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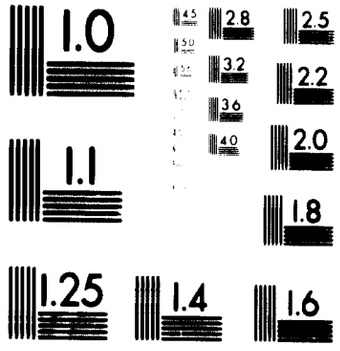

INDONESIAN TEXTILE INDUSTRY

EVALUATION AND RECOMMENDATIONS RELATED TO MANUFACTURING FACILITIES AND PROBLEMS

01387

By

KURT SALMON ASSOCIATES, INC.
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WASHINGTON, D. C.

PREPARED FOR

AGENCY FOR INTERNATIONAL DEVELOPMENT 2250

CONTRACT NO. AID/ea-24
PROJECT #497-11-990-000

MARCH 2, 1968

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March 2, 1968

Mr. Halsey L. Beemer
Private Investment and Industry Officer
Agency for International Development
American Embassy
Djakarta, Indonesia

Dear Mr. Beemer:

We are herewith submitting our report entitled - INDONESIAN TEXTILE INDUSTRY - EVALUATION AND RECOMMENDATIONS RELATED TO MANUFACTURING FACILITIES AND PROBLEMS. This report was prepared under Contract No. AID/ea-24 - Project #497-11-990-000.

As provided in the contract, ten (10) copies of the report are being forwarded to Indonesia. As per your request, all ten (10) copies are being submitted through your office.

This is a companion report to one being submitted by Dr. Leonard Doyle concerned with the economic structure of the industry. As such, we have intentionally refrained from including certain statistical data provided for our reference, which has been included in his report.

We feel we have covered the provisions of the contract, and, indeed in many instances expanded our remarks to pertinent related subjects. This seemed justified in order that the report might be of the greatest benefit for further improvement in the industry.

Special attention is requested to the opening remarks in Section II, for any individuals who may use this report.

It was, indeed, a pleasure to perform this work. The cooperation and assistance provided by members of your agency, the Ministry of Textiles and various personnel of the enterprises, both government and private, was excellent and greatly appreciated. We regret it is impossible to again express our thanks to each individual in this regard.

SINCE 1935 KSA
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Member: Association of Consulting Management Engineers, Inc.

Mr. Halsey L. Beemer
Private Investment and Industry Officer
Agency for International Development

March 2, 1968

We hope that the report, properly used, will be beneficial to the further development of the Indonesian Textile Industry.

Sincerely,

Gerald L. Turbyfill

Gerald L. Turbyfill

Al Batts

Al Batts

KURT SALMON ASSOCIATES, INC.
Washington, D. C.

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Scope of Assignment

Upon arrival of the KSA team in Indonesia, the question of the contractual agreement regarding the Statement of Work arose. Since the Indonesian AID officials had not seen the actual contract and statement of work, a comparison indicated the contract did not include all of the detail which had been submitted by the AID officials to Washington. The complete original draft submitted by AID Indonesia to Washington is repeated below with the contract as written included in quotation marks "_____" and parenthesis ( ) added for further clarification, during the discussion in the initial stages of the Indonesian stay.

Item 21 of PIO/T 497-11-990-000-3-80033

In association with Dr. Leonard A. Doyle and in cooperation with the Ministry of Textiles and Handicrafts, the contractor representatives will make a technical analysis of the present position and future problems and requirements of the Indonesian textile industry. The industry has three parts: power machine sector, handloom sector, and the Batik sector. The major emphasis will be on the power machine sector, which is almost entirely located in Java, the heaviest concentration being in West Java, followed by Central Java and East Java.

1. The main effort will be to determine the location and nature of the major bottlenecks to full production (primarily, spinning for KSA team, weaving is economic problem). This will involve defining full capacity in terms of product mix or input, analyzing percentage and nature of capacity, not presently usable because of mechanical breakdowns, securing general management estimates of requirements to restore to full capacity, spare parts inventory and country source for full operation.

2. Analysis of requirements for raw material (cotton) and operating supplies . (Dyes, chemicals, bleaches - minor consideration for KSA team.)

3. Analysis of labor problems as they may affect rate of utilization, particularly second and third shift operation. (Dr. Doyle stated a minor consideration for KSA team.)

4. Analysis of transport problems and warehouse problems. (Dr. Doyle stated minor consideration for KSA team.)

In conduct of this survey, the contractor representatives will, in association with Dr. Doyle:

"1. Inspect selected spinning mills and advise concerning best quality mix yarn if P. L. 480 cotton is used, and possibilities of mixing staple fiber to improve quality. Present output is nearly all 20's.

2. Advise on steps needed to get remaining 12,500 spindles in operation in a new 30,000 spindle plant of English origin.

3. Advise on possible quality (product) mix of best existing large weaving mills of approximately 200 looms. (To what extent specialization?)

4. Advise on problems of consolidating small weave plants of 50-100 looms into larger units.

5. Advise on technical problems of finishing equipment required in relation to findings re 1 to 4. (Requirements to meet the production of the spinning and weaving operations as the KSA team visualizes such operations at some time in the future)."

The contractor representatives will be accompanied by Professor Doyle and representative of Ministry of Textiles and Handicrafts who will interpret when necessary.

The textile industry has over 90 percent of its plants in Java, of which approximately 50 percent are in West Java centered in the Bandung region, 30 percent in Central Java in three main centers, 20 percent in East Java in and around Surabaja. The contractor representatives will spend one week with Professor Doyle in each of these geographic areas of Java. After the first survey, the contractor representatives probably will want to separate and work on most important problems which were disclosed by the first survey.

A trip be made to Sumatra to review the problems there, as time permits.

End of Original Draft

The above completes the statement of work as originally submitted. Dr. Doyle made the following capsule observations regarding the most important items of the report.

"The recommendations should be made on:

1. Spinning for the short run - 1 year

2. All textiles for the long run

3. What level of quality - relative - can be expected from the industry for the long run

4. The needs of the Technical Institute
   a. Additional equipment
   b. Technical personnel."

In conversation with Mr. H. L. Beemer and Dr. Doyle, the KSA team agreed to take the complete request, in conjunction with the clarification expressed, under consideration in the field work and the report. The contractual Statement of Work was to receive priority consideration, but in the interest of the overall study all of the original points as well as any area

which we felt might add to the improvements and future benefit of the Indonesian Textile Industry would be covered in as much detail as time allowed.

Regarding the time involved, the original request was written under the assumption that 6 weeks would be spent in Indonesia by the KSA team, while the final contract only allowed for 4 weeks. Again in conversation with Mr. Beemer and Dr. Doyle, it was mutually agreed the time should be spent, based on our judgment, in such a manner to allow the best coverage of the most important areas as they appeared after the initial plant visits.

Summary of Assignment and Recommendations

A. General

Initially, it is emphasized that the observations and recommendations presented in this report are made in a manner consistent with our normal procedures. As such, they are our best evaluation, as individuals, representing Kurt Salmon Associates, of the most pressing problems facing the industry. Any other individual using this report should realize the time limitation under which the analysis and report were made. As such, the report represents the KSA team's best interpretation of the observations and information at their disposal, and cannot be considered infallible in every detail. As written, it does not necessarily have the approval of content in part or in total, by the United States or Indonesian governments or any of their respective agencies.

It may appear that a major portion of the report consists of critical observations of the industry. Certainly any evaluation of the problems must consider the areas which need improvement, rather than those where problems do not exist. Therefore, the report, while often critical, purposely does not deal in those areas where praise is justified, as this was not considered to be the purpose of the report. Every criticism is made in the hope that it will be taken as constructive, and will in fact, help result in improvement in the industry and economic welfare of the country.

As can be gathered in the content of the report, the industry and the individuals responsible for its manufacturing operations are working under many handicaps. These result from past omissions as well as present handicaps from policies and procedures at the manufacturing and governmental levels. It must be understood that many of the problems are not within the realm of control or correction at the manufacturing level.

The writers apologize for being repetitious at some points in the report. It seemed necessary due to the inter-dependence of many items. Emphasis and clarification also dictated this in many instances.

B. Recommendations for Immediate Action

1. Based on our experience, there are many areas of potential improvement in the Indonesian Textile Industry. Recommendations to that end have been made throughout the report. We are sure there is much the present personnel in the industry can do toward making such improvements, but we are just as confident it would be more timely to provide advisers to the industry. Such advisers, by drawing on past experience, could undoubtedly assist in improving many areas of the operation much faster than even very competent individuals who themselves would have to learn through trial and error.

   In the following discussion our recommendations are based on the minimum requirements we foresee to start such an assistance program. The continuation or extension of any program beyond this should of course depend on the results of this initial recommendation and indicated potential of further assistance.

   A summary tabulation of such assistance follows:

Industry Segment	Type Adviser	Minimum No. of Advisers	Time in Months Minimum	Time in Months Desired
Spinning	Technical Specialists	4	6	9
Spinning	Gen. Administrative/ Tech.	2	6	12
Weaving	Gen. Adminstr./Tech	1	3	?
Finishing	Gen. Adminstr./Tech	1	3	?
*I. T. T.	Educator	1	6	12
	Research	1	6	12

* Discussion of recommendations for I. T. T. advisers is included in Section V-E-1.

We have made no attempt to estimate what the cost of such a program of assistance would be. We could not, of course, foresee all of the problems in selecting and placing such a group of advisers, or how it would be financed. As consultants, Kurt Salmon Associates would be happy to assist in such a talent search, or be considered for staffing any of the positions for which we have men especially qualified.

The most outstanding need of the Indonesian textile industry is to improve the quality of its production on present equipment. This often involves improvement in the condition of the equipment. In a few instances updating or adding equipment is indicated.

The major causes of the level of quality have been discussed at length in Sections V-B, V-C, and V-D. In fact, this subject is a major part of the content of all of Section V and indeed, the entire report. Specific recommendations on overcoming some of the problems have been included following the definition and discussion of the problem in the body of the report.

In addition to the technical aspects of the problem at the specific process, certain broader, more general implications affecting quality regarding Labor Utilization, Individual Incentives, Employee Relations, are discussed in V-A. Additional general problems affecting quality are covered in Section V, by segments of the industry regarding spare parts, training, equipment, etc. The effect which each segment of the industry has on the subsequent segment is discussed in Section V-C-1-c, Section V-C-2, and V-D-2. The basic dependence of the entire industry on proper use of cotton is discussed in Section IV, Section V-B-1-a, and Section V-D-2.

2. Spinning:

Therefore, the most apparent need toward improving quality in the industry is needed is the proper selection and use of cotton, followed by (preferably in conjunction with) improved technical knowledge and skills in the spinning plants. Recommendations in Section IV and Section V-B-1-a, if followed, should be the first step. This involves the proper identification and use of cotton. The second step involves improvement of technical skills "on the floor," that is of the employees responsible for maintenance and operation of the machines. We feel this can be accomplished best and cheapest by personnel from the machinery manufacturers. The specific recommendation is covered in Section V-B-3. Probable minimum requirements here would involve one technician for opening-carding, and one technician for drawing through winding for Japanese equipment, the same for British equipment, or a total of 4 technicians. Minimum time would be 6 months (9 months would be preferable). This time might consist of 2 months of basic instruction in one plant and 4 months assistance in individual plants. The opening-carding area is indicated to be the most critical of the two.

In conjunction with this, and the effectiveness would be greatly impaired if the preceding recommendation were not followed, we recommend the use of advisers in the combined areas of administration and general technical assistance at the manufacturing level. Such an adviser would be concerned with all of the general technical aspects of production and also with other considerations discussed throughout the report, too numerous to repeat here. Although three such advisers would be desirable, two would be the bare minimum and on that basis would allow only 2 to 3 days per month per plant, assuming all plants participated. Incidentally, only

plants sincerely interested in participating in such a program should be considered. A minimum of 6 months would be required to realize significant results, while planning on the basis of one year would be more realistic. Depending upon the depth to which such an adviser became involved, considerable amounts of local assistance may be indicated and no doubt a more economical approach.

3. Weaving

Due to the fragmentation of the industry, and the origin of the diverse equipment, it seems unlikely basic technical assistance could be assembled which could properly cover a significant segment of the industry. Furthermore, the true need for real technical assistance, because of the extremely poor workmanship involved at the looms, could not be determined.

Our recommendation here for initial action is therefore more conservative than those made in spinning. In order to allow some time for improvement in yarn quality before an extensive program is launched in the weaving area, some work in a restricted area is indicated. The most important immediate need here is in warp preparation. The desired results would be to study the problem, work with the plants, and determine what results can be expected from the various types of present equipment. Also evaluate whether such results can be considered sufficient to meet the present needs of the industry. In conjunction with this, the adviser should make further analysis of the real need in weaving. Is it technical, training, or just plain workmanship? Therefore such an adviser should have very broad experience in warp preparation, and have some experience in weaving.

We would recommend such a program be planned to last at least three months initially, then reconsidered, based on results, if indicated, additional plans made for further coverage of the industry. Such closer study should give a better indication of the needs of this segment of the industry.

Such a program, with one adviser, should be started immediately, probably in the Bandung area, restricted to 6 or 7 plants of different sizes and having various types of warp preparation equipment. The Induk should be one of the plants, but sincere desire for participation should be the only basis a plant is included.

4. Finishing

Basically, the same approach is recommended here as that recommended in weaving. Rather than being especially competent in one specific area of finishing, this adviser should have broad general knowledge. The work should be confined to 6 or 8 enterprises and extend over a minimum of a 3-month period. In this instance the adviser should assist the managers in current technical problems as well as formulate recommendations for improving the operations regarding upgrading or addition of machinery to meet the present minimum needs of the industry. Depending upon the success of such an abbreviated program and the resulting recommendations, plans should at that time be formulated to extend the program to other areas.

Again such a program should be started in the Bandung area in plants having a sincere desire to participate in the program.

4. General

There are many subjects discussed throughout the report, which indicate immediate needs for action, either with or without help from advisers. To repeat these in the summary would result in duplication. Some of these refer to broad policy decisions and reference to the specific subjects is recommended. Especially noteworthy in this respect are:

Section V-A-1 - Capital Requirements

Section V-A-3 - Operating Schedules

Section V-A-5 - Individual Incentives

Section V-A-6 - Employee Relations (and other references to workmanship)

Section V-B-6 - Machinery Balance

Section V-C-6 - Problems of Consolidating Small Weaving Plants

C. Recommendations for Long Range Consideration

Throughout the study there are discussions for considerations for long range goals of the industry. All of those listed under Section II-B-4 previously are certainly long range, as well as indicating immediate action. In addition, the implications of Section V-A-2 Type of Ownership should be considered in long range planning.

We have indicated in every segment of the industry, the immediate need for investment is needed to put the present equipment in adequate operating condition. In a few instances warp preparation or finishing equipment is needed. We cannot emphasize this point too strongly. Beyond this, analysis of Section VI certainly indicates the need for expansion in every segment.

Although there could be some exceptions with regard to the spinning industry, we feel the expansion of the industry should be considered as being needed on an equal basis for all segments.

In addition, after considerable analysis of all of the factors, we strongly recommend that emphasis on further expansion be placed on integrated plants. This approach is sound under any conditions. However, until the different fragmented segments of the industry can prove through performance that individual plants can collectively produce a competitive product, such individual plants cannot be justified. Certainly the control of production can be handled advantageously in integrated plants. Capital investment is less likely to be attracted to any individual segment so long as the service from the other segments is at its present level. Integrated plants refer to combined spinning, weaving, finishing, operations. The possibility of expansion by individual segments has been indicated, with certain limitations and contingencies, in the discussions by industry segment. Certainly this is possible, but again we feel the proper approach would be through integrated plants.

Although precedent must be considered, the attraction of capital at this point may no doubt require special concessions. The best overall economic needs of the country will best be met with any reasonable level of concessions. Such concessions would need to assure the financial success of well managed operations.

The use of advisers beyond the period previously outlined should be considered, based on the success of the initial individual periods and indicated future potential by segments through continuation of similar or revised programs.

General Notes By Industry Segments

The industry as observed by the KSA team might be considered as falling into the following manufacturing segments:

1. Spinning
2. Power Loom Weaving
3. Hand Loom Weaving
4. Finishing
5. Batik Dyeing
6. Knitting (including garments from knit goods)

The details of observations regarding the Spinning, Power Weaving and Finishing segments are covered in other sections of this report. The following brief outline is made only to establish the general nature and characteristics of each segment of the industry.

1. Spinning:

The potential spinning capacity in the country at present is represented by about 475,000 spinning spindles either in place or being erected this year. As of the time of the visit, the spindles were being utilized approximately as follows:

	Spindles	%
Operating (some less than 3 shifts)	320,000	67%
Not operating due to lack of spare parts	40,000	8
Not operating due to lack of cotton	11,000	2
Being erected - operation planned mid-year	60,000	13
New plants still in process of starting up	32,000	7
Older plant - lack of trained personnel	12,000	3
Total	475,000	100%

Our estimates of the industry annual consumption based on current or projected product mix are as follows:

	Bales	% of Potential
Annual rate of production - Jan. 1968	107,500	54%
Potential capacity	198,000	100%
*Probable level as of Jan. 1, 1969	156,000	79%
*Probable level for all of 1968	130,000	66%
**Ministry estimate for all of 1968	160,000	81%

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*These assume some progress on spare parts problems, some continued progress on starting plants, and 2 new plants starting up later in the year.

