged under the expansion program, the number of machines required and their speciafications are given. For the three 50,000 spindle mills to be constructed in the second phase of the program, it has been deciced to present a model plan at a later date.

7-2 30,000 Spindle Plant under Combined Spinning System for Medium and Fine Count Yarns

As introduced in the preceding chapter, the model plant is assumed to be operated under a combined spinning system for the production of medium and fine count polyester/cotton blend yarns, and combed and carded cotton yarns.

Synthetic fibre spinning and blended spinning are global trends in today's textile industry. Consolidation and improvement of the Tjilatjap mill as well as a few other mills now in progress, is intended to follow this trend. The model planning was made in an attempt to indicate the desirable state of such types of spinning by means of an assumptive model plant.

The model plant has a scale shown in Dwg. No. TEXO/JCI SP'G EXP 72-M-1 (Machinery Layout) which ensure the following production capacity.

Ne. 45/- polyester/cotton blend yarns	- 14,256 sps. (6,800 lbs/day)
Ne. 40 - 60/2 (average: 50/2) combed cotton yarns	- 7,776 sps. (3,000 lbs/day)
Ne. 40/- carded cotton yarns	- 8,208 sps. (4,200 lbs/day)
Total	30,240 sps. (14,000 lbs = 35 bales/day)

Use of Toyoda's machinery is assumed for the model plant. Calculations, number of machines and their layout are therefore based on the capacity of Toyoda's machinery.

Note: specifications and performance of machines of other makers do not differ much from those of Toyoda's machinery. However, there is a large difference in the machinery combination of the blow room machinery range and in the specifications of carding machine (Model CK7D HI-PRD Card). Hence, use of machines of other makers could cause a change in the number of machines.

For the calculation of the number of machines required, refer to Sheet 9 No. 9 (Calculation Data).

The Scale of polyester/cotton blend spinning was so determined that one set of blow room machinery range would display its full performance. Further, an allowance is made for the efficiency of polyester processing machines.

The sliver grain of cotton and that of polyester are designed to be in the ratio of 65 : 35 so that the mixing draw will be used for the production of blend yarns at a mixing ratio of 5 : 3.

For the calculations of Ne. 45'S/- polyester/cotton blend yarns, refer to Sheet No. 9 - A, and for the calculations of 50'S/2 (average) combed yarns and 40'S/- carded yarns, refer to Sheet No. 9 -B and - C, respectively.

As shown in Sheet No. 10 (Process Chart), the combination of machines is as follows.

Blow Room Range

For polyester - One line
For cotton - Two lines

Card (Toyodals Card Model CK7D) - 24 units
(Specifications of the card are almost the same for both polyester and cotton, but those of M.C.C. are not the same.)

Arrangement of drawing frames (DK9) is as given below:

Pre-draw of the combing line - 1 passage, 1 H x 2 D x 2 units
Pre-draw for grain adjustment of polyester card sliver - 1 passage, 1 H x 2 D x 2 units
Plyester/cotton mixing - 2 passages, 1 H x 2 D x 3 sets (6 units)
Cotton drawing - 2 passages, 1 H x 2 D x 2 sets (4 units)

It is envisaged that 6 units of high speed simplex fly frames each having 96 spindles will be installed in the fly frame section, and 70 units of ring spinning frames each having 432 spindles in the spinning section, so that the total number of spindles will be 30, 240. In addition, 12 units of twisting frames each having 400 spindles are to be installed to provide a total of 4, 800 spindles required for the production of combed yarns which will in principle be twisted yarns.

Details of the above-mentioned machines are given in Sheet No. 11 (Machinery List).

Sheet No. 9 -A-

CALCULATION DATA FOR Ne.45/-ESTER/COTTON BLEND YARN SPINNING

6800 lbs/day capacity, E 65% C 35% yarn

	Lap M/C		Card		Comber Line (C)			Pr.Dr. (E)	Mixing Draw(E/C)		(E/C) Simplex	(E/C) Ring Spig
	C	E	C	E	PR-DR	S.Lap	Comber		Mixing	Finish		
Required Qty. (lb)	3200	4950	2980	4650	2950	2920	2480	4600	7100	7050	7000	6800
Delivery Grain	13oz/1	13oz/1	360/6	350/6	350/6	750/1	330/6	368/6	350/6	350/6	222/30	22.2/120
Hank Roving	0.00146	0.00146	0.139	0.143	0.143	0.0111	0.130	0.136	0.143	0.143	1.126	45
Draft/Ends up					8.23/8	1.4/18	45	7.62/8	8/5+3	8/8	7.88	40
Twist per Inch (Twist Multiplier)											0.7/ 0.666	24.7/ 3.68
Spindle rev. (rpm)											850	13500
Delivery speed (m/min)	7.9	7.2	68.5	68.5	180	50	46.5	180	170	170	30.8	13.85
Cal. hanks/ day=24 hrs	14.0	12.6	120	125	340	87.5	180	340	315	315	80	26
EFF. %	80	60	83	80	75	75	80	75	75	75	80	85
Unit production (lb) per day=24 hrs.	7600	6900	720	700	1785	5900	865	1860	1650	1650	38.5	0.491
Required unit	0.42	0.72	4.15	6.7	1.62dly	0.49	2.85	2.46dly	4.3dly	4.27dly	182 sps	13850 sps
No. of Machine	0.42	0 72	4.15	6.7	1.62	0.49	2.85	2.4	4.3	4.27	96 x 1.9	432 x
M/cy. details		One Line	40" Hi-pro	40" Hi-pro	One passage			One passage	1H x 2D x 2P			

6800 lbs = 17 bales

Sheet No. 9 -B-

CALCULATION DATA FOR Ne 50/2 COMBED YARN SPINNING, COTTON

3000 lbs. capacity/day

Factors	Lap M/C	Card	Comber Line			Drawing	Simplex	Ring Spring	Ring Twisting
			Pr. Draw.	S. Lap.	Comber				
Required Qty. (lbs)	3980	3820	3780	3780	3140	3100	3090	3020	3020
Delivery Grain	13oz/1	360/6	360/6	750/1	350/6	360/6	200/30	20/120	
Hank Roving	0.00146	0.139	0.139	0.0111	0.143	0.139	1.25	50	50/2
Draft / Ends up			8/8	1.44/18	43.5	7.69/8	9.0	40	
Twist per Inch (Twist Multiplier)							1.35/1.2	25.8/3.65	20/4
Spindle Rev. (rpm)							850	13000	9000
Delivery speed (M/Min)	7.9	68.5	200	50	39.5	175	16.0	12.8	20.25
Cal. Hanks/ day=24hrs	14.0	121	328	87.5	69	325	28.25	24	20
Eff. %	80	83	75	75	80	75	80	85	85
Unit Production (lbs) per day=24 hrs	7600	720	2350	5900	775	1750	18.0	0.408	0.685
Required unit	0.524	5.2	1.62 dly	0.64	4.06	1.77 dly	174 sps	7240 sps	4420 sps
No. of Machine	0.524	5 2	1.62 dly one pass	0.64	4.06	1.77 dly 2 pass	174 sps (96x1.82)	7240 sps (432x16.7)	4420 sps (400x11.05)