** This figure is not impossible and indeed not impractical, but our lower estimate is based on their indicated past experience on the rate of progress in approaching potential capacity

The spinning equipment is mostly postwar equipment and in many respects is probably as modern on the average as plants in any other country. Certain operations do have equipment which should be modernized for improved labor utilization where labor is an important factor. Other than normal maintenance, most of the machinery should compete qualitywise with a typical industry anywhere. The quality of production actually varied to a considerable degree. The users of yarn generally indicated preference for yarn from certain local plants within the country to yarn from Hong Kong and Tawain but most felt the yarn imported from Japan was superior to most of the local production.

There are a number of areas in which the spinning industry can be improved from the standpoint of quality, cost and production; this is discussed elsewhere in this report.

With the exception of 3 small plants, not basically cotton type manufacturing, every spinning plant in operation and one of the two scheduled for operation in 1968 were visited by the KSA team.

2. Power Loom Weaving:

Industry capacity in this segment can only be estimated and is discussed elsewhere in the report in these terms.

There are reported to be about 25,000 power looms in the country. The KSA team visited 14 establishments having approximately 5,000 looms of which approximately 70 - 75% were being operated mostly on two or three shifts.

It would now seem we did not get a sample of the overall industry in these respects:

a. Two large provincial government plants were visited, which have in excess of 1,000 looms each, and to varying degrees are protected by imports. Also the GKBI plant furnishing the protected Batik dyeing industry was visited.

b. Including the plants mentioned in a. above, all of the plants visited averaged over 350 looms per establishment.

c. According to industry statistics available, there are 693 enterprises involved in the industry. Excluding the ones visited, the remaining would average 29 looms per establishment, compared to the 350 loom average per plant visited and 52 looms in the smallest visited.

d. It was noted that the smaller private mills were not operating nearly as full as the plants mentioned in a. above.

e. We were told that many of the smaller plants were not operating at all. One official in Sumatra estimated only 20% of the enterprises were open and 85% of looms were out of production on that island.

Although this indicates we did not get a cross-section of the smaller operations in the industry, the implication is that much of this is either out of operation or operating on a drastically curtailed schedule and therefore little could have been accomplished in visiting such operations.

The industry equipment is in most instances rather old, and does not have modern stop motions or bobbin changing equipment, both of which are important for good labor utilization in conjunction with optimum quality. The smaller establishments do not have warp preparation equipment necessary for low cost quality production and some of the larger establishments are in need of more modern equipment. The workmanship in most of the plants was considered very poor and aggravated to some extent by the warp preparation needs just mentioned. The resulting quality of weaving production varied from fair (by our standards and by comparison with imported goods in Indonesian stores) to quality in such a deplorable condition it was almost unbelievable. The latter category would cover a considerable portion of the production from the plants visited.

The machinery, quality, workmanship and labor utilization are discussed in more detail elsewhere in the report.

3. Hand Loom Weaving:

This segment of the industry is almost entirely in private enterprise establishments and varies from a few looms to over 100 looms per establishment.

Several of these establishments were visited in the Madjalaja, Klaten, Pekalongan and Bali areas, but considerably less than 1% of the total looms reported to be in the country were seen.

Reports of actual operation of the looms compared to the number of looms available varied considerably, but the best guess as to what per cent is actually operating would indicate somewhere between 5% and 15% of capacity.

This particular segment on the industry was to receive only cursory observation on the part of the KSA team and as such all comments are confined to this section.

The hand looms were of two types:

a. Improved Loom:

This loom in its present state is said to be a development of the Textile Institute some years ago and, in fact, is quite ingenuous in its construction and the skill with which it used. An even more ingenuous procedure for dyeing yarns and creating patterns in some fabrics with this special dyeing, is a procedure which could not be reproduced by traditional procedures on power equipment. There seems to be quite a demand for these patterns and even though this could not be duplicated, they could probably be copied to some reasonable degree in a more economical manner. A considerable portion of other types of the production observed in some of these establishments could be virtually duplicated by present power equipment.

b. Hand Loom:

These looms were seen only in Bali and are considered a "home industry." These looms and the skills required are also quite ingenuous, but much less productive than the Improved Loom. These looms are usually used to produce only smaller ceremonial garments and decorative type fabrics. No further comments will be made regarding this type loom.

It is our understanding that the type of fabrics produced on these looms are in some instances prohibited from import or in other instances, from duplication by mechanical means.

The productivity from the improved looms may vary, depending upon construction and pattern, from about 1 meter per day up to about 15 meters per day. Labor requirements are one person per loom plus supporting personnel for yarn preparation.

The productivity is consequently very low compared to power or automated quipment.

For the very fancy fabrics, which were also the fabrics having the lowest productivity, the market was apparently supported by tourist trade as well as the small per cent of the population which can afford this type goods. For the more common items which have higher productivity, in one instance, the calculated labor cost was only 15% of the labor plus materials cost. These fabrics were in this instance produced for a very reasonable labor cost, were of low quality, and no doubt for domestic consumption. These particular fabrics were used mostly for shirting and only 28" in width. The producer reported, and Dr. Boyle and the KSA team calculated, the profit margin was practically non-existent, if any at all, considering yarn replacement costs via inflation. This basic fabric could be produced on mechanical looms and is not prohibited from import or duplication. It is sold from the loom without further finishing. A piece of fabric purchased from this plant, upon inspection and testing, indicated off-color shaded areas, poor weaving quality and poor color fastness to washing.

The wages paid at the hand loom operations were very low. The yarn preparation employees, many young girls 9 or 10 years of age, were paid from rp10/8 hour day up to rp 20. per 10 hour day. Weavers, paid on incentive, ranged from rp 50. per day up to rp 80. per day.

These jobs constituted the bulk of the employees in such an establishment. The weavers, requiring varying degrees of skill (some very high requirements), were usually working at a very demanding pace, far above any other occupation observed in the country. Yet the remuneration, which usually consisted only of the basic wage, was only about 50% for the weaver and 10% - 15% for the yarn preparation work of what might be paid in a government operation or a larger privately owned weaving establishment, considering the basic wages, fringes, and typical family benefits.

The implications of the state of this industry seems to indicate:

a. Through low wages and overhead, the product can be produced at a reasonable cost from yarn to fabric, partially at least, due to paying low wages.

b. The final product is of such quality that it is not desirable except for the specialty items at any reasonable price differential. The fabric does not have such desirable and practical characteristics as special finish, shrink resistance, wrinkle resistant features which can be found in imports.

c. The dimensions, 28" width and pre-measured lengths, will often fail to realize good material usage when making garments.

d. The productivity of the industry has apparently declined considerably in recent years. This may be affected by the low economic activity but probably to some extent by competition on quality.

e. The population is probably continuing to shift to more western type dress.

Considering all of this, it would seem this segment is destined to a smaller role in the overall textile production and it would appear neither additional money nor effort should be expended toward trying to protect or re-vitalize the industry, but rather let it compete as it can with the remainder of the economy. Any measures which might be felt necessary should be only considered as temporary during a transitional period. Recommendations to this extent were not considered a part of the KSA team study, but rather in the field of Dr. Doyle's study and our comments have been made from the practical production standpoint rather than the broader economic implications which might be considered.

One additional observation which seems most appropriately covered in this section regards the dyeing of yarn for this segment of the industry. Some of the government finishing plants (Induks) which were set up to finish for smaller weaving mills also had equipment installed for yarn dyeing for smaller weaving installations. It was generally observed that the small weavers had found the cost of dyeing in these plants to be in excess of the cost which they could maintain by their traditional hand operations and have refrained from having work done in the Induks. The reason for these differences was explained as being primarily caused by the poor utilization of chemicals and dye stuffs as compared to the hand methods. The result is that yarn dyeing equipment at the Induks remains idle. A portion of the hand loom production is finished at the Induks.

4. Finishing:

As much as any other segment of the industry, we found wide divergence between quality of product, machinery modernization and general impression of operation.

We visited 13 operations performing finishing of some kind. While statistics indicate there are 61 operations in Indonesia, we feel we

saw a very good cross-section of this segment of the industry. We also understood that some of the plants were closed due to the present low production of the weaving facilities. None of the operations were found to be running more than 2 shifts capacity and when running 2 shifts, in many instances appeared to be running at a curtailed level.

A reasonable assumption would seem to be that this segment is running about 50% capacity, but this statistic was not considered significant to the study and was not investigated further.

Of the finishing mills visited, three stood out as being very impressive. The finishing operation (bleaching only) of the Batik Co-operative had very modern equipment and was apparently producing a good quality product, all for the Batik industry. The plant was operating 2 shifts. Two other plants visited were operating about 50% capacity, primarily bleaching and roller printing with some piece dyeing and one of the two had screen printing. These two plants were modern enough to compete with most plants in any location. The most ironic observation regarded the fact that neither of these plants finished domestic goods to any significant extent. One plant, having a weaving operation, sold a considerable portion of its production in the greige.

Two reasons seem to dictate their using imports for a considerable portion of the production:

a. **Some of the finer (combed fabrics) cannot be produced in Indonesia at this time.**

b. **The quality of goods which are produced in Indonesia is not acceptable for their purposes.**

The products from the above mentioned plants were of good quality. We were told by a machinery representative there was another plant in Bandung which we did not visit, that would rank with these operations in production and quality, but we cannot verify this.

At the other extreme were plants which started, in most instances, with greige goods of poor quality, and in some instances aggravated the problem with finishing of equally poor results. Some operations would be classed mediocre by comparison with these two extremes.

Although the finishing equipment and technology can be upgraded, as discussed elsewhere in this report, it probably is in better shape generally than the weaving segment.

Batik Dyeing:

Again, only cursory observation was expected from the KSA team and the remarks in this section are all that will be forwarded on this segment.

The writers were, indeed, intrigued with the opportunity of observing this operation.

We were quite flattered at the request by some members of the Co-operative for our suggestions on how to improve the industry. Although the individual request was quite sincere, the question of whether there is an overall desire to improve the industry is questionable so long as there is absolute prohibition of imports and regulations prohibiting the duplication of patterns by roller or screen printing processes. Such restrictions do indeed preserve this segment of the industry by preserving jobs, but does not provide much incentive for improving the industry or allow the consumer better purchasing power for Batik, or if he so desired, imitation Batik fabrics.

From the standpoint of observation, we spent very little time at only one operation and, being quite different from our area of practice, we probably could have added little (if anything) to this segment of the industry without spending considerably more time, which was not deemed practical.

As in the hand loom industry, we see a possibility that traditional changes may tend to lower the requirements of the industry, and if the standard of living is improved for the country, the cost of these "artistic" productions may become prohibitive in terms of present volume of the speciality market and domestic consumption. These considerations are again outside the main theme of our study and Dr. Doyle will probably cover the economic aspects to include some recommendations representing his thoughts on this segment.

6. Knitting:

The knitting industry was not considered to be of major consideration to the KSA team. All of the comments regarding this segment of the industry are included in this section.

The knitting industry as with the weaving industry was, for the plants visited, running at much less than capacity - usually operating only one shift. We were also told that a large number of plants were completely closed down.

We visited six plants which were knitting plants or had a part of their operation devoted to knitting. Two of the plants had virtually all of their conventional knitting stopped while the remainder were operating at considerably less than desired capacity.

The industry is reported to have in excess of 8,000 machines in the country. On this basis we visited plants having 4% - 5% of the machines in the country. The plants visited, with the exception of Pardede in

North Sumatra, were producing plain white bleached fabrics and sewing all production in garments both T-shirts and singlets (undershirts). Pardede produced various other outerwear and infants wear, in addition, which indicated technical competence in construction and styling.

The enterprises visited were all private enterprises and seemed to have good management. The quality of the product, fabric and garments were by comparison, considerably better than those being produced by the domestic weaving industry.

The owners and managers of the establishments seemed to feel they could compete with imports of lower "grades" and indicated imports in these grades were not a problem. They also felt the level of economic activity was mostly responsible for their present operating levels, but in addition they had not been able to secure the quantity of yarn which they could have used in recent months. (The writer could not verify the sincerity in this statement as one yarn plant executive indicated the knitting plants had been put on quotas to prevent their black marketing activities in yarn.)

Most of the production for the plain garments was of lower grade goods which require coarser counts of yarn which are produced in Indosesia. The medium quality goods can also have the yarn produced domestically but their present volume of such yarn is limited, and we were told it was of short supply. Most of the best grade garments (finest yarns) for which the yarn cannot at present be produced domestically are said to be imported as finished gaments.

Several items which could be improved in this segment of the industry are as follows:

1. The quality of the yarn and condition of the packages which reach the knitting plants are such that the plants spend considerable effort to rewind the yarn. Properly processed yarn reaching knitting plants can be placed at the knitting machines without additional processing.

2. The spinning mills generally do not distinguish between yarns to be used for knitting or weaving. The best quality knitting requires softer yarns, and until this is recognized through production procedures, the best quality in knitting will not be reached. This is discussed further under the Spinning comments.

3. The present finishing (bleaching) of knit goods is all by manual procedures with the results:

   a. Considerable amounts of poor quality were noted due to stains and dirt.

   b. A good white bleach was not usually obtained.

   c. The feel or hand of the fabric is rather harsh by comparison to what can be obtained with more modern procedures.

   d. Fabric stability could be improved by the latest equipment available.

4. Wages were usually indicated to be somewhat in line with the private weaving segment.

Considering this segment of the industry as a whole, it probably serves the domestic economic needs with tolerable quality as well as any other segment of the industry discussed herein.

For the long run, improvement in finishing (bleaching) equipment, for the typical plant visited is indicated. Unless this is done, imports which would give better market appeal at very little increase in cost could result in either loss of market by domestic plants due to quality differences or imposition of tariffs to protect the lower quality.

In addition, general improvement in all of the areas of manufacturing should be a goal in order to remain competitive. We feel, given a reasonable economic environment, the managements of the typical plants visited in the knitting industry will seek and innovate improvements in their operations.

This segment of the industry, including the garment making, which in fact is a major part of the labor involved, did indicate better labor utilization than the other segments of the power machine industry. With equipment modernization equivalent to that of the spinning industry, their level of utilization would probably have been twice as good.

P. L. 480 Cotton Considerations

General

The Indonesian industry is now anticipating all of their raw cotton requirements will be fulfilled by cotton supplied under P. L. 480. Virtually all of the raw cotton presently in the country was imported on this basis; present plans for 1968 are based on this program, and it appears most of the plans for future years would also be dependent on P. L. 480.

One specific point in the contract regarded "advice concerning best quality mix yarn if P. L. 480 cotton used."

While in Indonesia, a request was made of Embassy officials for some indication of the grades and staple available under P. L. 480, but we could not get any indication, except that longer staples were said to be in shorter supply than they had been previously.

The indications were that the raw cotton presently in inventory in the country was usually of grade and staple to meet the requirements of present product mix. There were indications that before the next shipment of cotton could be expected to arrive, at least some of the plants would not have adequate supplies of the correct grade and staple, if indeed any cotton remained in inventory.

Based on inventories and product mix, it would appear the past P. L. 480 shipments have also been adequate to meet the needs of the industry. In most instances, the plants indicated the use of staple length and grade consistent with good practice for the yarns being manufactured. There were only several instances which seemed to be using longer staple than might be necessary, but operating conditions being below the desired level, could have dictated this.

Should the availability of longer staples actually result in such short supply that the same proportion of long staple as previously received were not available, the present product mix for the industry could be upset and a shift to coarser counts would be necessary. Such a shift would require even larger amounts of cotton if the machinery is to be kept operating, and no doubt the supply/demand of market requirements would be upset.

Requirements

When the visit to Indonesia was nearing a close, the KSA team consulted with Mr. Carl Winberg, Agricultural Attache, regarding the present level and anticipated needs of raw cotton under P. L. 480. He stated a minimum of four months from signing of P. L. 480 agreement by the two countries to delivery of raw cotton to the plants must be considered when planning for the needs of the industry. Five months might be required.

Although, from figures available, we could not determine what the actual inven ory of raw cotton in the country was at the present time, our best estimate was that as of 2/1/68 it was about 40,000* bales.

This inventory, regardless of the correctness of the overall estimate, was not evenly distributed between plants and while some plants had a year's supply, some less than 3 months and, in one instance, a privately owned operation was already drastically curtailed because of the low supply of cotton.

Overall, the basic information generally used and the conclusions drawn in discussion with Mr. Winberg were as follows:

Present annual rate of consumption	- 107,500 bales
Estimated annual rate of consumption for January 1969	- 156,000 bales
Estimated consumption for calendar 1968	- 130,000 bales

*The 40,000 bales estimate is somewhat higher than the latest information from the Ministry of Textiles, but was based on the limited information received at the plants regarding inventories.

Based on signing of the agreement on February 15th, and 4-month delivery, the estimated 40,000 bale inventory would not be sufficient to keep the mills from running out of cotton. Even assuming a creditable job is done of shifting cotton between plants, the operation of the plants will probably be affected to some considerable degree by May 1.

In our opinion, unless some special effort is made to get new shipments to the country prior to June 15th, the industry will be seriously affected by a cotton shortage.

Based on our best estimate of the amount of progress the industry is likely to make toward reaching full potential, the following was outlined to Mr. Winberg as the indicated needs, in our opinion, to be covered under P.L. 480 for 1968 delivery.