3000 lbs=7.5 bales

Sheet No. 9 -C-

CALCULATION DATA FOR Ne.40/-CARDED YARN SPINNING

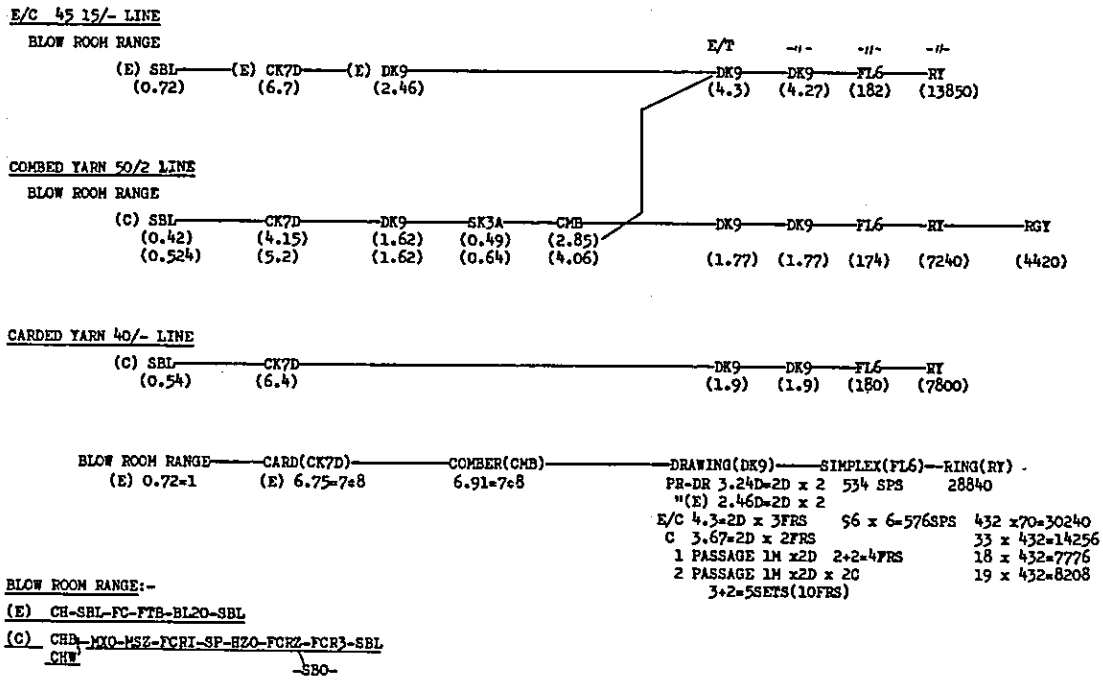
4200 lbs. capacity/day

Factors	Lap M/C	Card	Drawing	Simplex	Ring Spinning
Required Qty. (lbs)	4720	4525	4480	4450	4350
Delivery Grain	150z/1	380/6	380/6	230/30	25/120
Hank Roving	0.00127	0.132	0.132	1.085	40
Draft/Ends up			8/8	8.25	36.8
Twist per Inch (Twist Multiplier)				1.33/1.28	24.5/3.88
Spindle Rev. (rpm)				1000	13500
Delivery speed (M/min)	7.9	64.0	200	19.05	14.0
Cal. Hanks/day=24 hrs	13.85	115.0	412.5	33.5	26.3
Eff. %	80	83	75	80	85
Unit production (lbs) per day=24 hrs	8720	710	2350	24.5	0.558
Required unit	0.54	6.4	1.9 dly	180 sps	7800 sps
No. of Machine	0.54	6.4	1Hx2D 2pass	96 sps x 2(1.75)	432 x 18.2

4200 lbs 10.5 bales

SHEET NO.10

PROCESS CHART



BLOW ROOM RANGE:-

(E) CH-SBL-FC-FTB-BL2O-SBL

(C) CHB-MIO-MSZ-FCRI-SP-HZO-FCR2-FCR3-SBL
CHW
SBO-

Sheet No. 11

MACHINERY LIST

(1) Blow Room Machinery

(a) For Cotton

Blending Group — 2 groups

3-Blending Bale Opener, Model CHB
*914mm wide.
*Individual motor driven by B-belt for hopper

1-Waster Feeder, Model CHW
*914mm wide.

1-Mixing Opener with Conveyer Belt, Model MXO
*600mm wide.

1-Magnetic Separator, Model MSZ

Opening Group — 2 groups

1-Fan Condenser with Delivery Reserve Chamber, Model FCR1
*1,067mm wide.

1-Superior Cotton Cleaner, Model SP
*914mm wide.
*6 spiked cylinders

1-Horizontal Opener, Model HZO
*1,410mm wide.

1-Fan Condenser with Delivery Reserve Chamber, Model FCR2
*1,067mm wide.

1-Single Beater Opener, Model SBO
*1,061mm wide.
*3-blade beater and adjustable grid bar.

Lap Forming Group — 2 groups

1-Fan Condenser with Delivery Reserve Chamber, Model FCR3
*1,067mm wide.

1-Single Scutcher with Automatic Lap Doffer, Model SBL
*1,061mm wide to make 1,016mm wide lap.
*Carding beater
*High compression calender roller and one pair of fluted lap roller.
*Electro-pneumatic rack control device with automatic rack lifter.
*Electro-pneumatic lap moving-out device to lap scale.

1-Air Compressor for Automatic Lap Doffer

Air Filter Group — 2 groups

1-Air Filter, Model FTB

*Inlet mouth piece.

*6 dust bags.

2-Air Filter, Model FTS

*Dust box with carrier.

*12 dust bags.

2-Air Filter, Model FTS

*Dust box with carrier.

*24 dust bags.

Centralized Switch Board Cabinet — 2 sets

(b) For Ester

Opening Group — 1 group

1-Hopper Opener, Model CH(HO)

*1,067mm wide.

1-Single Beater Opener, Model SBO

Lap Forming Group — 1 group

1-High Speed Fan Condenser, Model FC

2-Air Filter, Model FTB

*6 dust bags.

1-Hopper Feeder, Model BL20

*1,067mm wide.

1-Single Scutcher, Model SBL

*1,060mm wide to make 1,016mm wide lap.

*3-arm carding beater.

*Fringe roller.

*Automatic lap doffing arrangment.

*High compression calender roller and one pair of fluted lap roller.

1-Air Compressor for Automatic Lap Doffer

Centeralized Switch Board Cabinet — 1 set

(2) Carding Section

(a) High Production Card, Model CK-7D (for Cotton) — 16 sets

*1,016mm wide on wire.

*92 revolving flats with fillet and 4 stationary flats with special metallic wire.

*200mm dia. taker-in roller.

*1,000mm dia. steel plate cylinder clothed with metallic wire.

*500mm dia. steel plate doffer clothed with metallic wire.

*Fly doffing comb

*2 over 2 drafting arrangement.

*Single coiler motion for 508mm (20") dia. x 1,067mm (42") high can.

*Automatic waste cleaning device for waste of cylinder, doffer, flat, fly comb and draft parts by means of blower and conveyer.

Air Filter Group (for Cotton) 2 groups

(b) High Production Card, Model CK-7D (for Ester) 8 sets

*1,016mm wide on wire.

*92 revolving flats with fillet and 4 stationary flats with special metallic wire.

*200mm dia. taker-in roller

*1,000mm dia. steel plate cylinder

*500mm dia. steel plate doffer

*Fly doffing comb

*2 over 2 drafting arrangement.

*Single coiler motion for 508mm (20") dia. x 1,067mm (42") high can.

*Automatic waster cleaning device for waste of cylinder, doffer, flat, fly comb and draft parts by means of blower and conveyer.

Air Filter Group (for Ester) 1 group

(3) Combing Section

(a) High Speed Pre-Comber Drawing Frame, Model DK9 2 frames

*1 head of 2 deliveries.

*One passage, 8 slivers fed per delivery.

*Coiler motion for, 508mm (20") dia. x 1,067mm (42") high can.

*4 over 5 drafting system.

*Extended sliver table with positive driven lifter roller for feeding 508mm (20") dia. x 1,067mm (42") high can.

(b) Sliver lap Former, Model SK3A 2 sets

*Sliver table to be fed up to 20 slivers.

*Feed can: 508mm (20") dia. x 1,067mm (42") high can.

*Lap to be produced 280mm width x 457mm dia.

*2 over 2 drafting system

*Automatic lap doffing apparatus with automatic spool replenishing device.

(c) High Production Comber, Model CMB 8 sets

*8 heads, 450mm (17.3/4) staff.

*Twin coiling motion for 508mm (20") dia. x 1,067mm (42") high can.

*125mmdia. combing cylinder with UNI-COMB.

*Top comb with 1 row of needle.

*Spring pressure arm weighting arrangement for top detaching roller.

*Top detaching roller with anti-friction bearing and synthetic rubber covering.

*3 over 4 drafting system.

*Pneumatic suction clearer for top and bottom roller.

*Stop motion.

*Waster lap winding arrangement.

(4) Drawing Section

(a) High Speed Pre-Comber Drawing Frame, Model DK9 (Balancing for Ester) 2 frames.

*1 head of 2 deliveries

*One passage, 8 slivers fed per delivery.

*508mm (20") staff.

*Coiler motion for, 508mm (20") dia. x 1,067mm (42") high can.

*4 over 5 drafting system.

*Pneumatic suction clearer for top and bottom roller.

*Electric stop motion with control box, auto-counter and signal lamp.

*Sliver table with positive driven lifter roller for feeding 508mm (20") dia. x 1,067mm (42") high can.

(b) High Speed Drawing Frame, Model DK9 (for E/C) 3 sets (6 frames)

*1 head of 2 deliveries 2 passage(s), 8 slivers fed 1er delivery

*508mm (20") staff.

*Coiler motion for 1st passage 508mm (20") dia. x 1,067mm (42") high can.
2nd passage 508mm (20") dia. x 1,067mm (42") high can.

*4 over 5 drafting system.

*Pneumatic suction clearer for top and bottom roller.

*Electric stop motion with control box, auto-counter and signal lamp.

*Sliver table with positive driven lifter roller for feeding
508mm (20") dia. x 1,067mm high can.

(c) High Speed Drawing Frame, Model DK9 (for Cotton) — 2 sets (4 frames)

*1 head of 2 deliveries.

*2 passage(s), 8 slivers fed per delivery.

*508mm (20") staff.

*Coiler motion for 1st passage 508mm (20") dia. x 1,067mm (42") high can.
2nd passage 508mm (20") dia. x 1,067mm (42") high can.

*4 over 5 drafting system.

*Pneumatic suction clearer for top and bottom roller.

*Electric stop motion with control box, auto-counter and signal lamp.

*Sliver table with positive driven lifter roller for feeding
508mm (20") dia. x 1,067mm (42") high can.

(5) Fly Frame Section

High Speed Simplex Fly Frame, Model FL6 — 6 sets

*96 spindles, 576mm staff, 355mm (") lift.

*Nominal full bobbin dia. 178mm (")

*Electric cushion starter for run and inch.

*4 lines of drafting roller on 15° inclined roller stand.

*Double apron D type high draft system, apron in one zone with collector.

*All 4 lines of bottom roller neck with anti-friction bearing.

*4 lines of top roller, weighted by SKF Weighting Arm, PK571

*22mm dia. flyer spindle, Flyer with presser

*Extended creel for feeding
508mm (") dia. x 1,067mm (") high can.