	Bales
Estimated consumption - 12 months ending January 31, 1969	- 133,000
Estimate of desired inventory (5 months) as of February 1, 1969	- 75,000
	208,000
Less inventory (estimate - February 1, 1968)	40,000
Desired allotment of P.L. 480 for 1968	168,000

We must again emphasize these recommendations were made on assumptions (estimates) of the present inventory level, as well as consumption during this period which was necessarily based on levels of improvement which were estimated as probable, rather than that which is theoretically possible.

The overall potential for the industry based on the spindles in place or being erected was set at an annual rate of 180,000 bales through a quick estimate made while in Indonesia. After having time to study the data collected in more detail, the potential estimate is revised to 198,000 bales annually. We do not think this will appreciably affect the 1968 estimates and especially considering some capacity may be unavoidedly lost by a

cotton shortage which has already developed. It is quite likely that several years, or longer, will elapse before the true potential of the industry is reached.

To give an accurate and dependable projection of the requirements by staple and grade and by plant was suggested at some point as being desirable.

We hasten to point out that such a projection would require the establishment of an equally accurate and dependable basis of production and product mix for each plant. Neither of these could be established as such and at best can be only estimates of what we feel might be accomplished, which is generally somewhat lower than that which is theoretically possible.

Under these conditions, we did not attempt to estimate the requirements of each plant, especially those which are below capacity for lack of spare parts for which we have no idea when they will be delivered, or those which have not yet begun to operate and for which we feel, based on their past experience, have very optimistic schedules of reaching potential.

The following list therefore only shows the estimated annual rate of consumption for the month of January, 1968, and our estimate of the probable maximum capacity for the plants based on their present product mix or projected product mix where such a projection was indicated.

Plant	January 1968 Est. Annual Rate	Projected Counts	Projected Possible Annual Consumption
Pardede	3,750	20's through 42's	14,520
Senajan	10,000	20's, 40's	15,500
Tjipadung	8,300	20's, 30's, 42's	15,000
Intiteks	2,800	20's	4,800
Wismausaha	0	Staple fiber	-
GKBI	9,000	30's, 36's	10,440
Bandjaran	4,100	20's, 32's, 40's	14,160
Texin	6,750	20's, 34's, 40's	10,200
Djantra	4,750	20's, 40's, others	12,000*
Setjang	7,500	20's, 42's	15,000
Tjilatjap	20,000	12's, 20's, 32's, 40's, 42's	26,400
Grati	8,000	20's 30's, 40's	11,520
Lawang	5,750	20's	8,400
Nebritex	12,000	20's, 42's	13,560
Tohpati	4,800	20's	8,280
Palembang	0	No basis	12,000
Bekasi	0	40's, 60's	6,120
	107,500		197,880

*Based on 25,000 spindles

The haste with which the information was collected may quite likely have resulted in some individual plant errors in both the January level, as well as the possible consumption at good operating levels. We do feel such errors would tend to cancel and that the totals are reasonably accurate.

It was from these figures, combined with our considered opinions of likely progress in start-up and spare parts that the 130,000 bale consumption for the 1968 calendar year and the annual rate of 156,000 bales, as of January 1969 were estimated.

We have previously stated, it seemed the grade and staple of cotton being used was in line with the requirements of the yarn being produced in most instances. Considering this, the unknown rate of progress in starting up and in spare parts, along with shifts in projected product mixes, present levels of inventory, etc., it would be impractical, if not impossible, for the KSA team to attempt to project the new needs of each plant by staple and grade for any given period. This can best be handled by the Textile Ministry where the responsibility rightfully belongs.

Use of Staple Fiber

A further request in the contract regarding P.L. 480 cotton stated "advise . . . possibilities of mixing staple fiber to improve quality."

Staple fiber is in this case considered to be rayon. We can speak with confidence regarding our experience on this subject. Cotton and rayon are not usually mixed for either product characteristic or to improve quality.

We would not recommend a program of attempting to mix rayon in an attempt to improve the quality of the yarn or the fabric. The only probable advantage would be in the price differential between cotton and rayon, and without extreme care, the quality problems may become worse rather than improve.

Furthermore, without proper research of the market potential, we would not advise attempting to market such a blend of fibers.

It seems appropriate at this point to mention that another staple fiber, polyester, sold under many different brand names is being blended with cotton in considerable volume in many countries. This is done for the characteristics of the fabric, rather than to improve the running quality of the yarn. These fabrics have steadily increased in the apparel market on a world-wide basis during recent years and is now an important part

of that market. Such fabrics were seen in the stores of Indonesia and will probably become an important factor in the consumers' choice to the extent they can be imported at a reasonable price.

Grade Verification

An opinion often heard in Indonesia was that the average grade and staple of the cotton received was lower than the basis on which it was purchased. They seemed to think it would average 1/32" shorter and 1/2 grade lower. We did see a few tests results which usually indicated the standards were not being met. We have no conclusive basis to either, agree with or doubt their claims, but we are inclined to believe they are at least partially correct.

We recommend that until better provisions, if any, can be arranged, all of the cotton shipped to Indonesia be sampled and tests made in the U.S. when the cotton is shipped. This, of course, assumes the recommended tests have not already been made and can be properly documented in accordance with the remainder of this recommendation.

The samples should be pulled in accordance with the standard procedure presently used in this country and the tests should be made by a dependable laboratory outside the influence of the parties involved.

The tests should include:

Staple
Grade } Each bale
Micronaire

Pressley for 10% of the bales in each shipment.

The records of these tests by individual bale identification should be sent to the receiving party in Indonesia and hopefully would be received prior to the time the cotton arrived. Copies of all such documents would probably be desired by an Indonesian agency, our government and any other

parties who may be involved in the responsibility of seeing that the contract, as written, is fulfilled.

Regardless of how the cost of such testing is handled, and it would seem reasonable this cost should be borne by the cotton users, it should be done in this manner until the Indonesia industry can arrange a better (cheaper) procedure, if possible. This recommendation is made based on the fact that there is neither adequate equipment, nor personnel in Indonesia to handle this volume of testing.

From such a procedure better information would be available at the production level. This should either bolster the confidence of the plant personnel by verifying the grades received, or indicate what manufacturing steps would be necessary, if indeed the cotton was below standard or the other cotton characteristics, such as Micronaire and Pressley results needed special attention.

There are characteristics, mentioned previously, which are not covered by grade and staple classifications but which are important in the manufacture of yarns.

(1) Micronaire - this relates to the fiber fineness and experience has established the usual levels for best operation. For 20's count from 1" cotton, an average Micronaire of 4.3 - 4.4 is desirable. This can be attained by blending bales of different Micronaire to achieve this average. Individual bales ranging from 3.8 to 4.9 for example, might be blended to the desired average. (Discussion of proper blending elsewhere in this report accomplishes these results.) Therefore, it would be desirable for the average Micronaire received in each shipment to be at this level. Should the average Micronaire be very much different from this, which would likely be higher for 1" cotton, the spinning problems would be greater than those encountered by many U.S. manufacturers who are very strict about maintaining their operating control and buy cotton with Micronaire

specifications for each shipment. These problems of high Micronaire can be overcome to some extent by using longer staple, but is rather expensive compared to simply using the correct Micronaire. Due to the way shipments are made, longer staples would not be readily available for substitution.

(2) Pressley - is a measure of the strength of the cotton in pounds per square inch. Again U.S. manufacturers usually buy cotton with certain specific limitations for this characteristic. Extreme variations should be avoided but a Pressley test of 75,000, or better, is required for reasonable operation while 90,000 is a more desirable level. Usually the Pressley from a particular geographical area will run fairly consistent, thus the recommendation that 10% of the bales be tested for this characteristic.

Industry Evaluation and Recommendations

The observations, analysis of problems, and recommendations in this section were made and presented through normal consulting procedures. We realize that many of the observations as presented are rather critical. Furthermore, we have not generally attempted to elaborate to any great extent on the areas which are performing commendably, as such was not considered to be the purpose of the contract.

We must frankly admit that the short time consumed for such a broad comprehensive report may in the case of some details result in erroneous assumptions or misunderstanding of information received. We do feel that for the bulk of the study covered in this section, as in other sections, the general observations and recommendations are sound.

The evaulation and recommendations are made primarily from a production standpoint; the final decisions regarding recommendations will, of course, rest with the government agencies or other groups charged with such responsibility, who may have to consider many other factors outside of the production area. The evaluations and recommendations are made, in our opinion, toward the long range improvement of the textile industry. Any criticism of present or past practices is made only in the sincere hope that such criticism, taken objectively, will indeed add to the future success of the individual plants and the industry.

As pointed out in "General Notes By Industry Segments," only the Spinning, Power Weaving and Finishing segments will be covered in this detailed discussion.

A. General

1. Capital Requirements:

This was not considered to be a major consideration of the KSA team and is only mentioned here for two reasons:

a. The capital requirements were outlined as being one of the major problems of the industry, especially those segments other than government spinning plants. The capital of the enterprises is said to have been dissipated through galloping inflation and unrealistic tax structures during such inflation. The solution to this problem lies within the economic and financial decisions which must be made and is understood to be of major consideration in Dr. Doyle's report.

The subject is mentioned here only to highlight the fact that regardless of what other steps may be made to improve the industry, without working capital to operate on a day-to-day basis and normal requirements for reasonable improvement and expansion, the other improvements will have been in vain. This problem should receive priority consideration in economic planning.

b. Contradicting statements were received regarding the capital considerations which were realized by government versus private enterprise. We make no attempt to verify the truth of the statements, but do feel that equal standards of loans and credit should apply to all segments of this industry, in order that the overall economy of the country will be the real benefactor.

The continuing or increasing need, or the improvement of the level, of credit terms necessary will be influenced by the action taken on the present policies which have caused and allowed this problem to reach the present proportions. These will be covered in Dr. Doyle's report concerning inventory valuations, tax policies, depreciation accounting, and the effects of the inflationary trends in the economy, etc.

2. Type of Ownership:

We will not attempt to make specific comparisons by plants, and neither can the typical conclusions drawn below be said to be true in every instance if each possible individual comparison were made, but the following conclusions were made for the industry:

a. Typically, the private mills seemed to have better qualified management than the government mills.

b. Typically, the quality of the product was better from the private mills than from the government plants. (Smaller private weaving mills were often an exception in this case.)

c. Typically, the private mills seemed to have better labor utilisation than the government plants.

d. Typically, the rates of pay (total remuneration including fringe) were higher for the employees in the government establishments. There were exceptions to this in the larger privately owned plants.

3. Operating Schedules:

Of prime importance in taking the greatest advantage of the capital investment is to utilize the equipment to the greatest extent possible considering the economic aspects of the alternatives.

For comparison, we point out that in the United States most textile plants operate 144 hours per week. This is done even considering time and one-half payments for all hours in excess of 40 hours per week per employee. Also, the labor cost is much greater as a percent of the total cost and as a percent of the more comparable overhead which would be incurred in Indonesia. The only time plants typically operate less than 144 hours is when management has some strong convictions about over productivity or when the economic activity dictates lower production.

The segment of the Indonesian industry which now is most concerned with maximum production is the spinning plants, but this could be important regarding some other areas at this time or any expansion in other segments which may justify major capital expenditures in the future.

The spinning plants visited ran from 115 hours per week for Djantra to 143 hours per week for Nebritex (excluding Wisma Oesaha which ran only 108 hours due to lack of power.) They averaged 126 hours per week.

Reasons for these differences include differences in lunch periods, differences in Friday schedule, and differences in operating schedule for Saturday. Some had periods not operated during the 24-hour day due to shift differences. All of these reasons for differences may have reasonable arguments but the fact remains that it is known to be possible to operate without these losses in hours as is proven by the U. S. system. Nebritex, realizing the importance of full schedules, has made arrangements to rotate during lunch periods.

If the average hours could be increased from 126 to 144, a 14% improvement or the equivalent of 68,000 additional spindles would be realized.

If a standard one-half hour lunch and one and one-half hour Friday stoppage were instituted, a 5.9% increase or the equivalent of 28,000 spindles would be realized from a 133.5 hour week. Since an abundance of labor supply is available, a standard 6-hour - no break shift - for a 4-shift operation might be considered to yield a 144-hour week. This might be considered for installation along with better labor utilization to take advantage of improved overhead costs without increasing labor costs. Certainly a more effective work

week should be considered along some lines, and present as well as future implications of such changes should be considered prior to implementation of any such decisions. It would of course, be desirable at least to standardize between government plants should any changes be instituted.

4. Labor Utilization:

We understand the fact that labor is not a primary cost in textile operations in Indonesia and was not a major consideration in our investigation. However, there are several points which we feel should be made in this regard.

For the spinning plants, the productivity of labor, without making detailed comparisons, is estimated to be about one-fifth or 20% of comparable plants in the U. S. We can only make this comparison as we are only thoroughly familiar with this country, but we would expect it to be considerably less than other developing countries.

Unfortunately, the abundance of labor and its use often allows operations to be run at such low levels of production and quality that could only be tolerated under such conditions. Under such conditions, the employees are not necessarily performing only 20% as much work as in the comparison made above, but are only 20% as productive because of the conditions under which they have to work in conjunction with the levels of work expected.

In some other instances the work content of some jobs was so low, our analysis from past experience is that the excess labor does not add anything to the productivity. To the contrary, through idleness an attitude of slothfulness develops which breeds poor work habits and mental attitudes which indeed result in poor quality and low morale.

To take the attitude that work must be supplied to the maximum number of people regardless of whether they add anything to the machine production, not only results in problems outlined above, but will no doubt cause considerable labor problems when, after a long period of such operation, an attempt is made to correct the situation to levels necessary for an improving economy and rising standard of living.

We even found considerable differences in levels of productivity within the same job categories. As an example, in the different plants we found spinner assignments ranging from 200 spindles per operator up to 1200 spindles per operator in spinning, on what appeared to be comparable running conditions for experienced operators.

Regardless of how small the effect of labor may seem to the overall cost, it should be remembered that businesses need to show a profit, not only to encourage investment but to create or at least preserve enough capital to remain competitive or even expand, both of which are very important to the long range success of the individual business and the overall economy. Optimum use of labor as well as other resources will all contribute to these goals which will not only preserve but expand the number of job opportunities.

The practice of industrial engineering, as it relates to labor utilization, is practically non-existent within the country. This, we feel, is due to the fact that the application of industrial engineering and the long range advantages of the proper use of such practices is not understood. The results of good industrial engineering practice will always result in better machinery as well as labor utilization and this should not be allowed to be rationalized by the present abundance of labor.

Definite steps should be taken to introduce to the industry and to the overall economy good industrial engineering practices. This may be helped by the introduction of appreciation courses at ITT and other universities, but should definitely be accompanied by some industry work at the manufacturing level.

5. Individual Incentives:

In most of the operations observed there was little present or future monetary incentive involved in either the quality or the quantity of the work performed and the resulting production of each individual.

Not only with the hourly employees, but at least through much of the supervisory ranks, the differences in pay regardless of the skill or the work involved was small, indeed insignificant. Although status is rightfully considered an incentive for good work, this usually is accompanied with some additional remuneration or the status becomes rather empty.

Since in the final analysis the employees actually performing the work are those on which the success of the operation must depend, a revised remuneration system which will reward employees with higher pay and potential meaningful promotions in relation to their contributions need priority consideration.

6. Employee Relations:

The choice of title for this item is not completely descriptive of the subject matter.

The point which we wish to make here regards the relationship between the employee-union-management and government which has apparently created a situation detrimental to the whole industry.

This situation was evident in most plants, was discussed to some degree in many plants, and was recognized as a major problem in several plants.

Specifically, it would appear the attitude of the employees in many instances results in poor productivity and workmanship, for which the management has no recourse to take the necessary actions to improve or completely correct the problem.

In a number of instances we discussed the theoretical procedures which have been outlined to handle such problems, but in many instances it was stated the union with implied government support (through inaction) would refuse to accept the decisions. Therefore, the procedures not only failed in the individual instances but in fact probably resulted in additional breeding of the same problems in other employee-management relations.

The problem was most evident in the weaving quality which we observed, and in the conditions (dirty) which some of the spinning plant equipment was allowed to operate. In another instance changes in job loads which were obviously justified were refused along with threatening overtones.

The only concrete reason for which an employee could be fired was for an act of stealing. To perform their work in such a flagrant manner as some observed is just as dishonest and detrimental to the operation as stealing.

Some additional study of this problem is indicated, and a further clarification and understanding of the responsibilities of management and unions necessary for the long range goals of the industry.

B. Spinning Plants

The topics to be discussed under this heading, many of which are interrelated, are listed below. Some of the specific problems may be noted under the brief notes for each plant following the discussions of the topics:

1. Quality
2. Management and Supervisory
3. Technical Deficiencies and Training
4. Parts Problems and Continuing Maintenance
5. Labor Training
6. Machinery Balance
7. Miscellaneous
8. Notes on Individual Plant Visits

1. Quality:

The quality of the production from the spinning plants is important because it not only affects the productivity of the weaving and knitting plants, but also has a direct bearing on the quality of the finished cloth in addition to the quality problems which pyramid from poor weaving results.

Due to the relatively short time alloted for this survey, we are only attempting to point out the more obvious areas which were noted. We feel sure that there were many areas in specific plants which were not detected as needing attention, which could have been covered in detail only with more extensive plant surveys.

a. Blending:

The first step, and one of the most important steps, to proper mill operation is proper blending. The Indonesian plants do not at this time have adequate information to do the best job of blending but in every plant visited a better procedure was

needed, based on information presently available. We are convinced that much of the poor material running conditions and some of the poor fabric quality observed was indeed due to the blending procedures in use.

It is desirable to blend as many bales at the opening line as space permits. A minimum of 30 bales is desirable under any conditions and more if possible. Many of the plants had enough space to allow more bales.

The dye characteristics of cotton are different and many instances of dyed fabric were noted in the finishing plants and in department stores which indicated insufficient blending to overcome this problem.

The running quality in spinning and weaving can result in extreme variations in the blend content due to variations in Micronaire, Pressley, staple and grade.

Since the individual characteristics of the bales are not known, and since the industry feels in general the grade and staple received are under the standards on which they were purchased, we recommend the individual bales be tested for grade, staple and Micronaire and 10% of the bales be tested for Pressley (lbs./square inch.)

In our opinion these bales should be tested by an unbiased laboratory in the United States, with the results identified by bale, sent to the individual plants to which the cotton was shipped. It is recommended, at least temporarily in this manner, as this seems the easiest to expedite so long as facilities are not available in Indonesia to perform the tests. Should the cost seem prohibitive, then further study of the requirements to perform these tests in Indonesia should be considered. This subject is discussed further under P. L. 480 considerations.

In this manner the feeling that sub-standard cotton was being received would either be verified or dispelled and the necessary information for properly blending to the best advantage of the plant and industry would be available.

When the bales are received, hopefully after receipt of the test results, the bales could then be stored by grade, staple, and Micronaire. Knowing exactly what is available in total, the blends could be put together in such a manner to maintain a consistent blend of the available stocks.

The basic procedure necessary to properly blend the maximum number of bales was basically explained to some personnel at most of the plants visited. We are convinced the proper blending of bales of known characteristics would in itself improve the operation of the spinning plants and to some degree, the knitting and weaving plants, which use the yarn. No doubt, written material regarding these procedures is also available in Indonesia. While many plants indicated the personnel could not be trained to follow this simple procedure, we feel that properly handled with the employees, this should be no problem.

In the absence of Micronaire being available for each bale, the blending of the maximum number of bales is still necessary; in fact, it becomes even more imporant. GKBI did, according to their statement, blend by Micronaire for all bales.

We observed from 4 to 16 bales being mixed at opening. In the notes presented later for each mill, this deficiency is referred to as "too few bales laid out at opening."

b. **Neps:**

Many of the plants had excessive neps in the card webs and yarn. Excessive neps are detrimental to good weaving and final fabric quality. The fact that there was considerable variation in the neppiness from card to card in many of the plants indicates the problem in many of the plants may have been at the cards in addition to the poor blending procedures possibly affecting this variation.

We cannot say conclusively where the problem lies in general or on individual cards, but we can say conclusively that many of the plants need help in this area. The only plant which appeared to be doing an outstanding job in this category was GKBI, while others for which an opinion could be formed as being acceptable included Tjilatjap, Lawang, Grati.

We did note that some plants did not take nep checks, some took them improperly, and there was considerable differences in the actual interpretation of the individuals responsible for making the count.

This problem could not be pinpointed as there are so many possible causes of neps, most of which are not obvious through the casual observation of our visits.

c. Yarn Twist By Product:

Most of the plants used only one level of twist in the yarns being produced. Warp yarns normally require the twist which will result in the best strength while yarns used for filling (weft) can use a lower twist and is usually handled in this manner in favor of the added production. Even less twist is normally used for knitting yarns as the strength is sufficient for the knitting process and a softer, more desirable fabric is produced.

While the operation of the spinning plant is simplified, the upgrading of the weaving quality and final product characteristics are not benefited by the uniform twist approach.

Typical twist multiples for the basic types of yarn are:

	Range	Typical
Warp Twist	4.25 - 4.75 TM	4.60
Filling (Weft) Twist	3.40 - 4.00 TM	3.75
Knitting Twist	3.00 - 3.75 TM	3.40

Certainly a step toward improving the industry would be to spin yarns to the characteristics needed by the final use of the yarn. Needless to say, the same steps needed to prevent the mixing of the different yarns in manufacturing would have to be used to assure the different twists of the same yarns were not mixed.

d. Running Quality:

This term is used to refer to the frequency with which the individual production units require attention to restart the unit into production due to malfunction of the machine or product.

We did not observe major problems of this nature except in spinning, which is the most usual process on which the running quality is a problem. The term usually used to measure this level in spinning is Ends Down per Thousand Spindle Hours (EDPMSH) or Ends Down.

We could not, in many instances, obtain figures on the level of ends down and in many plants the tests were not made or even aware of such tests.

This criterion of measurement is used extensively by most spinning plants to measure the running quality. Excessive levels of ends down cause loss of production, extra work requirements and often

indicate poor quality of the finished yarn. Such excessive levels may indicate problems at spinning, prior processes or the fiber or fiber blend itself. The measurement and follow-up is an excellent tool to control many of the characteristics of a good quality yarn.

In broad terms the level of EDPMSH should typically average from 30 to 50. They would exceed this when material or operating conditions are out of control. No hard and fast rule can be given for these levels but figures were quoted for the plants which had such measurements from 50 up to 190, while observation indicated some plants might have been as many as 300 or more.

The plants should use these tests to measure running quality on a regular basis, as a tool to measure progress or lack of it, and a guide to further improvement where indicated.

Some of the problems in running quality may be due to the Micronaire of the cotton actually used. A few tests were seen, which at this time cannot be verified as being a representative sample, indicated the Micronaire was probably higher than desirable for the product mix. This is further discussed under P. L. 480 Considerations and the recommendations made therein, if followed, will better indicate for future shipments, to what degree their problems with running quality are affected by the fibers used.

- Yarn Cleaning:

This term is used referring to the "slub catchers" or "snick plates" which are mechanical devices through which the spun yarn passes to remove any yarn imperfections which would be detrimental to further processing characteristics or final fabric quality.

Most of the plants in Indonesia were (a) not using them correctly, intentionally or otherwise; (b) had taken them off due to the fact the yarn ran poorly; or (c) in some instances said they were never on the machines.

This method of maintaining yarn quality will have to be practiced before the quality of products can be expected to meet the standards which must be desirable or the competition from imports.

Several plants were using the slub catchers correctly, these plants having the reputation in the industry of producing the better quality products.

f. Testing and Quality Control:

We are quite sure we did not get exact information on all of the testing procedures and equipment at each plant. The following outline notes the areas which we feel are most important:

(1) Lap Testing:

This is the first process and most important to keep under proper control.

Lap weights should be checked at random to be sure the operators are maintaining proper standards of rejection. We had indications that the standards were not maintained in some plants and did not get indications from any plants that the control was in fact checked under any systematic procedure. This is carried out by simply pulling about 10 laps from storage and re-weighing without operators having prior knowledge of the laps to be checked.

Yard-to-yard checks of laps is a most important control point to check and maintain. Several plants did not attempt to measure this, and most were not equipped to perform this function except by the manual method of spreading the lap on the floor. This is neither as accurate nor otherwise as complete as testing by a "lap meter" which is available. This lap meter is manufactured and sold in the U. S. for $1450 U. S. and we feel

every plant should have and use this equipment. For this nominal investment, properly used, better control of an operation can be maintained. There may be similar equipment manufactured in other countries, but we are not familiar with this possibility.

(2) Nep Checks:

This area of quality has already been discussed. The tests were apparently made at most plants, although not at others. There was considerable difference in the level of evaluation of the persons responsible for the actual counting and this needs to be standardized within the country. This is a very inexpensive test with inexpensive equipment and should be utilized to a greater extent than we observed.

(3) Weight Control:

This involves measurement and follow-up at carding, drawing, roving (if applicable) and spinning, and is usually combined with breaking strength tests at spinning. Most of the plants had equipment for this purpose and most of the plants seemed to be performing the tests properly and in sufficient numbers. However, other observations of weight variations, strength variations and overall strength levels would indicate that the tests have not resulted in effective controls in a number of plants.

Again standardization of tests, verification of equipment, instruction on tests results and implications as well as follow-up procedures should be studied and updated through training at many of the plants.

Yarn boarder or Seriplane was in use in only a few of the plants. This inexpensive method of visually checking the yarn for grade (relative to International Standards) should be a part of every plant's testing procedures.

(4) Other types of testing included:

Equipment for moisture checks was in most plants and appeared to be properly used in a number of plants.

Micronaire checks were made in several plants. This equipment can be helpful but used at its best requires 100% testing. This test has been recommended for all bales upon shipment from the U. S. under P. L. 480 and if done would not be required at the plants.

Pressley is also helpful to measure, usually on a random sample basis, the fiber strength. Only a few mills had this equipment and this has also been recommended to be performed at shipment under P. L. 480. Most plants did not have such equipment.

Evenness testers were in use in only one plant. Other plants had had testers which were planned for use, broken, not used due to lack or knowledge or, in one instance, lack of recording paper. This type testing is very important in reaching the optimum in a spinning operation. Adequate equipment per plant would probably cost $10,000 U. S. and although desirable, will require considerable technical training and experience to maintain a program of useful testing and follow-up. Those plants which have such equipment should use it insofar as possible, but we do not feel this should take priority for the plants in attempting to improve their operations until some of the other more obvious problems are overcome.

2. Management and Supervision

The time spent at each plant did, of necessity, require any evaluations of management and supervisory personnel to be made on a minimum of observation. For this reason, especially, we refrain from making any specific comparisons or positive evaluations of individual personnel. We do present some general statements about observations in this area.

We encountered what we felt were some well trained and competent managers, others which had little training or understanding of their operations and various degrees between these two extremes. We did feel the freedom of responsibility and the local conditions under which these men worked was in some instances considerably different and to some degree may have affected our evaluations.

The plants which appeared to have the best management teams were those in which the plants had been started and brought into full production with adequate technical support in the start-up. This of course may have reflected the competence of the lower levels of technicians and supervisors who had also received training initially.

In other instances, outstanding individuals within the teams were noted and seemed to have adequate technical knowledge and managerial ability, considering the conditions under which they work. There were other instances in which persons in responsible positions had little or no technical training and indicated little knowledge or ability to fill the position for which they were charged with the responsibility.

We believe there are adequate potential management and supervisory candidates to fill the positions required to operate the industry successfully. Additional training in some instances, adequate support of the many problems covered in this report, technical help where needed, recognition through promotion, and objective measurement and action on management results should fill the needs in this area.

3. Technical Deficiencies and Training

The same limitations to direct comparison of, or evaluation of, individuals or groups is made here as in management and supervisors. Reference here is made to secondary supervision and technicians (repairmen, etc.)

Again certain plants seemed to have personnel adequately trained in the technical aspects of yarn manufacturing while others, as evidenced by the performance, leave much to be desired in either training or application of knowledge to the job.

We suspect much of this is due to lack of training as pointed out elsewhere. The evidence of need is typically more apparent in those plants which did not have representatives of the machinery manufacturers, or incomplete follow through by the technicians, during the initial start-up.

In defense of this group, we must say that our evaluation may have been influenced to some degree by the spare parts and equipment problems, but we are confident that additional training is necessary in some of the plants.

We would further caution against an approach that these men can be fully trained by their supervisors, or by further training in other plants. Rather, the supervisors have themselves, often never actually performed the work and would not be qualified to train. In addition, they have many other responsibilities which would likely prevent the application of the thorough training required in many instances. Also, attempting to train in other plants where qualified instructors may not be available, under different conditions, may prove to result in much less than the desired results.

Our recommendation regarding the needs here would be to employ manufacturers' representatives for the equipment involved. Conduct initial instruction and training at one plant, where assistance was most urgently needed, involving personnel from similar plants, and follow-up at the individual plants later.

4. Parts Problems and Continuing Maintenance

Although it would have been desirable, it was completely outside the realm of possibility to confirm or challenge the needs of this segment of the industry regarding the need for parts.

We were convinced that the need for parts was urgent and necessary in considerable volume.

We did estimate 8% of the 475,000 spindles in the country were not operating because of spare parts. We were quoted figures, as we understood them, that $1.3 million (equiv. U.S.$) was estimated to overcome the parts problem. If this figure, or even twice this figure, is needed, every effort should be made to supply these parts as quickly as possible by whatever means are available.

Based on these figures, the equivalent of 38,000 spindles can be brought into production for which an investment in new plant would require several times the investment required here.

The only limitation to this recommendation would involve the Djantra plant if the needs of that plant have been included in the expenditure quoted above. This plant is discussed separately under the notes on individual plants.

If, at best, limited funds are available, any funds which are available for use, for the best indicated expenditure, should be channeled to the plants on some evaluated basis to consider:

a. Cost per thousand spindles to bring into production. This should be considered in increments by each plant. For example, a plant having 6,000 spindles standing because of spare parts at spinning or supporting equipment totaling $100,000 needs:

1st 1,000	spindles	require	$ 3,000
2nd 1,000	"	"	7,000
3rd 1,000	"	"	16,000
4th 1,000	"	"	18,000
5th 1,000	"	"	21,000
Last 1,000	"	"	35,000

By considering the total requirements in this manner, and convincing management they will be held responsible for meeting the projections, decisions could be made as to which plants spindles could add the most to the economy for the expenditures available.

b. The quality and productivity of the plants should also be considered under such allocations.

c. The normal expenditures necessary to maintain present equipment should of course receive proper consideration for all plants.

Although many circumstances have been involved in the spare parts problem reaching its present proportions, two major points should be constantly kept under consideration regarding this area:

(1) Proper maintenance including oiling, cleaning, settings and adjustments, timely repairs and consideration of preventive maintenance programs, will have a continuing effect on this problem. Every plant should give priority consideration to reducing the need for spare parts, employing the points outlined above and engaging assistance from the most qualified persons available. Technical training recommended elsewhere would no doubt help this problem also.

(2) Solution to this problem for the long run must be sought. There will always be a continuing need for spare parts for which production and quality (heart and soul) of the industry is dependent. Until provisions are made for this, the individual plants will constantly be in trouble. It would not seem practical to even consider further expansion of the industry until the day-to-day needs of the existing plants have been provided.

An additional possibility for consideration was injected into the parts problem... this being a consideration to attempt to take into account foreign exchange required to secure spare parts to bring the capacity up to its potential, compared to the foreign exchange required for equivalent yarn imports. Although we recognize that such an approach would be possible, we did not feel the time to study in this manner was justified at the expense of the basic production problems which constituted our primary objective. Our decision in this instance was influenced by:

(a) The parts requirements which were quoted usually included the requirements to some extent to maintain the present equipment for a period of time (usually one year).

(b) The same was true for some parts merely needed to improve quality to acceptable levels.

(c) Consideration would have to take into account the possibility of both 3rd party processing and normal imports because 3rd party processing availability of cotton is not known at this time.

(d) Every decision made to delay the remedy for this problem is going to continue to allow the crutch for the industry to use regarding production and quality. This crutch must be removed.

(e) There is no assurance the foreign exchange problem may not be as critical, or more so, in the years of 1969, 1970, 1971, etc. Any delay in securing parts could, by the continuing need for replacement parts, add to the problem. Immediate relief, secured by any reasonable procedures, should definitely help the exchange situation during any future years.

(f) Considering all of the above, and the fact the parts must be supplied some time, it seems foolish to use any foreign exchange for imports of yarn at the expense of supplying these parts, just because it may on some as yet undetermined basis, prove to be the indicated approach for the year 1968 or even 1969.

We fully agree that a rational approach to such consideration is desirable, but we do not feel time or effort to study all of the possible decisions which could be made regarding this subject, is justified. Especially when the need is so critical, and so many of the components to be considered consist of many variables or even intangibles.

5. Labor Training:

Several points seem appropriate on this subject.

Due to the cost of training labor and replacement in the U. S. and European countries, certain techniques have been developed and practiced by many firms, including Kurt Salmon Associates, as consultants to the textile industry. These techniques insure the most efficient training of labor.

While these developments have also been applied to established plants, they have been more often applied in new plant start-ups. The following advantages of these techniques should be of special interest to the Indonesian textile industry:

a. The best techniques known are used in indoctrination programs to build employee morale and loyalty.

b. Operators are trained to reach full production in a minimum period of time.

c. In conjunction with b., the plants are brought into full operation at the earliest possible time, thus assuring early absorption of overhead.

d. Quality standards are developed and required of the operators while in the trial training period.

e. Proper techniques used in the selection and placement of employees assures their being trained for the jobs for which they are best suited.

f. Procedures are established to effect the release or transfer of employees at an early stage of training if they are found to be unsuited for the initially assigned job.

g. Special emphasis is placed on the development of client personnel in order that they may be able to expand and maintain the program.

Replacement training costs in Indonesia may not be of major importance. However, the other advantages as outlined above are obvious and continuing. When reviewed in comparison to the length of time required and the results obtained in some recent new plant start-ups, the cost of such a program results in a real saving rather than an extra expense.

Such a program should be considered for any plant which is started in operation in the future. This would provide two main benefits:

a. The individual plant will derive the benefits of the techniques of formalized training.

b. Perhaps more important, the use of these techniques would be introduced to Indonesia by training local personnel in the complete application and administration of such a program.

6. Machinery Balance

A specific point in the contract was to consider the best product mix for the spinning plants if P. L. 480 cotton is used. As previously pointed out, based on past supplies of P. L. 480 cotton, the grade and staple has been adequate to meet their range of needs. The future possibilities by grade and staple are not known, therefore the best product mix must be thought of in terms of machinery availability.