*Electric stop motion for roving & sliver breakage by photoelectric cell with signal lamp.

*Full bobbin stop motion

(6) Spinning Section

Ring Spinning Frame, Model RY — 70 sets

*432 spindles, 70mm spindle distance, 205mm lift.

*Double apron high draft system, apron in one zone

*3 lines of drafting roller on 45° inclined roller stand

*3 lines of top roller, weighted by SKF Weighting Arm, PK220-17

*Pneumatic suction under clearer for front bottom roller.

*Spindle with knee brake for plastic bobbin

*Spindle insert NSK HA-25A and tape tension pulley NSK SR7

*Single flanged ring (44mm inside dia.)

(7) Winding Section

(a) Murata No. 12 Super Speed Cone Winder — 15 sets

*120 drums

(b) Murata No. 23 New type High Speed Doubler — 2 sets

*100 drums

(8) Twisting Section

Ring Twisting Frame, Model RYC — 12 sets

*400 spindles, 75mm spindle distance. 230mm lift.

*Dry system.

*Spindle with knee brake for wooden bobbin.

*Spindle insert NSK HA-25A and tape tension pulley NSK SR7.

*Single hanged ring. (50mm inside dia.)

7-3 Outline of Model Plant

As shown in Dwg. No. SP'G EXP-71-M-1, the model plant is planned to cover a floor space of 11,500 m^2 (= 100 x 115). The plant building need not be of any particular type, but since the production of cotton and blend yarns demands the installation and efficient functioning of air-conditioning facilities, the installation and efficient functioning of air-conditioning facilities, the building should preferably be of a windowless type with the ceiling height limited to about 4 to 4.5 m. Therefore, the building need not have ceilings if it is designed to have an almost flat and perfectly heat-insulated roof with a mild inclination.

Installation of air conditioning equipment is based on the following atmospheric and interior conditions.

Atmospheric condition: 30°C DB x 28°C WB (maximum temperature)
Interior condition (heat generation of power equipment considered):

Opening room	- 30°C DB x 75% RH
Carding-Simplex	- 30°C DB x 60% RH
Ring room	- 30°C DB x 55% RH
Winding & Twisting	- 30°C DB x 70% RH

Humidifying equipment are to be installed in the opening and winding sections, with refrigerating equipment concurrently employed for air conditioning to create satisfactory working condition for blend yarn spinning. Use of refrigerating equipment can be dispensed with for ordinary spinning mills if water-cooled air-conditioning equipment displays its function fully with a sufficient supp supply of cool water. Installation of refrigerating equipment is planned for the model plant since the production of blended yarns is vulnerable to the effect of temperature and humidity.

Ducting for air-conditioning is outlined in Dwg. No. TEXO/JCI SP'G EXP 72-M-2.

Spinning mills in Indonesia mostly resort to diesel power generation for the operation of machines. However, operation with commercial electrical power is advisable for the model plant if it is to be constructed at a place like Bandung or Djakarta where commercial electrical power can be readily obtained or is expected to be supplied shortly. For this reason, funds for the installation of diesel power generators are excluded from the estimate.

From Sheet No. 12 (Power Consumption List), power requirement of the model plant can be summarized as follows.

Operation of spinning machines	- Approx.	1,850 KW
Air-conditioning	- "	1,400 KW (720 KW for refrigeration inclusive)
Total	- "	3,250 KW
Total with power for lighting and other purposes	- "	3,500 KW

The exact position and floor space of appurtenant buildings such as warehouses are not indicated in the plant layout, since these will be presented in the feasibility report.

Sheet No. 12

Power Consumption List

Spinning Section			
1) Blow Room Machinery Range for Cotton	2 lines	35.6x2=71.2	kw
2) Blow Room Machinery Range for Polyester	1 line	13.35	kw
3) Card Room			
CK Card	24 sets	23x2.4=72	kw
Air Filter Group	3 sets	27.5	kw
Drawing Frame	14 frames	5.3x14=74.2	kw
4) Combing Line	2		
Pre-Drawing	2 frames	5.3x 2=10.6	kw
Slive Lap Machine	2 frames	5.2x 2=10.4	kw
Combing Machine	8 frames	3.7x 8=29.6	kw
5) Fly Frame	6 sets	11.3x 6=67.8	kw
6) Ring Spinning Room	70 sets	16.515x70=11.56	kw
	per total (1-6)	1532.7	kw
Twisting & Winding Section			
7) Cone Winder	15 sets	3x15=45	kw
8) Doubler	2 sets	3x 2= 6	kw
9) Ring Twisting Frame	12 sets	15x12=180	kw
	per total (7-9)	231	kw
Vacuum Setter	1 set	8.25	kw
Pneumatic Blow Cleaner and Fans	99 sets	0.55x99=54.45	kw
	(Fans)	2.2 x 6=13.20	kw
	Sub Total	1839.00	kw
Air Conditioning Section			
1) Air Conditioning Equipment		488	kw
2) Refrigerating Equipment		694.7	kw
3) Humidifying Equipment		30	kw
4) Hydrant pump		180	kw
	Sub Total	1392.7	kw
	Grand Total	3232.3	kw

7-4 Productivity and Production Organization

The spindle rotation of 13,000 - 13,500 rpm given in Sheet No. 9 is justifiable from the accuracy of machines. If the quality of lap forming machines, carding machines and sliver tables is satisfactory, it is possible to limit the number of broken yarns in the ring spinning section to less than 20 per hour for each 400 spindles operated at the above-mentioned speed.

Production capacity lower than the calculated value is given in Sheet No. 9 to reduce the margin of error in the calculation. As shown in Sheet No. 9 - C, the unit production of Ne. 40'S/- yarns by the ring spinning frame operated at a spindle revolution of 13,500 rpm and an efficiency of 85% is 0.558 lbs/day (24 hrs.)

This value is equivalent to 1.304 lbs in terms of Ne. 20'S/- yarns as is clear from the following equation.

0.558 x 2.334 (conversion rate to 20'S/-) = 1.304 lbs

Since the annual production (346 working days) turns out to be 475 lbs from this value, operation under the above conditions promises the following unit production capacity.

1.18 bales/spindle/year

When compared to the production target of 1 bale/spindle/year currently set in Indonesia, this value is about 18% laeger.

Note: Unit production capacity of 40'S/- yarns averages 0.585 lbs/spindle/shift in Japan. When converted to 20'S/- yarns, this is equivalent to 1.365 lbs/day 497 lbs/spindle/year, or 1.25 bales/spindle year.

Installation of high speed high production machines planned for the model plant will cut down the number of production steps and the number of direct workers as well. Assuming that a line and staff system outlined in Sheet No. 13 (Production Organization Chart) will be adopted, the personnel requirement of the production division will be as described below: (For the personnel distribution in the production division, refer to Sheet No. 14 (Personnel List for Production Division))

Operation Section	: Shift Chief (1) + Foremen (3) + Operators (84)	= 88
Machinery Maintenance Section	: Shift Chief (1) + Foremen (4) + Workers (33)	= 36
Total	:	124

The total of direct workers of the production division is 508 as calculated below:

124 x 4 groups = 496

Testing Room Chief (1) + Workers (5) = 6 x 2 shifts = 12

Total 508

Note: Workers required for ring spinning are 24 in total as shown below:

7 - frames/head	= 10
Bobbin doffing - 4 x 2 groups	= 8
Bobbin carriers, etc. (incl. sweepers)	= 6
Total	24

Personnel requirement for other divisions are as described below.

Engineering Workers Division : 56

(Power Generator (3) + Electrical Workers (4) + Air Conditioning (5) = 12 x 4 groups = 48

Repairing Shop (5) + Building Maintenance (3) = 8 x day working = 8)

Production and Control Staff Section : 8

(Engineers (3) + Clerical Workers (5) = 8 x day working = 8)

General Affairs Division : 56

(Division Chief (1) + Clerical Workers (3) + Guardmen or Watchmen (4) x 3 = 16;

Financing Chief (1) + Cashiers (2) + Booking (3) + Balance Sheet Calculation (4) = 10;

Labour Affairs Chief (1) + Raw Materials Keepers (2) + Product Storage (3) + Consumption Goods Keepers (3) + Transport Workers (6) = 15;

Clinic Doctor (1) + Nurses (4) = 5)

Total of these indirect workers is 120 man days. Hence, the total personnel requirement excluding division masters will be as follows:

Direct Workers	: 508
Indirect Workers	: 120
Total	: 628

Personnel requirement per bale is therefore as shown below.

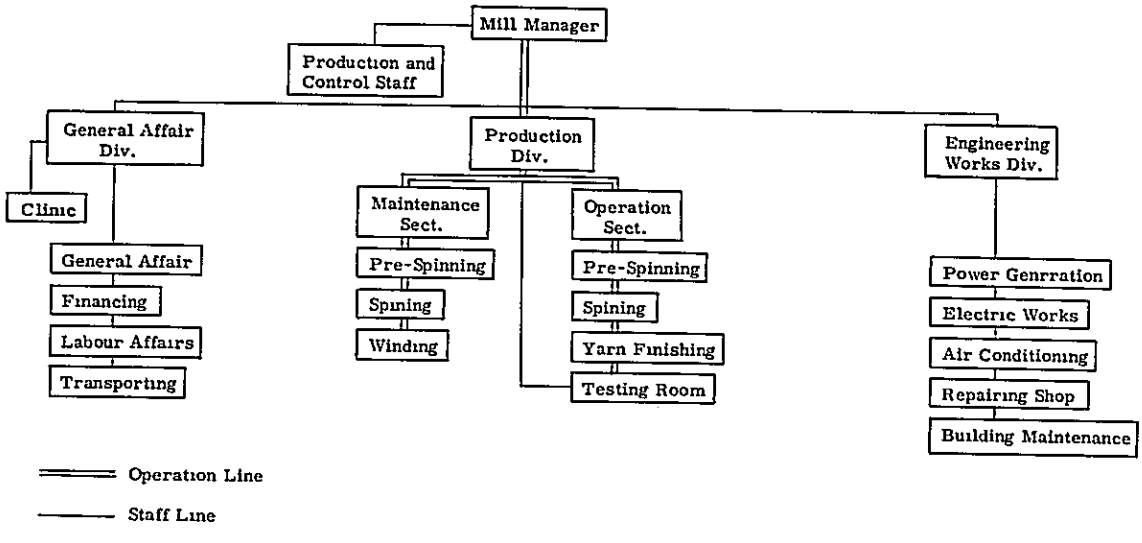
Direct personnel requirement per bale: 508/35	14.5 workers/bale
Total personnel requirement per bale : 628/35	14.5 workers/bale

Personnel requirement per bale of 20'S/- (conversion to 20'S/-) yarns will be as follows.

Direct : 508/99 = 5.1 workers/bale
Total : 628/99 = 6.1 workers/bale

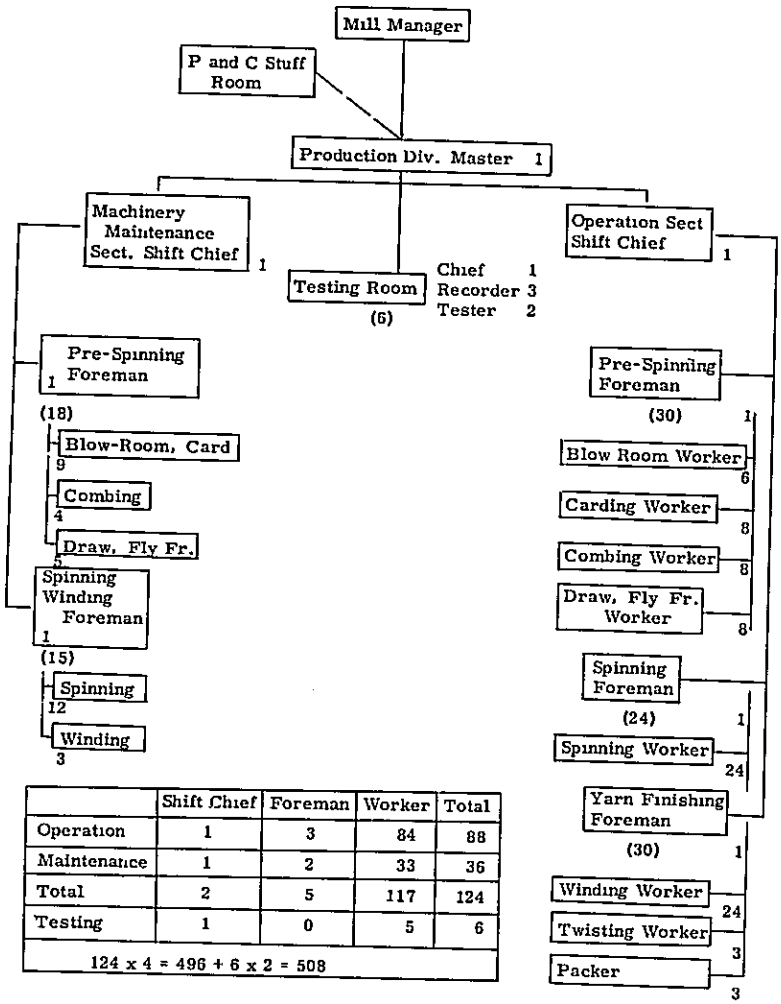
Sheet No. 13

PRODUCTION ORGANIZATION CHART



Sheet No. 14

PERSONNEL LIST for PRODUCTION DIVISION



	Shift Chief	Foreman	Worker	Total
Operation	1	3	84	88
Maintenance	1	2	33	36
Total	2	5	117	124
Testing	1	0	5	6
124 x 4 = 496 + 6 x 2 = 508				

7-5 Economic Justifiability

Assuming that a preferential tariff (PL-480) will be applied to raw cotton, SM Grade (1 - 1/16" class) is planned to be used.

Assuming again that the FOB price of SM grade is $0.32/lb and that the exchange rate stands at Rp 215 = $1.00, the cost of raw cotton will be as follows.

0.32 x 215 = Rp 69.-/lb

When the freight charges and other expenses are added to the above value, the cost of raw cotton will be Rp. 78.-/lb.

As for polyester fibre, its cost can be calculated as follows from its market price in Japan which stands at ¥300.-/kg.

¥300 x 375/360 = Rp 325/kg
Total cost including freight and other expenses - Rp 365/kg - Rp 165/lb

Note: Polyester fibre of 1.5 D x 38 - 40 mm (standard fibre for T/C blend spinning) is planned to be used.

Material requirements for one bale (400 lbs) of T/C blend yarn (65% : 35%), carded yarn and combed yarn is as given below.

Polyester	:	400 x 65% x 110% (waste rate: 10%)	290 lbs
Cotton	:	400 x 35% x 125% (waste rate: 25%)	175 lbs (comber)
Combed yarn	:	400 x 125% = 500 lbs	
Carded yarn	:	400 x 112.5% (waste rate: 12.5%) = 450 lbs	

Accordingly, the material cost for one bale of yarn will be as follows.

T/C Blend Yarn:

Cotton	- Rp 78 x 175 =	Rp 13,650.-
Polyester	- Rp 165 x 290 =	Rp 47,850.-
Total	-	Rp 61,500.-

Combed yarn (Ne. 50/2) : Rp 78 x 500 = Rp 39,000.-
Carded yarn (Ne. 40/-) : Rp 78 x 450 = Rp 35,100.-

The average personnel requirement per bale is 17.8 workers if all employees (628 workers) are required for the daily production of 35 bales as assumed in the preceding item. The personnel requirement per bale varies, however, by the kind of yarn. The personnel requirement for respective kinds of yarn is given below assuming that 115% of the said average value is required for T/C blend yarn and combed yarn and 70% for carded yarn.

T/C Blend yarn	:	17.8 x 115% = 20.5 workers/bale
Combed yarn	:	17.8 x 115% = 20.5 workers/bale
Carded yarn	:	17.8 x 70% = 12 workers/bale

If the monthly wages of employees including foremen and chiefs is Rp 8,000.- (= Rp 320/day/head x 25 days), wages to be paid per bale will be as shown below.

T/C Blend Yarn	:	20.5 x 320 = Rp 6,560.-
Combed Yarn	:	20.5 x 320 = Rp 6,560.-
Carded Yarn	:	12.0 x 300 = Rp 3,600.-

When welfare exrenses and seasonal salaries amounting to 15% of the wages are added, the personal cost per bale turns out to be as follows.

Ne. 45/- T/C Blend Yarn: 6,500 x (1 ±0.15) = Rp 7,475/bale
Ne. 50/2 Combed Yarn : 6,500 x (1 ± 0.15) = Rp 7,475/bale
Ne. 40/- Carded Yarn : 3,600 x (1 + 0.15) = Rp 4,400/bale

Assuming that the daily fuel cost, which occupies a large portion of the cost of secondary material, is Rp 150,000, the per bale cost of secondary materials can be estimated to amount ot Rp 4,300. With the cost of consumable supplies, packing materials and repair work added to this value, the average cost of secondary materials is estimated to average Rp 4,800/bale.

Assuming, again, that the working cost is equivalent to the personnel cost and that the production control cost is equivalent to the sum of personnel cost and overhead expenses, the production cost before depreciation turns out to be as shown in Sheet No. 15 (Manufacturing Cost List).

Note: The above average cost of secondary materials varies by yarn count as follows:

Ne. 45/- T/C Blend Yarn : Rp 4,950.-
Ne. 50/2 Combed Yarn : Rp 4,950.-
Ne. 40/- Carded Yarn : Rp 3,360.-

The cost before depreciation of Ne. 40/- carded yarn incurred at existing mills is approximately Rp. 53,295/bale, whereas the market price of the same yarn is Rp. 85,000/bale. Hence, the operation of the model is economically justifiable even if the interest for depreciation is taken into consideration.