Of course, the market demands will dictate the actual yarns which will be produced, but so long as the spinning segment produces only a portion of the needs the most practical product mix would seem to be that which best utilizes the most equipment.

Basically, within practical limitations, a spinning mill is usually designed to produce a particular weight yarn, or at least an average weight for a variety of yarns. If the weight or average weight produced is heavier than that for which a mill is designed, the spinning equipment cannot be supported by the preceding equipment, and thus idle spinning frames will result. On the other hand if the mill produces a finer yarn than that for which it was designed, the spinning equipment cannot produce at the rate of the preceding equipment which will be partially idle. Under either condition the maximum machine utilization will not be as good as if the equipment is operated on the product mix for which it was designed. Such maximum utilization should put a mill in its best competitive position compared to other plants or to imports.

Some notes on each plant's present or projected product mix and the resulting balance are covered in the notes for the individual plants. Overall,

as covered in those individual comments, some of the plants have adopted product mixes which have resulted, or will result, in considerably less than maximum machinery utilization - in some instances each running disproportinate amounts of what the other was designed for.

Although a more thorough study would be required for the individual circumstances, included in these notes are some instances where the most probable product mix forecast for a plant would still result in certain types of extra equipment. Such equipment, if verified as being extra by more detailed study, could be considered for transfer to another plant needing such equipment, or as being used as a nucleus for an additional plant. We have only made a point of the most obvious instances and are quite sure a more detailed study would indicate additional equipment transfer or consolidation possibilities. Such planned transfer of equipment would be an obvious move toward reaching the maximum in machinery utilization.

7. Miscellaneous

There are several areas which were indicated as being questionable in manufacturing procedures. We must point out that the fact we are not familiar with the exact make of equipment prevents us from being positive in this area. We only make these observations based on our experience with different but similar equipment. More time would be required to substantiate these indications.

a. Card Settings:

Many of the card settings were stated as being somewhat closer than we are accustomed to. We cannot verify the actual setting, but if these settings are being attempted our experience would lead us to believe a portion of the problems with neps and proper maintenance of cards is caused by this.

Without attempting to detail these closer settings by plant, we will only note they were closer and outline what is acceptable, as the range and ordinary practice in the U. S. on U. S. equipment.

		In Inches		
		Maximum	Minimum	Ordinary Practice
Licker-In to Cylinder		.010	.007	.007
Doffer to Cylinder		.010	.005	.007
Five Points for Setting Flats to Cylinder	Back	.012	.010	.010
	Int.	.010	.009	.010
	Int.	.010	.009	.010
	Int.	.010	.009	.010
	Front	.012	.010	.010

b. Spinning Drafts:

With the exception of the Japanese OM type spinning, most of the best type equipment observed in Indonesia is normally considered to have a practical draft of 35 or so, preferably held to a maximum of 30.

Two plants both having British Platt equipment supplied information indicating drafts on finer yarns above 40 and in one instance as high as 60. Both of these plants were having considerable trouble with quality and ends down at spinning. We repeat, we are not familiar with the claims of the equipment, but the draft would appear to be higher than normal practice, conducive to good yarn and running quality.

Drafts used at GKBI and Tjalatjap #2 were also higher than those to which we are accustomed. However, these plants did not seem to be experiencing as much difficulty in spinning as the two mills mentioned above.

8. Notes on Individual Plant Visits

T. D. Pardede located in Medan

This plant was not operating at near its capacity due to the extreme shortage of cotton fibre. From the production information furnished, a bottleneck appears very likely at drawing at approximately the 120,000 lbs. per week level. At present plant is only using 37,600 lbs. of cotton per week. Assuming additional drawing capacity was added, the plant could operate at approximately 150,000 lbs. per week on existing opening, carding and spinning equipment. Insufficient data was collected to properly evaluate roving capacity.

This operation consists of two plants and is a completely integrated operation through weaving and knitting.

These plants appear to be well managed operations with relatively good equipment throughout. Equipment appears to be well maintained. No major spare parts problems exist. Mill could easily reach capacity if supplied with cotton.

Specific points noted are as follows:

a. More bales should be laid out at opening for better uniformity of cotton mix.

b. Waste is well utilized in the production of blankets and sanitary napkins.

c. Break strength factor was good on all yarn counts from their records.

d. Neps @ 30 per 100 square inches is acceptable but could be improved upon.

e. Card clothing, both metallic and cloth, was in reasonably good condition.

f. In addition to the normal employee benefits, housing and schooling were also furnished employees. The education is probably well above average, judging from conversations on technical matters with their Academy graduates who were technicians and supervisors within the plant.

g. Plant utilizes a preventive maintenance schedule plus, when in a curtailed situation operates all equipment on a planned rotation basis.

h. Lab testing equipment appeared adequate.

i. Machinery balance. This plant ran a greater variety of yarns than most other plants and probably will usually have more imbalance in its operation for this reason, combined with the fact they are an integrated plant and very diversified. For this reason market demands and prices could dictate production levels of different yarn for a better overall operation than might be indicated by the best machinery balance in spinning.

Based on present counts, it would appear the early processes could not support spinning at full production, but this could not be detected during the visit due to the very curtailed operation from lack of cotton.

Senajan located in Djakarta (Central Government)
Due to post holiday absentees, this plant was observed during a period of much less than full operation.

a. Too few bales laid out at opening.

b. Did not make yard-to-yard weight checks for control of laps.

c. Cards were not observed running, therefore opinion on neps was not formed.

d. Lea (skeinbreak) tests on their records indicated much weaker than normal.

e. Reported ends down @ 160/1000 spd. hours is much higher than should be possible.

f. Machinery balance. This plant was apparently designed for 20/1 or an average count of only slightly finer than this. Their projection was that 20/1 would be operated on about 60% of the spindles and 40/1 on 40%. On this basis the early processes in the plant would only run at about 80% of its capacity, or would have 20% excess equipment. As of the visit, the plant had only 50% of its equipment on 20's which indicated an even worse situation. The indicated best balance from this plant is about 10% of the spindles on 40/1 and 90% on 20/1.

Tjipadung located in Bandung

This plant was the plant specifically mentioned in the AID/KSA contract as follows:

"Advise on the steps needed to secure full capacity operation of an English origin, 30,000 spindle plant now operating with 17,500 spindles."

This plant was running 45 of 81 frames in the plant and was planning for 60 frames by the end of January and 75 by the end of March. Six frames could not be operated until spare parts were received.

Management seemed to feel confident the schedule would be met and, based on the time indicated for starting other plants, meeting the schedule would be quite an accomplishment by comparison with other

plants and their record to date in this plant.

The only advice which seems appropriate, therefore, is to follow through on their plans and if a concerted effort is made, we see no reason why the plant could not be operating fully by April, with the exception of the spare parts needed for 6 frames.

a. Too few bales laid out at opening.

b. Observed two laps doffed in excess of 1,000 grams off weight against a stated standard of $\pm$ 250 grams.

c. Spinning was running with extremely dirty equipment and ends down appeared very excessive.

d. Their records indicated the skein breaking strength was fairly good by comparison with other plants.

e. Machinery balance. This plant has projected for June, 1968 operation that the spindles will be distributed 53% on 20/1, 7% on 30/1, and 40% on 42/1. The indication is that this product mix is shifted too much to the finer yarns and that the twisting available could not maintain the projected 42/1 for plying. At the projected product mix the early processes would have only 75% - 80% of its capacity used, and if the projected balance is maintained, would have considerable excess equipment in these processes. Better overall balance would indicate 30% for 42/2, the remainder on 20/1.

Intiteks located at ITT in Bandung (Central Government)

Due to the schedule, a very short visit was made to this plant.

a. Too few bales laid out at opening.

b. Although ends down/1000 spindle hours were stated as being 50, the idle spindles and ends down observed appeared to be very excessive.

c. Slub catchers were often plugged or improperly set.

d. Machinery balance. This plant was apparently designed for a combination of fine and coarse yarns. The spindle speed has been reduced from that originally projected and with the present spindle speed is not a bad balance on 20/1, which all of its spindles were operating on. However, this left the twisting spindles idle and excess equipment. With the reduced spindle speed, either earlier processes will not be utilized on fine counts, or twisting will not be utilized on coarser counts.

Wisoma Ocsaha located in Bandung (Privately Owned)

This mill is spinning primarily rayon staple which would have little connection with P. L. 480.

a. Very old opening and picking equipment which should be and is planned for replacement.

b. The clothing on many of the cards needed replacing.

c. The drawing, roving and spinning equipment was a conglomeration of some very good late model equipment to some very old, inadequate equipment.

d. The plant ran a curtailed schedule due to a combination of a lack of commercial power and requirement of stopping plant diesels during certain periods.

e. Machinery balance is not considered due to the wide range of equipment condition and capacities.

f. Overall, considering the equipment, the yarn quality appeared good.

Bekasi located in Bekasi

This plant was visited while still under construction, and is in the process of erecting equipment.

The plant was originally designed to produce carded 20/1 and 42/2 but was later revised to produce 42/2 and 60/2 combed.

In making this revision, a plant will be put into operation with the following:

a. The opening, picking (scutching), carding and drawing equipment will be utilized to the extent of approximately 60% of its capacity; roving at somewhat less than 100%.

b. Additional doublers, twisters, and winders have been ordered to support this revised plan, while there are a number of Indonesian plants originally designed for ply yarn which have all or a portion of the machinery for these purposes sitting idle.

Although the decision was probably made after careful consideration, the fact that there will not be manufacturers' representatives used in the installation of this Italian equipment is very disturbing. The condition of some of the present plants is considered to be due to the lack of, or insufficient follow through by, the initial technicians from the manufacturers.

This plant in our opinion, is even more critical due to this being both the first Italian and the first combing equipment, to the writer's knowledge, to be installed in the country for yarn production purposes.

Without the responsibility of the start-up under the direction of the manufacturer, there will be little recourse for:

a. Missing or improper parts
b. Failure to meet productive speeds
c. Failure to meet quality requirements
d. Parts which fail due to improper manufacture, settings, repair, or maintenance

Based on experience, we feel some manpower and the basic responsibility for the proper initial operation of the equipment should include the manufacturer of the equipment. For the long run, considering the levels of cost, production and quality as well as the training which is received by the permanent employees, the use of such assistance can usually be considered a bargain at any reasonable price.

GKBI located near Jogjakarta

This plant is operated under a cooperative but the general attitude of the personnel was that of a profit-oriented, well managed operation.

Spinning was integrated with weaving and finishing (bleached fabric).

a. Too few bales laid out at opening.

b. This plant tests every bale for Micronaire and attempts to blend to average of 4.5. This was, to our knowledge, the only plant in the country using this very desirable procedure.

c. Neps at carding were the best observed in the country and good by any standards.

d. Ends down were high according to their records, but still better than most plants.

e. Slub catchers were used on winding.

f. A major problem was being encountered due to problems with lapping at drawing, reducing production and bottlenecking complete plant to some extent. Recommendation - consider securing additional equipment to break this bottleneck which they stated occurred quite often.

g. Overall, labor utilization appeared to be among the best of plants observed.

h. The only real disappointing observation in this plant regarded the level of loom stops which were reported at 8.0 per loom hour. An effort was made to substantiate this and the indication was that this was true. The reason for this level could not be determined, but there would appear to be vast possibilities of improvement either in the yarn, preparation or weaving or a combination of these. Our U.S. standards would expect this construction to be about 1.0 stop per loom hour while as much as 2.0 stops per loom hour would be very excessive.

As recalled, this was the only plant visited which had records of loom stops, and observation would indicate other plants' stops were equally as high, or in some cases considerably higher.

i. Machinery balance - spinning. The plant was well balanced on its product mix, which remains constant, with the exception of an indicated 10% excess capacity on carding and some excess in cone winding.

Bandjaran located in Bandung

This plant started operation in September, 1967 and at present is producing at about 20% of its capacity. The equipment is primarily Chinese with Japanese roving frames.

The progress in starting to date is slow and although the exact starting schedule was not known, a concerted effort should put this plant on-stream by mid-year at the latest.

a. Too few bales laid out at opening

b. Neps were excessive.

c. No ends down checks had been made, but ends down did not appear as high as many other plants.

d. One yarn count being spun at present, 20/1, was being spun with a 3.8 twist multiple for warp, weft and knitting yarn, was resulting in skein break strengths which would be very undesirable for warp yarns for weaving.

e. Machinery balance: This plant was projecting a product mix for its spinning spindles as 45% on 20/1, 27% on 32/2, and 28% on 42/2. Considering the twisting equipment is being utilized quite well with this mix, it is about as good as could be maintained, but would result in an indicated 15% - 20% excess equipment in carding and drawing.

Texin located at Tegal (Provincial Government)

This plant was stated as still being affected to a considerable extent due to the loss of a large number of employees following the attempted Communist coup. Running much less than capacity.

Most of the yarn produced was going into fabrics at the same plant; the fabrics were of almost unbelievably poor quality, but this was affected only to some extent by the yarn quality and greatly magnified by the poor workmanship in weaving.

The production manager, who was the guide through the yarn operation, seemed to have a sincere understanding of the quality level of their production. He more freely discussed the discipline problem which many of the mills indicated, and which is discussed elsewhere in this report.

a. Too few bales laid out at opening.

b. Critical need for reclothing some cards (parts problem)

c. Neps were very high on many cards.

d. Skein break checks indicated low breaking strength.

e. Most slub catchers were open, if on winders at all.

f. Yarn quality observed was poor (graded C/D).

g. Machinery balance. Based on their present product mix of approximately 25% of the warp and filling frames operating on 20/1 and 75% on 40/1 for filling and 34/1 for warp, this plant should also have considerable excess equipment not utilized in its carding and drawing processes.

Djantra located in Samarang

This mill, having mostly prewar equipment, was in very poor mechanical condition. Some general recommendations for the future of this plant are made following the observations.

a. Too few bales were laid out at opening. Considerably less bales were observed being used than were stated as standard.

b. The general atmosphereic conditions throughout the plant were unbearable and records produced indicated the variation in conditions were so poor the possibility of reasonable quality and production levels is out of the question.

c. The neps in the card web were extremely high in many instances with extreme variation from card to card (excluding the waste blends being run).

d. Ends down in spinning, in conjunction with idle spindles, appeared to be from 25% to 35% for the frames in operation. Normal operation might be considered high @ 5% due to the usual causes.

e. Breaking strength for 20/1 yarn was low in spite of the fact longer than normal staple length was being used.

f. Due to the various states of equipment conditions, the balance for this mill was not calculated.

Two points which are considered in the following recommendations were noted as follows:

a. A new building has been started at another location, in preparation for moving this equipment.

b. British technicians who have evaluated the plant estimated $700,000 U.S. in parts only to get the plant running, and $2,100,000 U.S. to bring the plant to a state to make it competitive.

Recommendations:

a. The equipment should be moved, but if the probable atmospheric conditions in the new location even approach those of the present, the building should be air conditioned.

b. Some of the equipment, especially noted in spinning, has deteriorated and been cannibalized to such an extent it should not be considered for operation.

c. Although approximately 30,000 spindles is considered an economical unit, this operation when moved should be reduced to something less than this following a detailed study to determine expenditure required to bring the operation to certain varying levels of productivity. For example: the study may indicate that 90% of the postwar and 60% of the prewar spinning equipment, and the equivalent amount of supporting equipment, might be brought into proper operation for a fraction of that necessary to re-establish the complete plant. In addition, the remaining equipment should furnish a considerable amount of certain spare parts to supply the resulting 24,000 spindle unit for a considerable period of time.

d. Any expenditures in the amounts quoted to establish the plant to full production or to a competitive basis should certainly be channeled toward the plants requiring much smaller expenditure, before such indicated amounts are even considered, if ever for this plant, regardless of its location.

e. Machine balance. Due to the various conditions of the equipment, no attempt was made to determine the best machinery balance for this operation. A much deeper investigation than time allowed would have been necessary to make specific recommendations for this operation.

Setjang - located in Magelang

This plant is equipped with British equipment. Extensive money for spare parts replacement will be needed for this mill ever to become a fully operational unit in terms of its potential capacity. Mill was not started until 1966 which was four years after the equipment arrived. Equipment was exposed to weather and thievery before the mill actually began operation. In addition to the money in foreign exchange needed, mill management should also consider further training of technicians to properly maintain the equipment once the needed parts are purchased.

Specific points noted are as follows:

a. Too few bales laid out at opening.

b. No nep counts at cards are presently made. Neps appeared quite high.

c. Yarn break factor was low and showed considerable variation.

d. Nineteen cards were standing, primarily because of spare parts; a number of others had rusted doffer combs, clothing was in poor shape.

e. Some drawing and roving frames stopped because of lack of spare parts.

f. Spinning was in terrible shape:

(1) 21 frames were stopped for spare parts. Possibly some of these frames could be started up since not all are stopped because of the same parts missing from each.

(2) 5 frames were stopped for mechanical work. 5 frames were stopped for cleaning, 3 frames without roving, 5 frames for yarn count changeover. It does not appear reasonable to have this number of frames stopped at one time for these reasons.

(3) Two frames were stopped for doff. Only 40 frames were running out of 81. Many of these frames showed extreme rust in drafting zone.

(4) In addition to this, the ends down level appeared quite high which further reduces the actual production level that can be expected.

g. Fifteen twister frames - 5 stood because of lack of spare parts. Two frames were in production.

h. No slub catchers in at winders - slub catchers were rusty and removed.

i. Do not use evenness tester - no chart paper.