Sheet No. 15

MANUFACTURING COST LIST

Kind of Yarn	Material Cost			Process Cost				Total
	Raw Cotton	Secondary Material	Per Total	Personnel Charge	Mfg. Expense	Over Head Charge	Per Total	
Ne. 45/1 E/C Blend Yarn E=65 C=35	61,500	4,950	66,450	7,475	7,500	15,000	29,975	96,425
Ne. 50/2 Combed Yarn	39,000	4,950	43,950	7,475	7,500	15,000	29,975	73,925
Ne. 40/- Carded Yarn	35,100	3,000	38,100	4,140	3,360	7,500	15,000	53,100

7-6 Estimate of Funds Required for the Model Plant

As shown in Sheet No. 16 (Summary Estimate for Main Machinery/ Equipment), funds required for the machines and equipment to be installed at the model plant can be summarized as follows:

Main Machinery (CIF Djakarta)	: $3,000,000.-
Auxiliary Equipment and Accessories (CIF Djakarta)	: $ 400,000.-
Subtotal	: $3,400,000.-
Air Conditioning Equipment (CIF Djakarta)	: $ 560,000.-
Total	: $3,960,000.-

Note: 1. The above cost is to be paid in foreign currency.

2. Estimate for diesel engine generating equipment is not included in Sheet No. 16 since it is unknown whether the operation of the model plant will resort to a commercial power supply or diesel power generation. If diesel power generators are to be employed, approximately $600,000 will be required for the following equipment.

AC Generator (1,250 KVA) - 4 sets
Diesel Engine - 4 sets

In addition to the above foreign currency requirements, local currency funds will be required to cover the following.

Land and Land Levelling	:	(existing land to be used)
Construction of Plant Buildign :	:	Rp 230,000,000.- (= 11,500 m^2 x Rp 20,000/m^2)
Construction of Appurtenant Buildings	:	Rp 40,000,000.-
Wiring and Piping Works (incl. materials)	:	Rp 15,000,000.-
Total	:	Rp 285,000,000.-

Besides the above amount, approximately Rp 115,000,000.- should be raised in local currenty to cover the installation expenses of machines and equipment.

Hence, total funds required are as shown below.

Foreign Currency Funds:	Approx. US$4,000,000.- =	Rp1,500,000,000.-
Local Currency Funds :	Approx.	Rp 400,000,000.-
Total Funds Required :		Rp1,900,000,000.-

I. Summary Estimate for Main Machineries and Equipments

A) Main Machinery			FOB Japan in U.S. Dollars
1) Blow Room Machinery (TOYODA)			
For Cotton			
a. Blending Group	2 groups	$26,450.00	$ 52,900.00
b. Opening Group	2 "	$18,585.00	$ 37,170.00
c. Lap Forming Group	2 "	$19,340.00	$ 38,680.00
d. Air Filter Group	2 "	$15,450.00	$ 30,900.00
e. Centralized Switch Board Cabinet	2 sets	$ 4,780.00	$ 9,560.00
Sub-total: (For cotton)			$169,210.00
For Polyester			
a. Opening Group	1 group		$ 9,680.00
b. Lap Forming Group	1 "		$ 23,270.00
c. Centralized Switch Board Cabinet	1 set		$ 4,360.00
Sub-total: (For ester)			$ 37,310.00
Total: 1)			$260,520.00
2) Card (TOYODA)			
For Cotton			
a. High Production Card, Model CK7D	16 sets	$10,070.00	$161,120.00
b. Air Filter Group	2 groups	$ 9,280.00	$ 18,560.00
For Polyester			
a. High Production Card, Model CK7D	8 sets	$10,070.00	$ 80,560.00
b. Air Filter Group	1 group		$ 4,730.00
Total: 2)			$264,970.00
3) Comber Unit (TOYODA)			
a. (Pre-comber) High Speed Drawing Frame	2 frames	$ 7,560.00	$ 15,120.00
b. Sliver Lap Former, Model SK3A	2 sets	$11,960.00	$ 23,920.00
c. Air Compressor	1 set		$ 290.00
d. High Production Comber, Model CM8	8 sets	$18,400.00	$147,200.00
Total: 3)			$186,530.00
4) Draw Frame (TOYODA)			
a. High Speed Drawing Frame, Model DK9 (for Grain Adjusting)	2 frames	$ 7,930.00	$ 15,860.00
b. High Speed Drawing Frame, Model DK9 (for E/C)	2 sets (6 frames)	$15,860.00	$ 47,580.00
c. High Speed Drawing Frame, Model DK9 (for Cotton)	2 sets (4 frames)	$15,130.00	$30,260.00
Total: 4)			$ 93,700.00
5) High Speed Simplex Fly Frame, Model FL6 96 spls. (TOYODA)	6 sets	$27,550.00	$165,300.00

6) Ring Spinning Frames, Model RY 432 spls. (TOYODA)	70 sets	$17,910.00	$1,253,700.00
7) High Speed Cone Winder and Doubler (MURATA)			
a. Cone Winder, Model No. 12, 120 drums	13 sets	$10,000.00	$ 130,000.00
b. Doubler, Model No. 23, 100 drums	2 sets	$ 9,160.00	$ 18,320.00
c. Cone Winder after Twisting, Model No. 12, 120 drums	2 sets	$10,000.00	$ 20,000.00
	Total:	7)	$ 168,320.00
8) Ring Twisting Frame, Model RYG 400 spls. (TOYODA)	12 sets	$16,560.00	$ 198,720.00
9) Vacuum Setter Model SBR-4 (NICUM)	1 set		$ 22,000.00
10) Blow Cleaner (LUWA)			
a. Model BS (Blow & Suction Cleaner) for Ring Spinning Machines	1 lot (70 sets)		$ 55,160.00
b. Model B (Blow Cleaner) for Ring Twisting Frame	12 sets	$ 560.00	$ 6,720.00
c. Model B (Blow Cleaner) for Cone Winder	17 sets	$ 560,00	$ 9,520.00
	Total:	10)	$ 71,580.00
(Total for A. FOB Japan			US$2,800,550.00
(CIF Djakarta			US$2,990,000.00)

B) Auxiliary Equipments, Accessories and Spare Parts

1) Spare Parts, Tools and Gauges for Main Machineries	1 lot	$100,000.00
2) Auxiliary Machineries	1 lot	$ 60,000.00
3) Accessories and Miscellaneous Equipments	1 lot	$120,000.00
Total for B. FOB Japan		US$380,000.00
(CIF Djakarta		US$400,000.00)

C) Air Conditioning Equipments and Hydrant & Sprinkler (KENZAISHA)

a. Air Conditioning Plants	1 plant	$269,180.00
b. Refrigeration Plants	1 plant	$120,505.00
c. Humidifying Equipments	1 lot	$ 14,085.00
d. Hydrant and Sprinkler	1 lot	$131,460.00
Total for C. FOB Japan		$535,230.00
(CIF Djakarta		$562,500.00)

Grand Total: FOB Japan	US$3,715,780.00
CIF Djakarta	US$3,952,500.00

7-7 Estimate of Funds Required for the Plants Envisaged by Expansion Program

Assuming that the 30,000 spindle expansion plants to be constructed in the first phase of the expansion program are 100% cottonyyarn plants equipped with about 10,000 spindles for the daily production of 10 bales of Ne. 50/2 combed cotton yarn and with ab ut 20,000 spindles for daily production of Ne. 40/- carded cotton yarn, funds required for each of the two plants, calculated on the basis of Sheet No. 16, would be as shown in Sheet No. 17 (Summary Estimate for 30,000 Spindle Plants for Combed and Carded Yarns). Sheet No. 17 can be summarized as follows:

Main Machinery (FOB Japanese port)	: $2,721,050.-
Auxiliary Equipment and Accessories	: $ 385,000.-
Air Condition Equipment	: $ 280,000.-
Total	: $3,386,050.-

With the cost of power generator equipment, $600,000 added to the above amount, the total foreign currency requirement amounts to $3,986,050 ≒ $3986,000.- or Rp 1,500,000,000.-.

Assuming that the local currency requirement will amount to about Rp 4,000,000.-, a total of Rp 1,900,000,000.- must be secured.

With respect to the 20,000 spindle expansion plant for Ne. 20/- carded cotton yarn production, fund requirements shown in Sheet No. 18 (Summary Estimate for 20,000 Spindle Plant for Carded Cotton Yarn) can be summarized as follows:

Main Machinery	: $1,800,000.-
Auxiliary Equipment and Accessories	: $ 400,000.-
Subtotal	: $2,200,000.-
Power Generation Equipment	: $ 450,000.-
Total	: $2,650,000.- = Rp 1,000,000,000.-

With the local currency requirement of Rp 300,000,000.- added to the above amount, a total of Rp 1,300,000,000.- must be secured.

As for the 50,000 spindle plants to be newly constructed in the second phase of the program, the approximate foreign currency requirements for machines and equipment per plant are as follows:

For production of Ne. 40/- carded yarn (70 bales capacity)	: Approx. $5,250,000.-
For production of Ne. 50/2 combed yarn (doubled yarn)	: Approx. $6,000,000.-

Above estimate does not include the cost for power generation equipment. and expenditure of consulting and technical services.

If two of the three plants are to be operated for carded yarn production and one for combed yarn (doubled yarn) production, the total foreign currency funds required would be as follows:

$5,250,000.- x 2 =	$10,500,000.-
	$ 6,000,000.-
Total	$16,500,000.-

The local currency funds required for the three plants would be as follows.

Local Currency Funds per Plant : Approx. Rp 600,000,000.-
Total Local Currency Requirement: Approx. Rp 1,800,000,000.-

Assuming that the expansion program will be so implemented that the two 30,000 spindle plants are constructed in the first year, one 20,000 spindle expansion plant and one of the three new 50,000 spindle plant (for combed and carded yarns) in the second year, and the remaining two new 50,000 spindle plants (for carded yarn) in the third year, the fund allocations over the three year period will be as tabulated below:

Year	Plant	Foreign Currency ($)	Local Currency (Rp)	Total Rp
Initial Year	30,000 sps.	4,000,000.-	400,000,000.-	1,900,000,000.-
	30,000 sps.	4,000,000.-	400,000,000.-	1,900,000,000.-
	60,000 sps.	8,000,000.-	800,000,000.-	3,800,000,000.-
Second Year	20,000 sps.	2,650,000.-	300,000,000.-	1,300,000,000.-
	50,000 sps.	6,000,000.-	600,000,000.-	2,850,000,000.-
	70,000 sps.	8,650,000.-	900,000,000.-	4,150,000,000.-
Third Year	50,000 sps.	5,250,000.-	600,000,000.-	2,568,750,000.-
	50,000 sps.	5,250,000.-	600,000,000.-	2,568,750,000.-
	100,000 sps.	10,550,000.-	1,200,000,000.-	5,137,500,000.-
Total	230,000 sps.	27,150,000.-	2,900,000,000.-	13,087,500,000.-

It should be added that the construction of two 30,000 spindle expansion plants and one 20,000 spindle expansion plant to be carried out in the first and second year respectively should be accompanied by the rehabilitation of the respective existing mills. Approximately $600,000 should therefore be included in the estimate.

Further, the spinning rehabilitation of the Texin mill should also be conducted and for this purpose, an amount of about $800,000 should be appropriated.

Sheet No. 17

Summary Estimate for 30,000 Spindles Plants for Combed and Carded Cotton Yarn MFG.

(Ne. 50/2 Combed Yarn, 10 bales/day, Ne. 40/ Carded Yarn 27.5 bales/day capacity)

(A) Main Machinery

1) Blow Room Machinery Range, Consist of:- 3-Blending Group 3-Opening Group 3-Lap Forming Group, Lap Auto-Doffer Type 3-Air Filter Group 3-Centralized Switch Board Cabinet	3 sets	@84,600	$ 253,800.00
2) High Production Card, CK7D Type	24 sets	@10,000	$ 240,000.00
Air Compressor Unit	3 sets	@ 9,200	$ 27,600.00
3) Combing Unit:-			
Pre-Drawing Frame, 1H x 2D x 1 Passage	1 set		$ 7,600.00
Sliver Lap Machine	1 set		$ 12,000.00
High Production Comber	6 sets	@18,500	$ 111,000.00
		per total	$ 130,600.00
4) Drawing Frame, High Speed Type, 1H x 2D x 2 passage	5 sets	@15,850	$ 79,250.00
5) High Speed Simplex Fly Frame 96 spe	8 sets	@27,500	$ 220,000.00
6) Ring Spinning Frame, 432 spindles 70 spindles gauge, 205 lift	70 sets	@18,000	$1,260,000.00
		sub total	$2,211,250.00

(B) Yarn Finishing Section

1) Quick Traverse Cone Winder, 120 drums, Cone from Ring Bobbins	14 sets	@10,000	$ 140,000.00
2) High Speed Doubler, 100 drums, Cone from Cone	2 sets	@ 9,150	$ 18,300.00
3) Ring Twisting Frame, 400 spindles, 25 spindles gauge, 230 lift	15 sets	@16,500	$ 247,500.00
Re-wind Cone Winder, 120 drums	2 sets	@10,000	$ 30,000.00
		sub total	$ 435,800.00

(C) Blow Cleaner Equipment

Suction & Blow Type Pneumatic Blow Cleaner	
for 70 sets of Ring Spinning frames	$ 55,000.00
for Ring Twisting Frame	$ 8,400.00
for Winding Machine	$ 10,600.00
sub total	$ 74,000.00
Total price (FOB Japanese port)	$2,721,050.00
CIF Djakarta	$2,915,000.00

(D) Auxiliary Equipment, Accessories for the above Machinery:-

Spare Parts for Main Machinery

Auxiliary Machineries, including Testing Machine

Accessories, etc., about $ 385,000.00

(E) Air Conditioning Equipment for the above,

but carrier system only(water coaling system) about $ 280,000.00

Grand Total FOB Price	$3,386,050.00
CIF Djakarta	$3,623,000.00

Sheet No. 18

Summary Estimate for 20,000 spindles plant for Cotton Carded Yarn, Ne. 20/- (60 bales/day of 24 powers capacity)

1. Blow Room Machinery Range	2 sets & 4 pickers	@85,000	$	170,000.00
2. High Speed Flat Card, CM-300 Type	48 sets	@ 8,000	$	384,000.00
3. High Speed Drawing Frame 1H x 2D x 2 passage	6 sets	@15,800	$	94,800.00
4. High Speed Simplex Fly Frame 124 sps.	6 sets	@19,000	$	114,000.00
5. Ring Spinning Frame, 432 spindles, 75 spindles gauge, 203 lift	50 sets	@17,500	$	875,000.00
		sub total		$1,637,800.00
6. High Speed Cone Winder, Cone from bobbin, 120 drums	10 sets	@10,000	$	10,000.00
7. Doubler Winder, 100 D	2 sets	@ 9,150	$	18,300.00
		sub total	$	118,300.00
8. Blow Cleaner Equipment				
for 50 ring frame			$	36,000.00
for winder			$	6,800.00
			$	42,800.00
		Total price (FOB)		$1,798,900.00
		CIF Djakarta		$1,906,000.00
9. Auxiliary Equipment, Accessories for the above			$	210,000.00
10. Air Conditioning Equipment, water cool carrier system			$	180,000.00
		Grand total (FOB)		$2,188,900.00
		(CIF Djakarta		$2,320,000.00)

CHAPTER VIII PROPOSALS FOR IMPROVEMENT OF INDONESIAN SPINNING INDUSTRY

As already described in Chapter III, the productivity of Indonesia's spinning industry is still low and the yarn quality is in need of improvement even though there are a few exceptional cases. The current low productivity cannot be improved only by the expansion of mills and the introduction of modern facilities. Such expansion efforts must be accompanied by the structural improvement of the whole industry.

It deserves mention that a number of joint venture companies have been established recently with the capital participation of textile enterprises of advanced countries including Japan and European countries, and some of them have already started full-scale operation.

Though the laboru system adopted by these joint venture companies is the one prevalent in Indonesia, their production is controlled under a modern management system so that they are on a higher level than Indonesian enterprises in both production capacity and quality.

It is to be noted that competition with the joint venure companies in price, quality and volume will increase the pressure of imports from newly developed textile producing countries which are already supplying the Indonesian market with fabrics of stable quality at low prices.

In view of the heavy pressure caused by imported textile products and the expected competition with joint venture companies, it is imperative that improvement be made, without delay, to the production and management system of the Indonesian textile industry. Such improvement is particularly necessary for the spinning industry in which a huge capital investment has been made.

In the spinning industry, yarns are produced by machines, while workers control the operation of machines and the flow of semi-finished products from one production stage to another. Productivity of the spinning industry therefore depends largely on labour productivity and the control of machine operation. Accordingly, the following measures must be taken for the structural improvement of the spinning industry.

1. Improvement of labour productivity
2. Elevation of the quality of workers and their proper distribution
3. Rational control of mill operation
4. Charging the maintenance staff with the rational maintenance and control of machines

The labour productivity observed at a spinning mill in the Bandung district is as described below. (Spinning industry in the Bandung district is known to have the highest productivity in whole Indonesia.)

Number of spindles and production capacity of the said mill are as follows.

No. of Spindles : Approx. 30,000
Production Capacity: Approx. 87 bales/day (24 hrs) of Ne. 20/- yarn

Personnel requirement of this mill is as follows:

Operators	:	616
Maintenance Staff (Power, Air-condition, etc.)	:	66
Controllers (Foremen, Shift Chiefs, etc.)	:	77
Administration Staff	:	153
Total	:	906

When the total personnel requirement is divided into -

693 Direct Workers = Operators and Controllers
213 Indirect Workers = Maintenance and Administration Staff,

the personnel requirement per bale turns out to be as follows:

Direct Workers	: 693/87	8 workers/bale
Entire Workers	: 906/87	10.4 workers/bale

The ratio of direct workers to indirect workers is 76.5 : 23.5.

At the model plant introduced in Chapter VII, a daily production of 99 bales (Conversion to 20/- count) is assured by the same number of spindles. Personnel requirement of the model plant is as follows:

Direct Workers	: 508	
Indirect Workers	: 120	
Entire Workers	: 628	
Per bale requirement	- Direct Workers :	508/99 = 5.1
	Entire Workers :	628/99 = 6.4

Note: The model plant is intended to be operated under a combined spinning system for T/C blend yarn, combed yarn and doubled yarn. Its personnel requirement is larger than if it is operated only for carded yarn production.

When compared with the above personnel requirement of the model plant, the number of direct workers employed by the mill in Bandung district is larger by about 60% and that of the entire work force by about 64%. Further, the direct workers and indirect workers required by the model plant are in the ratio of 81 : 19, which indicates that the number of indirect workers employed by the milliin Bandung is extremely large.