Tjilatjap located in Tjilatjap (Provincial Government)

This plant having two separate units at one location, was by any standard one of the best operations visited.

Although this plant has some parts problems, they had been able to keep most of their frames in operation. Aprons have been used much longer than they desired. Management seemed to have a grasp of the importance of maintaining mill balance while at the same time considering the market demands. Good central laboratory equipment has been secured, and after training of technicians, should benefit operation.

a. Too few bales laid out at opening.

b. Neps were above average in the old plant, but average in the new plant.

c. Stated ends down per M spindle hours were about 50 average, but during observation appeared somewhat higher.

d. Yarn quality and appearance looked good by comparison with other Indonesian plants and records for skein break indicated to be among the best observed.

e. Supervision seemed to be well informed and alert.

f. Machinery balance. Both of the units at this point would indicate some low utilization of equipment in processes prior to spinning, which would indicate a shift to finer yarns than those for which

they were originally designed. Excess equipment is especially indicated at roving in the #1 unit, and scutchers and carding in the #2 unit. Twisting capacity in the #2 unit appeared to be a bottleneck but since the exact amount of the finer counts which are manufactured to be sold as single yarns was not known, this may not have been a real problem.

Grati located in Pasuruan

This plant was also started recently (1963) and has never reached full capacity. The stated reason for running even less equipment than possible is a desire not to reach production levels that can't be maintained if spare parts are not recieved.

a. Too few bales laid out at opening.

b. Strippers (vacuum) were not yet operational and doffers were very dirty.

c. Ends down and idle spindles in spinning were very high, estimated at 25% - 30% of running frames. Stated ends down of 190 per M spindle hours is excessive for 20's. Frames were operating extremely dirty.

d. Winders were not equipped with slub catchers.

e. This plant projects 52% of its spindle on 42/1, 32% on 20/1, and the remainder on 30/1. A shift to finer counts than for which the mill was designed is also indicated here. On the above mix, considerable excess equipment (as much as 25% or more) would exist in the earlier processes.

Lawang located in Malang

This plant has started recently and has never reached in excess of 2/3 of its capacity due to lack of parts.

a. Too few bales laid out at opening.

b. Control of lap weights was indicated as being very good.

c. Neps were indicated as being very good.

d. Spinning was running very good although they did not know what ends down levels were occurring.

e. From an operational standpoint this mill was operating and apparently producing a yarn of such a quality to rank among the better operations observed. Improvement in labor utilization and improvement in capacity through spare parts are the major areas of improvement potential.

f. Machinery balance. According to the number of twister spindles installed, this plant must have been designed for 100% plied yarns and even then appears to have at least 10% and possibly as much as 30% excess twisting capacity, depending upon the TPI(Twists/Inch) used in the single and ply yarns. As the operation was observed, the total production on its limited operation was in 20/1. When all of the spindles are brought in operation the earlier processes would only support about 75% or so of the spinning spindles. Although more detailed study of the exact conditions would be necessary, it would appear a better balanced operation might be attained by having about 50% of the spindles on 20/1 and 50% on a finer plied yarn with over 50% of the twisting spindles remaining as excess equipment.

Nebritex located in Pasuruan

This mill is located in an old sugar mill building which hurts the operation of the mill from a material handling standpoint. The equipment for the most part is old, but well maintained considering its age and the difficulty of obtaining spare parts. Spare parts were a major problem throughout the plant. Plant is expecting some assistance from United Kingdom grant. The amount expected by the plant is 25,000 pounds sterling. This would appear inadequate for their needs. Management appeared to be doing a good job considering the handicaps that exist.

Specific points noted are as follows:

a. Good mixing of bales at opening process.

b. Card clothing in poor condition on old cards.

c. Low inventory of cotton causing curtailed operation.

d. Need some technical assistance in quality control and wants additional testing equipment to test cotton being received.

e. Break factor relatively good considering condition of some of the parts problems in the drafting zone of the drawing frames.

f. Slub catchers in winding were open.

g. Did a good job of warp preparation especially considering age of slashing equipment.

h. Could do a better job in weaving by demanding better quality from weavers.

i. Reeds and shuttles causing some problems in weaving.

j. Machinery balance. The indications, based on all equipment in place, is that this plant is considerably out of balance, having excess equipment at all processes prior to spinning. However, since much of this

equipment is older and the condition not known, when considering only equipment which is in good operational condition, the balance may be much better.

Tohpati located in Bali.

This plant has had many problems in getting started and still operating at less than 60% of capacity due to parts problems. Parts remain a major cause for not getting this plant to capacity.

a. Too few bales laid out at opening.

b. Due to time of visit, did not see spinning frames operating, but were running fairly clean and ends down did not appear too bad.

c. Labor utilization was very poor, as indicated by running only 60% of spindles with a full standard complement of labor. Even the standard is very generous.

d. Machinery balance. For all practical purposes the same narrative on this subject for the Lawang plant applies here.

C. Power Weaving

As discussed under General Notes on Industry Segments we did not observe a balanced cross section of this segment of the industry, but we do feel enough of the different enterprises were seen, compared to the available statistics, that the overall character of the industry could be determined.

One problem which was usually stated as a major problem in this segment of the industry was that of working capital. As in other sections of this report, this problem was considered and, we understand, is to be covered in Dr. Doyle's report.

Another problem, sometimes given was that the industry could not compete cost-wise with imports.

A more complete observation would seem to be made in a statement, which was a direct quote from the manager of a plant:

> "Our biggest problem is the price of imports is too low and the quality is too high."

This may be partially true but it avoids placing the emphasis on the quality of the domestic production. Other, more rational explanations of the problem included "the relation of price/quality of imports to price/quality of domestics."

The observation of the latter industry officials was similar to our overall analysis of the problem, except it would appear the major factor in this price/quality reasoning is not, or at least should not be, price but in reality is QUALITY.

The KSA team, in addition to observing such a large amount of the production in the plants being produced at such poor quality levels, visited fabric stores or centers on several occasions in various cities throughout Indonesia. Such visits were undoubetedly skewed toward the stores

handling better quality merchandise and handled by for a majority, often approaching 100%, of imported fabrics. Such stores, no doubt, handled the top or near top quality merchandise from domestic producers. However, even this domestic production was always found to be inferior in quality. Such reference to quality here is referring to actual visible physical defects in the fabric, which, of course, will be avoided by the customers excepting possibly where considerable price allowances are made for such quality. Some bolts of cloth had one or even several such defects in every yard. There were virtually no pieces to be seen which did not have a defect at least every several yards.

The imported fabrics were often fabrics which cannot, with present equipment, be considered practical for manufacture domestically, but a considerable portion of imported fabrics were of design and construction similar to those domestic fabrics in the same store or at least were produced domestically.

Dr. Doyle's report is to deal more specifically with the details of cost and cost comparison. The combination of order - delivery time lag, exchange rates, domestic yarn pricing policies, etc., all seem to become involved in any domestic import price comparisons. The KSA team did not make any attempt to verify the claims of competitive price position (excluding the quality) of the imports compared to domestic production.

Again, excluding the quality aspect, it would seem the domestic producers have advantages over imports by:

(1) The labor cost must be as low as and probably lower than any of the major sources of imports.

(2) The policy of domestic yarn pricing seemed to be held at some level below that of imported yarns.

Many of the plants are running only a small part of the machinery and some closed down completely. It would seem the above advantages coupled with continuing costs being incurred in both overhead and labor (due to regulations), the plants should at least be producing as marginal producers, if not at reasonable profits.

All of this considered, it would seem the real problem again returns to quality, and possibly labor utilization either alone, or as it is affected by other factors such as material and equipment.

The continuing discussion on power weaving will be covered by the following subjects:

(1) Outline of Plants Visited

(2) Yarn Quality

(3) Preparation Equipment

(4) Weaving Equipment

(5) Parts Problem

(6) Problems of Consolidating Small Weaving Plants

(7) Possible Quality Mix

(8) Long-range Investment in Power Weaving

1. Outline of Plants Visited - Power Weaving

Plant	Approximate Looms In Place	Approximate Looms Operating	Type Fabrics	Observed Quality
Bandung P.T.	364	97	Sarong, Twills, Shirting, Drapery	Very Low
P.T. Garut	1,200	1,170	Plaid Sarong Ex. Towels (56 Looms)	Low
P. T. Wisma Oesaha	240	186	Print Cloth, Twills Shirting, Sheeting	Fair
Plant in Madjalaja (Name not recalled)	110	42	Drill	Low
Harapan	139	134	Drill, Shirting, Drapery	Very Low
Texin	1,136	800	Cambric, Sheeting Twills	Very, Very Low
GKBI	500	500	Cambric (Biru)	*Best
Infitex	70	60	Cambric, Drill, Shirting	Low
P.T. Daja Manugel	250	240	Shirting	*Best
Nebritex	296	200	Shirting, Sheeting	Low
Kasrie	261	139	Twills, Netting, Blankets, Towels	Fair
Kantjil MAS	243	153	Drills, Shirting, Netting	Fair
Balitex	52	44	Calico, Drills, Matting	Fair
Pardede	162	102	Blankets, Labels	Fair
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The "observed quality" as listed is recognized as not being very precise and is, to some extent, relative for the production within Indonesia. We apologize for having to make comparisons with quality from U.S. plants, but it is really the only true comparison, due to our experience we can make.

With the exception of the mills listed as "best," the level of quality of much of the production could not be considered as first quality goods. Most of the production for the mills listed for any degree of "low" quality would be considered unmerchantable for the use it was originally intended.

Many reasons for this comparative level of quality are covered in the following discussions.

2. Yarn Quality

As can be surmised from the discussion on your manufacturing, the quality of the yarn, undoubtedly, has some bearing on the performance of the weaving plant. Also, as indicated in that discussion some improvement in this yarn quality is certainly desirable and indeed possible.

Due to the other factors involved, as discussed here, which are interdependent to some extent, we could not put a quantative value on the degree to which the yarn quality affects the weaving segment.

The only positive conclusion which can be drawn from this initial study is that the improvement of yarn quality from the domestic plants would indeed be beneficial to the weaving segment and would help put them in a better competitive position regarding both yarn and weaving quality.

This need does not apply to every spinning mill to the same extent, but it does apply to some degree to all including the integrated plants.

3. Preparation Equipment

Preparation equipment is referred to here as the equipment used to prepare the warp and filling (weft) yarns for weaving.

The equipment used in Indonesia for filling preparation included some of the newest and as modern as any available, as well as some so old and domestically produced that we were not at all familiar with these types.

Although proper preparation of filling yarn is important to reaching the optimum in weaving quality and efficiency, and labor utilization, the present equipment for this purpose, used in conjunction with good workmanship should be adequate to fill the present needs of weaving. The labor utilization cannot be expected to be as good on much of this equipment as on more modern automatic equipment, but it was usually so much worse than it had to be, at present, that this would not seem to be an important factor. In most instances, the package sizes were small which could affect the productivity of the looms, as well as the labor but to change this would usually require major changes of the looms themselves which would hardly be justified with the equipment where this would be required. Nothing further will be covered regarding the filling preparation equipment.

Warp preparation equipment can be thought of as basically warping and slashing. Warping is the combining of small packages of yarn into "section beams" which allows high production and maximum potential quality from the sizing (starching) operation. Slashing is the actual application of size (starch) to the yarn to improve its running quality at weaving.

At least two plants, Harapan, and the other plant in Madjalaja, did not have mechanical sizing processes. The operation was performed by hand and, though not familiar with this type of processing, the indication was, as expected, the results were very poor, compared to modern mechanical means. Due to lack of experience in this very old method of sizing, we cannot say conclusively, but our opinion is that it is out of step with the requirements of the industry to produce goods to meet the needs of domestic consumption or compete with imports. The indication would be that a large part of the smaller plants not visited also lacked mechanical preparation equipment.

The remainder of the plants visited did have warping and slashing equipment in varying degrees of modernization. Much of this equipment was rather old and, in general, did not have the latest auxiliary equipment and control devices to allow the optimum in the quality of the warps for the looms. Also, most of the equipment was "hot air," rather than "can" slashers as normally used for cotton in our experience. "Hot air" refers to drying by flow of air; "cans" refer to drying by surface contact. While our experience has indicated the optimum cannot be obtained from "hot air" we do feel that other factors being equal, reasonable success can be obtained from the "hot air" equipment.

The warping equipment, being old in many instances, operated at comparatively slow speeds. Speed of this equipment, as presently installed, should not be considered a major handicap and as such would not, in any way, cause a quality problem. We did observe instances of poor quality from these machines due to the manner in which they were being operated.

a. Creel alignment causing excessive stops.

b. Stop motions working improperly or in instances completely disconnected. In other instances, it appeared the warpers were probably never so equipped.

c. Brakes improperly adjusted.

The slashing equipment was also very old and again speeds were very slow, with the same implications for speed as mentioned above.

The machinery usually did not have the improved features of later equipment and this will, no doubt when applicable, prevent the plants from reaching the optimum which we have seen in past experience.

Such desirable features include:

a. Lack of pneumatic pressure rolls ? look a pressure

b. Automatic stretch control

c. Automatic viscosity and adequate temperature controls

d. Moisture controls

In addition, certain areas of improvement which could have been improved with better maintenance and parts:

a. Poor pressure rolls

b. Improper threading of slasher

c. Improper viscosity of size, hardened, thin, etc.

All of the above items were those observed by the KSA team; there may have been more - equally or more important.

In addition, the workmanship, especially noted at warping, could have improved the operation and resulting quality.

No doubt, many of the plants could improve their operation by better warping and slashing equipment, but again, the degree could not be determined on such cursory observation, with the many factors discussed herein being interrelated.

Warp preparation equipment at the Induks, used to supply small weaving establishments' needs, were also observed operating in conditions similar to the above.

Several of the plants' equipment was operating at better than the general level observed.

Although we did not specifically encounter the problem, we were told that many plants had to use plied yarns due to not having sizing equipment. To do this would normally increase the price of the fabric considerably and should normally demand a premium in the market. Except in a seller's market, the demand for this premium grade fabric probably would be low and the weavers would be at a disadvantage by not having equipment to utilize the cheaper single yarns.

4. Weaving Equipment

The power weaving segment, more than any other of the three major segments discussed in this section, had a wide variety of equipment in terms of age and manufacturer.

When compared to equipment within our range of experience very little, if any, of the equipment could compete on an economical basis. The point of reference here regards the lower speeds at which the looms in Indonesia operate, the lack of automatic bobbin changing equipment and automatic warp stop motions. We are inclined to think, however, that much of the equipment observed, if not typically so, was probably basically as modern as equipment in the countries where most of the imports were indicated as originating. If this indication is indeed so, then the true reason for failure to compete with imports should not be the modernization of the loom itself, but to the extent it may be affected by yarn quality and yarn preparation previously discussed, or to the level of success which the looms are operated. The success may be measured in productivity and quality, which are quite often affected by the same basic causes, but not always so.

Productivity in terms of machines and labor is directly and even proportionlly influenced by the way in which a loom runs. This is referred to as "stops" and indicates malfunctions of the loom or breaks in the yarn which causes the loom to stop and require manual attention. Only one plant, which appeared to be one of the better operating plants, had adequate measurement of this item to give a comparison of the level of stops with our experience. We suspect most of the others were almost as bad, or even considerably worse. This particular plant indicated 8.0 stops per loom hour. On comparable fabrics we would expect the stops per loom

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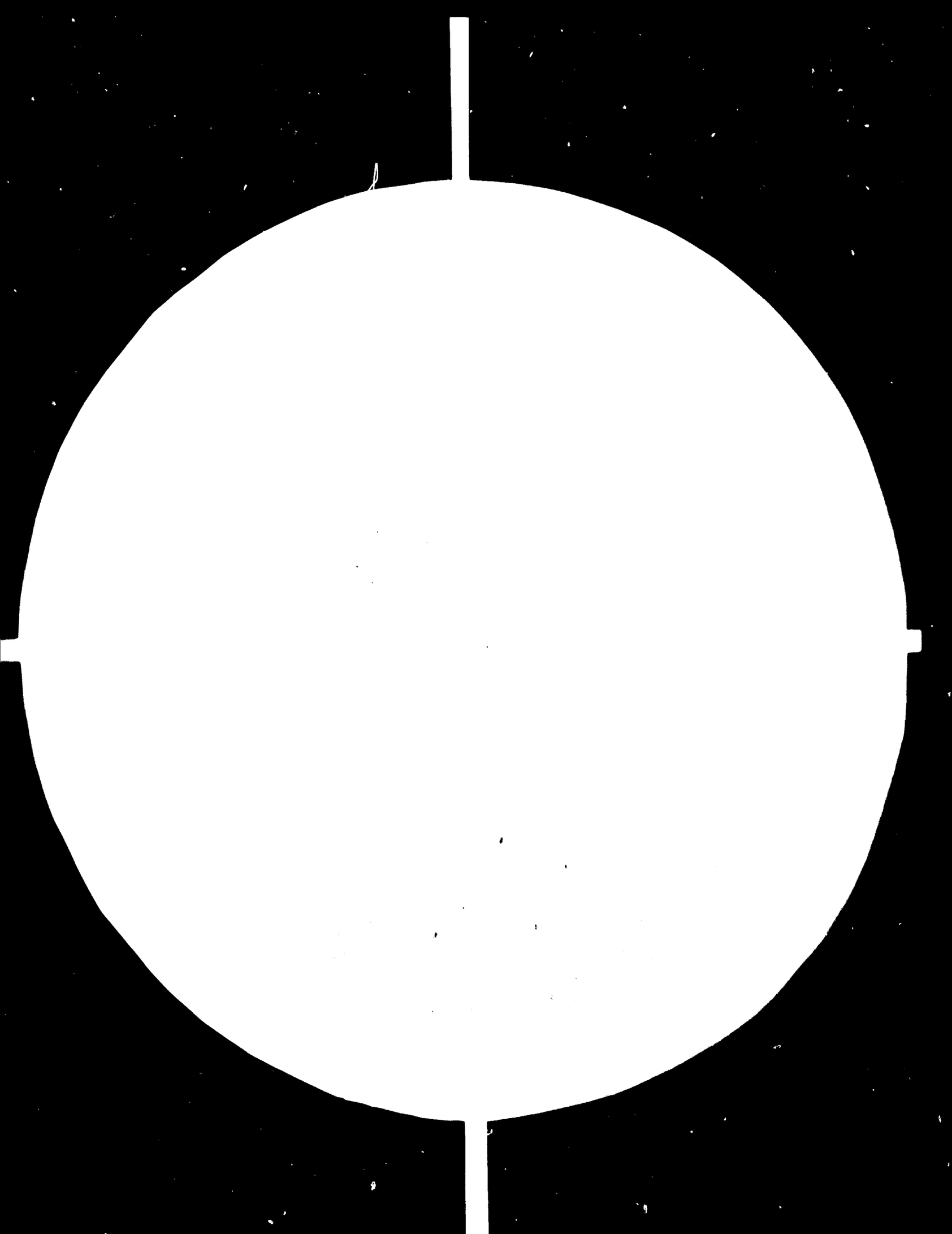

hour to be slightly over 1.0 and at a level of 2.0 would be considered out of reason. The stop level is not considered to be greatly influenced by the lack of automatic features previously mentioned, but due to the yarn and yarn preparation previously mentioned and the maintenance of the looms.

In terms of labor productivity, the best comparison in a weaving plant, especially where "weavers" are a great majority of the work force as in Indonesia, is the comparison of the production of weavers. Weavers operated from 1 to as many as 8 looms in the establishments visited, most usually from 2 to 4. In the U.S. on comparable fabrics, weavers might typically operate from 20 to 30 looms and considering higher speeds and higher efficiencies at which the looms are operated would result in productivity per employee of 10 to 15 times that of Indonesia. This comparison reflects the benefits of the automatic features, as well as the other items discussed here, which could improve the competitive position of the Indonesian plants. Maintenance of looms have an important bearing on this.

Regarding the maintenance of the looms, a number of outstanding items were noted which, no doubt, affected the productivity by loom stops, as well as the quality:

*a. Reeds were often noted as being in very poor condition.

*b. Shuttles were often noted in the same poor condition.

c. Maintenance of harness and heddles was undoubtedly adding to the poor running quality.

d. Protector motions were not operating properly.

*Items (a) and (b) could have been partially the result of poor supply of spare parts.

After considering the yarn quality, preparation, modernization of equipment and loom maintenance there remains one area which was really more outstanding than all of the others. This concerned the workmanship in most but not all of the plants visited, the major exceptions being GKBI and P.T. Daja Manungel, where the workmanship was much better, in varying degrees, to the remainder. The fact that these two plants have somewhat newer looms with some automatic features and better warp preparation equipment not found in the others might be considered to be indicative of the reasons for this better performance. This may be true to some extent, and in addition these two plants were getting somewhat better labor utilization than the others which is, no doubt, at least partially due to the automatic features. In spite of the fact other plants did not have the equivalent machinery, we were convinced all of the difference was not in equipment but to a considerable degree workmanship on the part of the weavers.

The problems may have been compounded due to the other areas of possible need outlined. However, much of the poor quality observed was due to the fact that items of work had been performed improperly and resulted in poor quality. Work performed in the same manner on the newest most modern equipment available would have resulted in the same defects. In some plants the weavers were noted as being children, 12 - 14 years of age, but in other plants where the resulting quality was just as poor, this same observation was not true.

Workmanship is discussed previously in this section regarding all segments of the industry.

In summary, there is much in the way of modernization through new equipment which would be helpful to this segment of the industry but

there is also much that could be done with the equipment presently in place to improve the present competitive cost position in the market, and especially regarding the final fabric quality.

5. Parts Problems

Since this industry was so fragmented and the source of supplies was equally dispersed, during a study of this type, it would have been impossible to attempt to determine either the real needs or the solution to the problem.

No doubt, the problem is not as great as it would be otherwise, if there were not some machine shops in Indonesia which supply a number of parts. We definitely feel the real need for parts may not have been recognized on items such as some mentioned previously - reeds, heddles, shuttles. Even though the loom can run to some extent even where the need for such items is not so obvious, quality and productivity which result are more nearly an indication of the true need than the fact that the machine merely runs to some extent.

As in spinning, if the true potential of the industry is to be realized in production and quality, the parts problems must be considered in its overall role. Where parts must be secured by foreign exchange, it must be remembered that such parts, properly used, should not result in more exchange than the equivalent cost of parts in the imported fabrics, which will invariably result if the domestic production does not compete.

6. Problems of Consolidating Small Weaving Plants

Consideration of this item was specifically outlined in the AID/KSA contract.

There can be no exact formula for establishing the size of a weaving operation. Normally, the tangible considerations would usually indicate the larger the operation the more economically it can be operated. Certain other more intangible considerations are necessary such as location of market, labor availability, diversity of product, and possibly other special considerations for the individual plant.

We have previously indicated the average size plant visited, according to the statistics, did not represent the typical weaving establishment. The average size of the plant visited was 350 looms while the statistics would indicate the size of the plants not visited averaged 29 looms.

If all of the plants averaged 350 looms, which had been established under a free economic environment and were operating with reasonable success, the need for consolidating would be dictated by the forces within that economy. From an initial planning standpoint, the establishment of plants from 500 to 1,000 looms would be a more likely size unit. Without knowing the exact product mix and other factors involved, it would be useless to attempt to be more specific than this.

In considering the possible consolidations of the smaller units into larger units of any size, major technical problems should not be encountered.

The major problem under any free economic system would be the meeting of the minds of the small individual owners in the pooling of assets into one enterprise. This would involve satisfying each individual's interest regarding values of equipment, location of the consolidation, the individual's role in the new enterprise, etc., etc. Certain inducements by the government policies and regulations may be helpful in this regard and be justified when the present state of the industry is considered in conjunction with possible overall economic advantage which could result. Simply stated, this advantage would be a resulting enterprise which produced efficiently and good quality products which would meet the needs of the consumer, while competing with imports, and providing jobs for the population, without protection by high tariffs, or prohibition of imports. The use of inducements by the government to encourage such combinations will be covered further in Dr. Doyle's report.

The only major economic disadvantage which would be encountered would be the expense necessary in providing new buildings to house the consolidated equipment to replace the smaller buildings presently used, and the moving of the equipment into these new buildings. Although the possibility of the elimination of competition may be considered as a disadvantage, such degrees of consolidation as discussed here would probably not result in such a problem.

There would be many potential advantages in the consolidation of the equipment into larger units, including the following major ones:

a. Larger units could afford a higher level of management skills in both the administrative and technical areas of manufacturing.

b. The larger units would be able to establish a better working relationship with the finishing operations (converters) than at present. One of the problems as outlined by one of the major

finishing plant in the use of domestic goods, included the difficulty of securing an adequate supply of cloth of dependable quality from the small scattered plants presently in operation.

c. Normally, volume purchasing of supplies and materials will result in economies in purchases, as well as transportation. Larger plants would, of course, buy items in larger volume.

d. Service departments, such as testing and quality control, shop, and parts manufacture, engineering, accounting, training, industrial engineering, etc. can be established within the economic structure of a large organization to provide the best in personnel and services in these areas of optimizing an operation.

e. The advantages of good yarn preparation equipment can be justified in a larger plant where the investment can be utilized to its capacity by the larger number of looms available.

The construction of the fabrics involved would dictate the amount of warp preparation equipment involved. The following is used as an illustration of what might be indicated for typical modern U.S. equipment. For the typical fabrics run in Indonesia on their present weaving equipment two warpers and one slasher should support 700 to 1,000 looms. This would apply to high volume greige shirtings, sheetings, etc. The price of U.S. equipment - two warpers and one slasher - of this type would probably cost about $100,000 U.S. Based on this type equipment, we might conclude an 800 loom plant would be a reasonable size operation. Considering the possible problems of consolidating this number of small units of looms, possibly 400 to 500 looms with only one warper and one slasher would be more practical.

Before any definite conclusions could be made in this respect, more complete plans of the fabrics, numbers and types of looms, etc. would have to be considered; also, to be considered would be alternate equipment available from other foreign machinery manufacturers which would probably be priced lower and may have different production capacities.

f. The establishment of larger organizations producing acceptable quality products in volume would not only be able to supply the present finishing plants better, but could be a factor in highlighting the need and economic potential in the establishment of more modern finishing plants.

g. Certain economies in electrical power requirements could probably be realized in a larger consolidated operation.

h. Total working capital requirements of a consolidated operation should be less than the equivalent capacity of the smaller units.

These above discussions outline the possibilities of improvement of this segment of the industry through consolidation of some of the smaller units. The mere consolidation, in itself, would not effect the improvements. Our evaluation is that consolidation probably will be necessary or present small operations will fade out to larger, more modern, well-managed enterprises before this segment of the industry will ever be considered as meeting the economic needs of the country.

7. Possible Product Mix

To "Advise on possible quality mix of best existing large weaving mills of approximately 200 looms" was also a specific part of the AID/KSA contract.

Based on the statistics regarding the size of the weaving enterprises, we must assume we saw a good cross-section of the plants, if not most of those, having from 150 to 300 looms. Most of the plants of this size were weaving:

Plain Shirting
Sheeting
Print Cloth
Plain Twills
Drills
Netting

Other than the above items, a few looms were observed on yarn dyed drapery/upholstery, blankets, calico.

Most of the basic fabrics and the calico are woven from natural yarn as it is shipped from the spinning plants.

Considering the present needs of the population, within the limitations of the yarn available from the local manufacturers, we consider these to be the basic fabrics which the plants should be producing.

From a manufacturing standpoint, it can usually be assumed the manufacture of a single product can be done more successfully than by a highly diversified manufacturer within the same plant. Considering all of the possibilities of combining a broad line of items into one plant, by comparison, if all of the basic items above

were combined in one plant, as they were in some instances, it would still not be considered as a highly diversified operation. Based on this and our experience, we consider these fabrics to be compatible for production within the same plant, although not necessarily an ideal situation.

In a free economy, it is quite unlikely that a plant can choose to manufacture only one product and remain stable through seasonal demand changes, economic fluctuations and trends in consumer taste. Therefore, to meet market demands, the plants must manufacture those items which they can sell profitably. All of the basic items mentioned are compatible with most of the basic equipment and any combination of these (plus the netting where equipment is applicable) could reasonably be manufactured in a 200-loom plant. To restrict the diversification to as few items as practical would be desirable from the standpoint of manufacturing and marketing of the product in volume.

In plants of this size the use of dyed yarns, as we noted in only a few instances, would not seem practical. Such fabrics would more reasonably be run in a plant of this size, or larger, which specialized in these type fabrics. In this manner, the necessary modern equipment and the necessary technical skills could be fully utilized.

In summary, the present fabrics being woven, restricted to as few items as can be successfully marketed would be desirable and acceptable in even a 200-loom plant.

8. Long Range Investment in Power Weaving

The need for improved weaving equipment and the auxiliary yarn preparation equipment has been indicated in the previous discussion. Certainly, the improvement in workmanship which is needed on much of the present equipment would also be just as necessary on the more modern equipment. Otherwise, the investments would be in vain.

The most pressing need would seem to be that of improving the yarn preparation equipment, especially the warp preparation. This would be more practical, due to the investment required in larger enterprises which could support the investment. Successful operation on the part of the plants should then logically result in improved weaving equipment to the extent the capital expenditures could then be justified by an improved return on such expenditures.

In addition, it would be desirable to have one or more new plants, consisting of modern preparation and weaving equipment, constructed. To have at least one or more new plants started, after proper consideration of the market potential, and using reasonable precaution to insure the plant truly has the opportunity to succeed in a free market, could be considered a model or basis for the need of additional plants.

We felt the weaving operation at P. T. Daja Manungal already approached the type of operation which would indicate reasonable success. The equipment was not the most modern available, but did have some automatic features. In addition, the quality did indicate that good workmanship is possible, and the operation of all looms available on a full 6-day, 2-shift schedule would indicate there is a demand for domestic production of good quality.

Although not the most desirable approach, consideration of investing in used machinery (looms) from the U.S. or other countries might be a practical approach, where many of the automatic features could be secured with a much smaller investment.

The primary problem in consolidating plants, modernizing equipment, or building new plants would seem to be that of convincing investors, either domestic or foreign, that such investments would be practical and profitable. This involves many political and economic considerations of the present state and future prospects of the economy. Dr. Doyle indicated his intentions of discussing some of the financial aspects of incentives to encourage investment in this and other segments of the industry.

It seems appropriate at this point to mention that one private enterprise, apparently well-managed, in another segment of the industry was considering, or even negotiating, the establishment of a 30,000-spindle - 800 loom plant to produce cotton/dacron fabrics.

It also seems significant that the venture must have been considered for the following apparent reasons:

a. Domestic production of good quality was not available to supply its finishing capacity.

b. Virtually all fabric finished was imported at present

c. The future need to supply the consumers' demands for practical dacron/cotton fabric was being anticipated by this firm.

It would be desirable for all decisions regarding investment, either private, goverrment or government-influenced to be made on a sound analysis of needs, rather than political considerations or expeditious decisions.

D. Finishing

During the visit to Indonesia the KSA team visited 14 plants performing finishing of various types. According to statistics of the industry, there are 63 establishments which would indicate less than 25% of the plants were visited. Based on the number of "jigs" in place, according to statistics, the indication is that about 30% of the capacity was visited. Based on the fact that many plants were said to be closed completely, it could be assumed we may have visited plants presently handling nearly 50% of the domestic finishing production.

One indication, for which we never really understood the reason, was that a considerable portion of the goods were being sold in the greige. Of course, these could be going to other finishing plants but this occurred to a considerable extent at those plants which also have weaving operations. Possibly more than we can realize, the consumers were using unfinished goods, or were possibly dyeing the fabrics themselves before use.

As stated elsewhere in the report, it was impossible to establish the capacity of the finishing segment of the industry. It was obvious that most, in fact, all of the operating plants visited were producing on a curtailed basis and overall this segment was probably producing at about 50% of its capacity.

The plants visited were primarily finishing the basic types of fabrics which have been indicated as being produced in weaving. The major exceptions to this included P. T. Garut which was finishing its own plaid sarong, Ratatex and P. T. Daja Manungal which were finishing

imported greige goods, and certain of the integrated plants, towels, blankets, some knit goods, etc. to a limited extent.

The remainder of the discussion on this segment will be included under the following headings:

1. Outline of Plants Visited
2. Quality
3. Equipment
4. Long Range Investment - Finishing

1. Outline of Finishing Plants - Visited

Plant	Primary Operations and Comments
Pardade	Dye, Bleach, Screen Print - Modern equipment, well maintained, good quality
I.T.T.	Dye, Bleach Pilot Operation - Mostly poor equipment
Bandung P.T.	Dye (also yarn dye) - Some equipment adequate
P. T. Garut	Bleach, Dye, Sarong Finish (also yarn dye) - Adequate finish for sarong production
P.T. Wisma Oesaha	Dye, Bleach, Screen Print - Not operating during visit - Mostly inadequate equipment
J.P.I.P.K. (Induk)	Dye, Bleach, Screen Print (also yarn dye - commission warp prep.) - Adequate equipment, poorly maintained
Texin	Dye small portion on continuous range - Poor finished quality
Infitex (Induk)	Dye, Bleach (also yarn dye - commission warp prep.) - Not operating during visit
P.T. Daja Manungal	Bleach, Roller Print, Continuous Dye - Good finished quality, modern equipment
Kasrie	Dye, Bleach (also yarn dye - special finishing processes) - Good quality with some inadequate equipment.
Kantjil Mas	Dye, Bleach (also yarn dye) - Relatively good quality with some inadequate equipment
GKBI	Bleach Cambric only - Good finished quality - modern equipment
Ratatex	Bleach, Roller Print - Continuous Dye - Includes mercerizing - Good finished quality
Balitex	Dye, Bleach - Poor finishing quality

Due to curtailed operations, the primary operations outlined above, may be incomplete. All screen printing observed was non-automatic. We understood there are some automatic machines in use in the country.

A number of the smaller plants were not using the bleaching equipment at all. Yarn dyeing equipment was usually standing, or operating at very low capacity.

2. Quality

The quality of the finished fabric is only partially dependent on the actual finishing processes but also reflects the quality of the yarn and weaving processes.

The quality of the cloth from the typical finishing plant did reflect the quality of the yarn and weaving processes previously discussed. Considering most fabrics and most finishing procedures, very little can be done in finishing to improve on the quality problems from spinning and weaving. Therefore, considering all of the processes involved in fabric production, a considerable portion of the domestic production from finishing, at present, would have to be of low quality.