In Japan, the rate of indirect workers does not exceed the 12% level as shown in Sheet No. 19 (No. of Employees by Plant Scale).

The percentage of indirect workers should be held within 20% of entire work force unless there exist some special conditions.

Per bale personnel requirement in Japan is shown in Sheet No. 20 (Employees per Bale by Plant Scale) and Sheet No. 21 (Employees per Bale in Japan).

In order to ensure a proper distribution of workers, account must be taken of their skills in addition to the performance of respective machines.

Sheet No. 19

Employees by Plant Scale

Plant Scale	Per Plant	Per 10000 sps.	Section Percentage	
			Direct	Indirect
10000 & less	93	151	87.4	12.6
10000/20000 sps.	177	129	86.8	13.2
20000/30000	354	142	87.9	12.1
30000/40000	389	114	87.9	12.1
40000/50000	488	109	87.6	12.4
50000/60000	590	108	87.0	13.0
60000/70000	602	95	88.6	11.4
70000/80000	728	97	87.2	12.8

Sheet No. 20

Employees per Bale by Plant Scale

Plant Sczle	Employee/Bale (Ne. 20/-)		Actual Spuncount (Average)
	Direct	Entire	
10000 & less	4.63	5.31	16.32/-
10000/20000	5.37	6.22	20.92/-
20000/30000	5.51	6.28	22.59/-
30000/40000	4.63	5.28	24.74/-
40000/50000	5.57	6.38	30.32/-
50000/60000	5.30	6.12	28.45/-
60000/70000	5.14	5.79	33.43/-
70000/80000	5.44	6.28	46.02/-

Sheet No. 21

Employees per Bale in Japan

Year	Employees (average)			Per	Per bale		
	Male	Female	Total	10,000 sps.	Direct	Entire	Converted to 20/-
1967	16,036	72,617	88,653	98.8	5.53	6.37	4.52
1968	18,049	74,007	92,054	97.0	5.43	6.24	4.37
1969	18,967	72,737	91,704	94.7	5.46	6.24	4,28

The prevailing social restriction on female factory workers makes it difficult to expect a rapid increase in the number of female workers. It is to be noted, however, workers employed at spinning mills are required to watch and control machine operation rather to perform any technical work. Most of the work required at spinning mills can therefore be satisfactorily performed by female workers, and female workers are much more efficient than male workers when they are trained. It may be added that female workers perform the blow room and carding work in Japan.

In order to improve the quality of workers, they must be given systematic vocational and technical training. The skill of workers can be improved in a short period (about three months) if they are trained by the T. W. I. (training within industry) system. It is therefore recommended that foremen of respective sections be trained by experts of the T. W. I. system so that they may be able to improve the skill of workers in their respective sections.

The standard working manual which is used for such training should be prepared so as to meet the condition of respective stages of production.

Standards for the vocational aptitude test must be established so that workers may be distributed properly by their level of knowledge, motile ability, tactile ability and physical features. In the ring spinning process, for instance, workers with good motile ability should be assigned to bobbin doffing work and those with excellent tactile ability to yarn tying work. For this purpose, each job must be analyzed to designate its scope. The analysis of each job, it must be added, is an important factor in quality control.

Another important thing for the structural improvement of the spinning industry is to rationalize the operation control. Needless to say, the operation of Indonesian spinning mills is controlled by the operation instructions which are issued to attain a given production target. It appears, however, that little attention is paid to maintaining the planned level of production and quality by constantly comparing the production with the target value and controlling the quantity and quality by statistical methods. The statistical method is applied to graph production factors in order to obtain the significance of any errors detected as a result of analysis of the graphed factors. The correlation between factors and results is clarified, and the effects produced by these factors are to be reviewed so that the conclusion derived therefrom will be generalized and compared with the actual production to correct errors in the mill operation. This operation control leads not only to the assurance of quality but also to a reduction in production cost.

Like any other profit oriented enterprise, a spinning enterprise aims at turning out products of uniform quality at a lowest possible cost. This calls for efficient labour management, improvement of labour productivity, assurance of uniform quality through quality control, and effective financial control (formulation of actual cost and standard cost, and budgetary control).

While these control measures are very important, a thoroughgoing control of the machines is also of infinite importance since machines play the leading role in a spinning factory.

The operation of the spinning mills is to be carried out by separating the function of machine operation from that of machine maintenance. The Japanese

spinning industry is characteristic in that it has an established operation system under which two groups of workers, one charged with the responsibility to maintain the yarn quality and operate machines, the other responsible for the perfect maintenance of machines, work in close co-operation with each other. It may be said the high technical level achieved by the Japanese spinning industry is in effect due to this operation system.

The team noted that a clear distinction between the operation of machines and their maintenance has not yet been established in Indonesia. It was noted that planned maintenance is not conducted satisfactorily when compared to breakdown maintenance. A combination of planned maintenance and corrective maintenance is essential for the satisfactory maintenance of machines.

It is recommended that a system be established under which two groups of workers, one undertaking machine operation, the other maintenance, will co-operate with each other for effective mill operation. The production division shown in the production organization chart presented in Chapter VII is therefore divided into the maintenance section and operation section. In view of the heavy load imposed on machines by the continuous operation under the existing 3-shift 4-group system, adoption of the production organization presented in Chapter VII is considered to be an urgent necessity.

In the said organization chart, the production and control staff are placed under the direct control of the mill manager. The team noted that the function of production and control is performed by sub-managers even at mills belonging to P.N. Sandung Group. The function and responsibility of production and control staff must be made clear. The team is of the opinion that an independent section should be established for such jobs as statistical studies, surveys, analysis, formulation of production plan, control of daily production level, quality control, maintenance control, and cost control. Training on cost control is considered essential since the control activity of most mills does not seem to cover cost control. Strict cost control by each section coupled by the production rationalization for quality improvement is the only way to compete with foreign spinning enterprises.

It is advisable that the head office of spinning mills formulate a long-range production plan based on its market survey and analysis, It must be noted that the successful management of an enterprise calls for a long-range production plan prepared on the basis of an accurate demand forecast, and not a short-term production plan which only meets orders received.

Technical training on new machines is naturally essential for the modern production control introduced above, but what counts more for the structural improvement of Indonesian spinning industry is the management techniques. Introduction of modern management techniques is therefore recommended.

With respect to the competition with joint venture companies which will probably to take place in the future, it must be pointed out that whichever party is weaker in competitive power will inevitably be defeated by the other party. If structural improvement is promoted and the competitive power of Indonesian textile enterprises becomes balanced with that of joint ventures in quality, quantity and price, then a fair competition on the Indonesian textile market can be expected provided that there will occur no meaningless or unfair competition. Furthermore, this will necessarily lead to the distribution of enterprises by district and kind of

product ensuring the coexistence of Indonesian enterprises with joint venture companies. Such a coexistence will serve to elevate the level of the Indonesian textile industry.

Structural improvement must therefore be promoted to have the way for such coexistence and foster international competitive power. Hence, it is recommended that a definite policy be established to provide textile enterprises with the technical guidance necessary to enhance their structural improvement.

Early materialization of the spinning expansion program is desirable since it will undoubtedly contribute to the development of Indonesian industries and the betterment of the livelihood of her people. However, its implementation calls for a huge capital investment which will entail a substantial decrease in precious foreign currency reserve. To make this huge investment truly worthwhile, it is essential to promote the structural and technical improvement of these spinning enterprises. With the demand for synthetic fibre fabrics and blended fabrics showing a steady upward trend, it cannot be expected that the the introduction of modern facilities will prove fruitful unless it is accompanied by improvements in techniques.

The program aims primarily at expanding the supply of varns, but the consolidation of weaving and knitting industry can not be ignored since it is indispensable for the overall development of textile industry. Since individual weaving and knitting enterprises are small in scale and their competitive power is small, spinning enterprises should play the role of reorganizing them into groups of enterprises co-operating with each other.

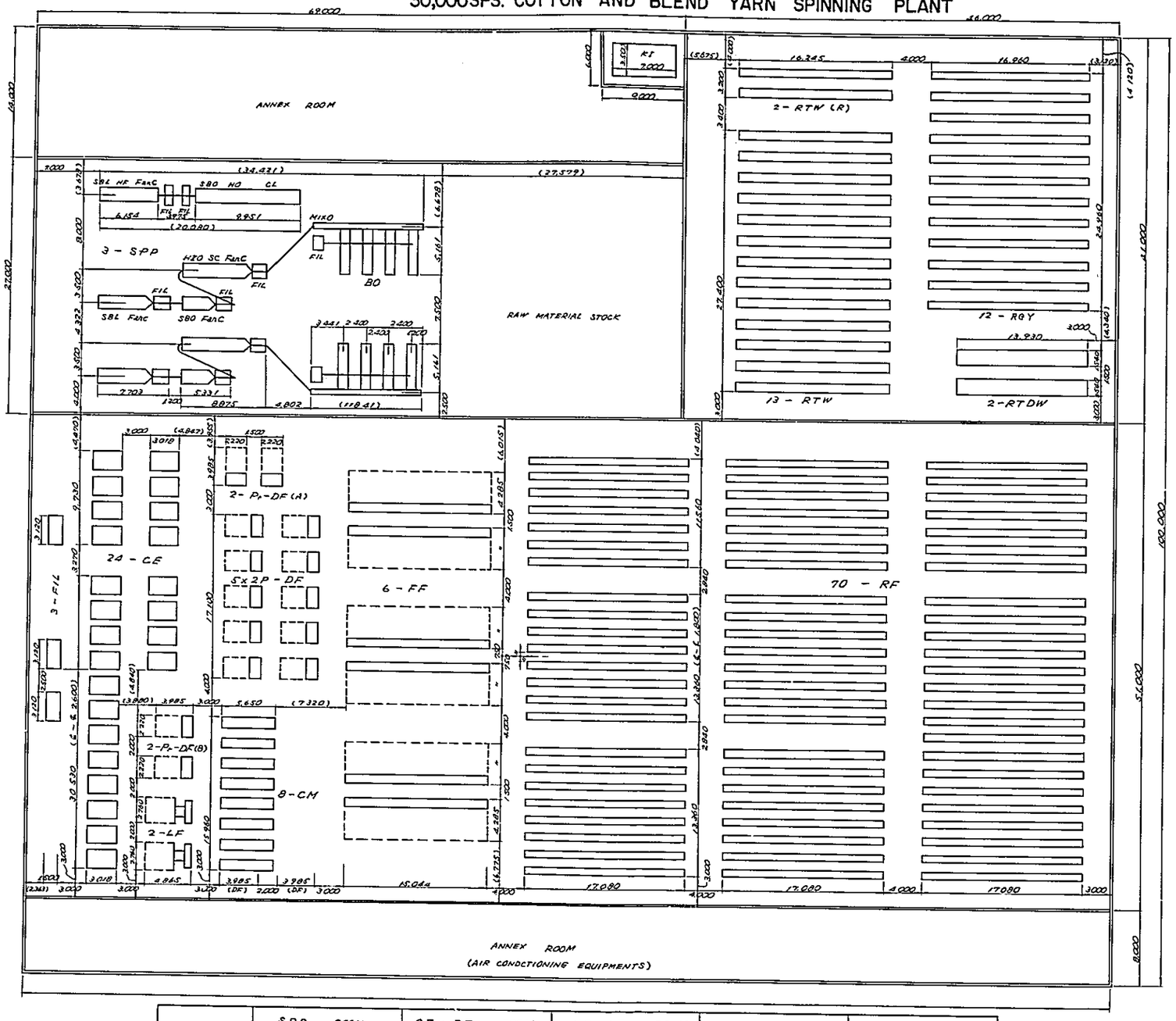
An integrated plan intended solely for the expansion of the spinning industry is undoubtedly justifiable in itself. However, if the spinning industry is to foster the weaving industry by district, formulation of a more comprehensive plan would be indispensable. Spinning industry should be charged with the responsibility to promote the overall development of Indonesia's textile industry.

The spinning expansion program presented in this report was prepared from such a point of view.

Expansion planning was centered on the model plant of this repott, but no detailed description was given for all six plants due to the limited survey period and lack of necessary data. It is hoped that there will soon be an opportunity to discuss this with competent Indonesian authorities and to conduct a feasibility study according to their requirements, for submission of a detailed design and planning for all six plants.

The team is aware that this report might be found to be rather abstract and not completely satisfactory. The team would therefore be more than pleased if this report would serve only as a guideline for the textile administration of the Indonesian Government.

MACHINERY LAYOUT CHART
FOR
30,000SPS. COTTON AND BLEND YARN SPINNING PLANT



FLOOR SPACE	SPP ROOM	CE ~ RF ROOM	WD TP ROOM	ANNEX ROOM	TOTAL
	1.863	5.865	1.886	1.886	11.500

MACHINERY	QTY	MAKER	REMARKS
SPP	C 2 ES 1	TOYODA	
CE	ES 8 C 16	"	CANS AIR FILTER ATTACHED 20"D
P_1 - DF	2×1P	"	2" 20"D
LF	2	"	DOUBLING 18 20"D
CM	8	"	20"D
P_1 - DE	2×1P	"	2" 20"D
DF	5×2P	"	2" 20"D
FF	6	"	96 SP
RF	70	"	432 SP 7030 44R (LUWA CL)
WD	13	MURATA	120" 6"Tr.
DW	2	"	100"
RGY	12	TOYODA	400 SP 75 SG
WD (R)	2	MURATA	120" 6"Tr.
RI (STEAM TWIST SETTER)	1	NIKKU	

1. PRODUCTION / DAY OF 3 SHIFTS (24 HRS)

POLYESTER/COTTON BLEND YARN, No 45/1

14,256 SPS. 6,800 LBS

COTTON CARDED YARN, No 20/1

8,308 SPS 4,200 LBS

COTTON COMBED YARN, No 40/2 ~ 60/2

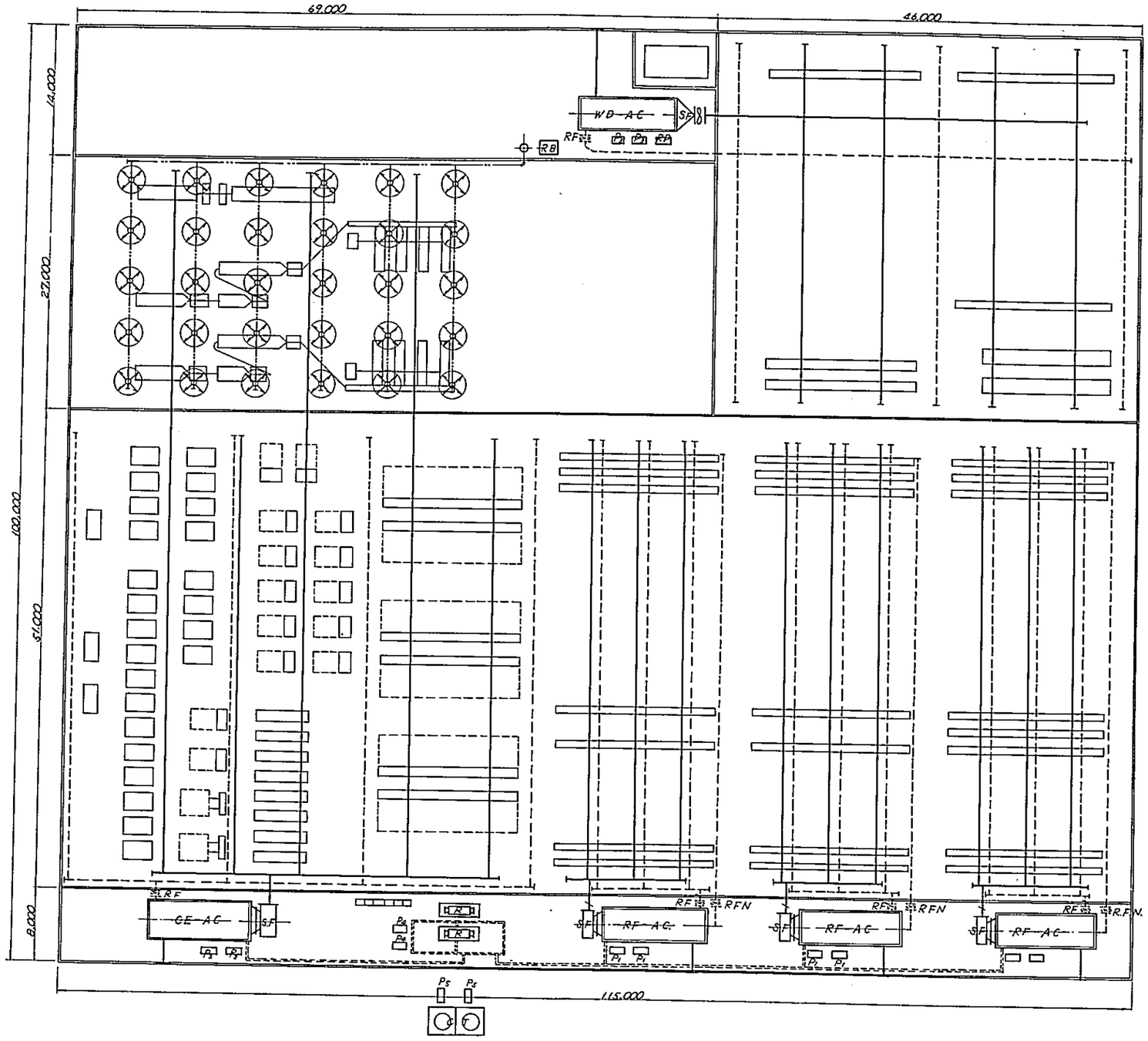
7,776 SPS 3,000 LBS.

2. SHEET No.10 PROCESS CHART FOR PROCESSING ATTACHED

3. SHEET No 9 (A,B,C) MACHINERY CALCULATION DATA ATTACHED

SUBJECT	COTTON AND BLEND YARN SPINNING MACHINERY LAYOUT
DRAWING NO (DATE)	TEXCO/JCI-SP'G EXP-72-M-1 (10/5/70)
SCALE	1/300
DRAWING BY	TEXCO, TOKYO.

AIR CONDITIONING EQUIPMENT LINING



BLOWING DUCT

RETURN DUCT (UNDER GROUND)

HUMIDIFING PIPING

WEATER RETURN PIT

PLANT LAYOUT OF INTEGRATED TEXTILE FACTORY