There were several outstanding exceptions to the generally poor quality:

GKBI, finishing cambrics primarily from their own looms, indicated good overall quality, including finishing.

Ratatex and P.T. Daja Manungal also appeared to have produced good quality in finishing, combined with good imported fabric - result - good overall quality.

Some of the other plants finishing quality appeared to be fairly good, especially considering the condition of the equipment, which varied from adequate to somewhat inadequate, sometimes within the same plant. On some occasions, it was rather difficult to determine whether

the finishing or prior processes were the major problems in certain general fabric appearances.

One problem, which was not evident in the greige cloth from weaving was the appearance of shaded (off color) bars across the width of the dyed cloth. We observed this on numerous occasions, and were of the opinion (we could not be positive of this) that the problem lay in the improper "blending" of cotton in the spinning plants. This is discussed further under that subject for that segment of the industry.

The success in finishing depends on numerous factors, many involving chemical processes, which were impossible to evaluate during a study such as this. We feel confident that the quality of the water in some plants was affecting the quality, but could not determine whether it would be considered intolerable. Other plants, in planning, had recognized the need and provided for an adequate supply of water conducive to good finishing.

There were other areas which obviously were having an effect on the quality. The two most outstanding were the manner in which the cloth was handled and the condition of some of the equipment.

Improper handling in finishing can result in dirty, soiled and damaged fabrics. The normal procedure is to use special trucks between processes in the handling to avoid such unnecessary losses. In many instances, we observed the handling to include piling of cloth on floors and transporting in such a manner the cloth became soiled or damaged.

The most obvious problems regarding equipment maintenance involved the conditions of many of the rolls on the various equipment in the plants. This may have been improper procedures causing excessive damage, or simply a replacement supply parts problem. We are

quite sure the latter was a major problem, regardless of the reason the rolls are in their present condition.

The most outstanding example of this was an integrated plant which had comparatively good weaving and even dyeing quality, and was ruining every yard on a calender which had a badly damaged and worn roll. There were many other pieces of equipment, to a lesser degree, causing the same results. Again, this was not true at all of the plants.

The problem of supplying spare parts, and especially the use of foreign exchange to secure spare parts, has been discussed in the spinning and weaving sections. The problem must be faced with the same alternatives. Either the necessary parts to improve and/or maintain quality must be provided, or domestic production will not be acceptable in a free economy.

Other than the appearance quality of the products, there are other fabric characteristics which indicate the "overall quality level." These involve shrinkage resistance, wrinkle resistance, soil release, optimum strength, color fastness, hand or drape of material, etc. These might be considered by some to be luxury characteristics. The first three characteristics were not to our knowledge added through special processes at any of the plants. Mercerizing for strength and lustre was involved at only one plant, although we understood there was at least one other plant having this equipment. The last two characteristics were apparently of major concern at only a portion of the plants. Although some may consider these to be luxury characteristics, they are desirable and improve the serviceability of the fabric. Competition will, we feel, require greater consideration for these characteristics, even to the extent of the additional equipment which will have to be added.

3. Equipment

As has already been implied, the effectiveness of the equipment in terms of that which is available varies to a considerable degree from plant to plant.

In order to consider the industry's position in this regard, we are listing a simple outline of the processes usually considered necessary to produce quality goods:

Basic		Alternates
Singe		
Desize	Can be combined	
Scour	Can be combined	
Bleach		
		Mercerize
Dye or Print		
Finish (Stenter)		
		Calender
		Sanforize

The three finishing plants visited which were equipped with adequate equipment for their operations have previously been mentioned: Ratatex, GKBI and P. T. Daja Manungal. These should be considered as models for their type of production. Pardade appeared to have adequate equipment and P. T. Garut also for their respective purposes. All of the others had inadequate equipment to some extent. Remarks which follow exclude reference to these plants.

Some of the plants did not have singeing equipment. This is needed for good quality.

Much of the equipment used for scouring and desizing was very old but, in most instances, used to its best advantage could fill the needs. Some operations did not have equipment for desizing and scouring other than on the jigs. Quality indicated the operations on the jig, if performed at all, were not adequate for good dyeing. This, in conjunction with unbleached fabrics, resulted in poor dyeing. Jigs can be used successfully in preparing cloth for dyeing.

Bleaching was usually performed by discontinuous processing. The bleaching operation was not operating at many of the plants, but in general it again appeared the equipment should meet the needs if properly used. It certainly is not modern in terms of productivity or labor utilization, but considering the investment required for the volume at most of the plants, such investment could not be justified.

As stated previously, mercerization was not usually performed at the plants. Although desirable to compete with certain higher quality goods this, in our opinion, is not a factor for the present production at this time, or anytime in the future until many of the other problems are solved. It would be foolish to add mercerization costs to most of the quality being produced.

Depending on the exact processing routine, drying of fabrics may be performed between several different steps. Some plants had simple can dryers adequate for this purpose while others still resorted to air drying, which among other things subjects the cloth to the possibility of considerable damage and soil. Some plants definitely needed better drying equipment.

Most of the dyeing equipment in Indonesia were "Jig" type machines. Some of the jigs were old and out of date, even by Indonesian standards, but at present capacity most such jigs were not in use. Dyeing

can be successful on this type machine and considering the volume requirements versus the cost of more modern high capacity machines, we cannot recommend investment in this type machinery at this time.

Screen printing was observed at only two plants, and these were non-automatic machines. Automatic screen printing machines are higher production machines, and were being considered for installation by some firms. Since equivalent quality goods can be produced on non-automatic machines, investment in this equipment prior to the time the equipment to meet other quality standards, is highly questionable.

Finishing was performed in each plant on conventional stenters, and was usually followed by a calender. Most of this equipment was old and slow. In some instances, new machinery was said to be needed while the indication was that proper maintenance of the basic machine and auxiliary equipment would have fulfilled the needs of present requirements. Better finishing formulas were indicated as being needed in many plants.

In summary, compared to equipment available today, much of the equipment leaves much to be desired. However for purposes of improving this segment to meet its present needs, only selective purchases of equipment to fill the needs of the basic requirements of quality production is indicated.

4. Long Range Investment - Finishing

This subject can only be discussed in terms of the success in improving the present weaving industry and additional investment (expansion) in that segment of the industry. Our best estimate from the general statistics available would indicate the present finishing capacity must be approximately the equivalent to that of the power loom weaving industry. The hand loom industry apparently did not utilize any appreciable amount of the finishing capacity and is therefore not a major factor.

As indicated in the previous section, major capital investment in complete plants would be difficult to justify as the present volume and quality of weaving could not support such plants. Rather, it would seem the short term and long term needs of the present plants would require investment in specific pieces of equipment, either new or replacement, as it can be truly justified by the need for either improved quality or increased production. Otherwise, the investment should be made in either improving the present equipment and/or securing technical help.

Before any new finishing plants could be planned, the present fragmented nature of the weaving may have to be consolidated to some extent as discussed elsewhere in this report. Actually expansion of weaving may be required before it could be justified.

Based on our evaluation of some of the present problems, and the fact that the integrated plants were typically producing higher quality goods, the expansion of spinning, weaving and finishing as integrated units, would probably be the most probable approach. This has been discussed earlier in Section II.

Major long term investments in expansion of the finishing segment would therefore appear to be dependent on similar investments in weaving.

E. Miscellaneous

1. Institute of Textile Technology (I. T. T.)

Dr. Doyle suggested we consider I. T. T. in our recommendations.

During the time at I. T. T. we did not have the opportunity to observe all of the campus or equipment. Due to the time of day, some of the areas were closed. Our recommendations were therefore based partially on what we observed, and otherwise based on the areas which indicated more detailed study.

The 8,000 spindle spinning plant at I. T. T. has been considered under the spinning segment, and will not be covered here, except to state that the Institute is fortunate to have an operating unit so easily accessible to the students and faculty.

We understand that I. T. T. has a primary responsibility in the research field as well as education. We are not qualified, by our visit, to comment on the effectiveness in fulfilling this responsibility, because we could not determine what projects or areas of research they they were presently undertaking. We feel confident, based on the industry's needs, in recommending that improvement in and expansion of the research activities from whatever their present level, is needed for further development of the domestic industry.

We did not investigate the curriculum of study. We were told, and cursory observation would indicate, a dire need for textbooks.

Observations would also indicate the equipment for both spinning and weaving study was sufficient for the needs of the school. There appeared to be an outstanding need for virtually every type of dyeing and finishing equipment. Laboratory equipment appeared reasonably adequate.

The needs of the Institute were discussed with Dr. Doyle who, being an educator, was in many respects more qualified than the KSA team on this subject.

We agreed the Institute should consider outside advice in each of the areas of education and research. The use of two individuals would be indicated, but if only one could be obtained, possibly this would suffice.

In the field of education, a textile educator would be desirable. The initial period, one to three months depending upon the depth of an initial study, should result in recommendations. We would estimate at least the remaining portion of a year would be required to implement the short term recommendations.

In research, a person experienced in broad research activities, with educational and manufacturing background, would be desirable. Such an undertaking would probably require a minimum of one year to establish the policies and administration, and put together the personnel to carry such a program.

If one person had to be used for this dual responsibility, the initial study of the educational needs, followed by simultaneous implementations and research activities, would be recommended. Naturally a longer, rather untimely period would be required to obtain the same results. The best combination of the desired background should be sought.

Regarding the equipment requirements, such equipment should be sought from machinery manufacturers who have an interest in further sales of equipment in Indonesia. Either new or relatively modern second hand equipment would suffice.

2. Second and Third Shift Operations

This subject is covered based on the original draft (see Statement of Work) "Analysis of labor problems as they may affect rate of utilization, particularly second and third shift operations." This was felt to be a minor consideration for the KSA team.

The labor problems as they may affect the rate of utilization, in general, have been covered in previous sections of the report.

Regarding second and third shift operations, we can only speak from experience. With minor limitations, the second and third shift operations can be just as successful, without additional labor problems, as a day shift operation. Furthermore, a considerable number of plants in Indonesia were operating three shirts, and at least a portion (if not all) of these plants were operating without indications of major problems in this regard. We must assume the question arose from problems in a particular plant or locale. Under any condition we feel the problem, properly handled, can be overcome to take full advantage of major capital investments.

3. Transport and Warehouse Problems

This item was also noted in the original draft but again was of minor consideration to the KSA team.

There were some instances of some poorly located plants, but by and large it would seem the plants are somewhat concentrated by areas of population. Other instances of poor location of particular segments of the industry in relation to the other segments were noted.

We understood part of this resulted from political considerations and it seems useless to dwell on the subject further. Certainly future expansion should be based on need which takes into account raw material, intermediate, and market transportation of goods.

Most of the enterprises seemed to have few, if any, problems with respect to warehousing. In fact, most seemed to have an excess of storage, assuming reasonable receipt of raw material and control of finished inventories.

4. Staple Fiber (Rayon)

The question arose at some point regarding the advisability of some plants converting to the processing of rayon fiber.

Rayon does seem to be used to a considerable extent in the hand loom industry and one plant specializes in the production of rayon yarn and fabrics.

We did not have statistics to indicate consumption of rayon yarn by areas or even in total. The hand looms (improved) on Bali did use rayon yarn in a major portion of its production. We estimated such consumption would be only a small part of the production of the 15,000 spindle Tohpati plant on Bali, and concluded it probably would not be practical for any plant to specialize in the production of rayon yarn for sales.

Should cotton supplies become short, or the price differential between cotton and rayon become somewhat greater, there may be reason to consider substituting 100% rayon fabrics for some of the present cotton goods. The decision would have to be based on the probable market acceptance of a reasonable volume of such fabrics.

Industry Capacity and Domestic Requirements

Consideration of the overall capacity of the industry was not considered a significant part of the KSA study. However, in order to get a broader picture of the industry from the information available, the following was noted: The statistics regarding production, consumption, weaving equipment, etc. was the best available although the accuracy cannot be verified by the writer.

The government bases its annual consumption on a desired 7.45 meters (8.15 yds.) per capita, estimates the population for 1967 at 112 million and for 1968 at 115 million. The average fabric is considered to be 7 meters/kilogram or 3.47 yds./lb. (yarn bales = 400 lbs./bale)

Based on the Ministry estimates for 1967:

	Equivalent Yards	%
Domestic yarn production - 100 M bales = 40,000,000 lbs. =	138,800,000	18
Imported yarn - 53 M bales = 21,200,000 lbs. =	73,564,000	10
Imported textiles (includes finished garments)	558,829,000	72
	771,193,000	100%

or for 112,000,000 population = 6.88 yds./capita

The above would indicate a great majority of the textiles were imported and only 18% were manufactured from fiber to fabric.

1968 Ministry Projection

	Yards	%
Domestic yarn production = 165 M bales = 66,000,000 lbs. =	229,020,000	24%
Imported yarn 200 M bales = 80,000,000 lbs. =	277,600,000	28%
Required imports to meet projected needs	467,430,000	48%
Projected needs 115,000,000 population x 8.15 yds.	974,050,000	100%

The 1968 potential for domestic yarn production is certainly within the above projection; however, our best estimate was the domestic yarn production for the year 1968 would probably be closer to 130 M bales unless progress toward improved operation is accelerated above that observed. Our estimate of the annual rate of production during the January visit was 107.5 M bales, and the estimate of the maximum potential based on present or projected product mix is 198 M bales of cotton yarn and 4 M bales of rayon yarn. This assumes the 474,372 spindles in place, or being erected are producing at reasonably good efficiency. (Excluded from these calculations are Plants Siantar, Kasa Husada and Pembalut Indonesia which we did not visit and were told were basically not cotton type fabric manufacturers.) The projections are also made on present hours/week for normal operation.

The maximum spinning capacity indicated in comparison to total projected consumption for the present population is 29% of requirements.

The weaving industry is so fragmented the statistics available are not considered accurate but the best estimate of weaving potential was considered approximately as follows:

Power looms: Est. 25,000 @ 160 picks/min. average
Average 60 picks/inch @ 60% efficiency
with 7-hour shifts and 250 days/year =
117,000,000 yds./year/shift operated

Hand looms: Est. 250,000 @ 6 meters/day average
for 1-shift operation
409,000,000 yds./year

To consolidate the looms potential:

Although some power looms operate 3 shifts, others will probably never be brought into production, so it seems reasonable to assume a two-shift operation on the average for all looms is the best that will probably be attained.

For the hand looms the estimates of the number of looms actually running varied to such an extent the figures were completely useless. Based strictly on an estimate that the hand looms, considering market demands, quality and cost will probably never operate at better than 25% capacity.

Based on these assumptions:

			Annual Yards
Power looms	117,000,000 yds/shift x 2 shift	=	234,000,000
Hand looms	409,000,000 yds. x 25%	=	102,250,000

These assumptions would indicate the industry has the potential to weave nearly 50% of the projected needs. We must point out, however, that the industry is apparently operating at probably less than 1/2 of this potential at this time and until quality and costs are improved as discussed elsewhere in this report, the industry will probably continue to run at that level or less, unless other forces are brought to bear on the trend.

The Ministry estimated the 1967 production at 245,000,000 yards and forecast 500,000,000 yards for 1968. However, the industry is now producing much below this. The combination of the indicated lower than projected imported yarn and our estimate that the domestic yarn production will fall short of the projection, would suggest imports for the year probably will not be much different from 1967 or consumption will be much below that projected.

The finishing capacity could not be evaluated as only a cross section of the finishing plants were visited and statistical information regarding machinery capacity was not available. The present equipment was not running at anything approaching its capacity due to the low production from weaving. The quality of some of the final finished goods was affected by the weaving quality and even aggravated in many instances by poor finishing. Some of the better finishing plants were operating strictly on imported greige goods, even then at less than potential capacity. It appeared there probably was enough finishing capacity, although it needed improvement in many instances, to take care of the weaving production for the foreseeable future.

The knitting industry was not studied in any detail, as only six such establishments which were probably less than 5% of the industry were visited. The previous discussion on spinning and weaving capacity did not take into consideration the yarn requirements of knitting which would affect to some degree the indicated yarn available for weaving. Considering the many assumptive projections, it was not deemed practical to even attempt to adjust the indications by the knitting requirements. As in weaving, we did find knitting was operating at somewhat below the potential capacity, as many machines were idle and in two instances, the plants had completely stopped their production on cotton knit goods.

Appendix I

Itinerary of KSA Teams - Indonesian Visits

Date	Consultants	Plant Name	Location	Type Operation
1/8	D, T, B	Textile Ministry	Djakarta	Administrative
1/9	D, T, B	Senajan	Djakarta	Spinning
1/9	D, T, B	Persodjo	Djakarta	Knitting
1/10	D, T, B	I. T. T.	Bandung	Textile School
1/10	D, T, B	Intiteks	Bandung	Spinning
1/11	D, T, B	Bandung P. T.	Bandung	Weaving, Finishing, Knitting
1/11	D, T, B	Tjipadung	Bandung	Spinning
1/11	D, T, B	P. T. Garut	Garut	Weaving, Finishing
1/12	D, T, B	Patal Banjaran	Bandung	Spinning
1/12	D, T, B	P. T. Wisma Oesaha	Bandung	Spinning, Weaving, Finishing
1/13	D, T, B	J. P. I. P. K. (Induk)	Madjalaja	Weaving
1/13	D, T, B	Power Loom Enterprise (Name not noted)	Madjalaja	Weaving
1/13	D, T, B	Harapan	Madjalaja	Weaving
1/13	D, T, B	Hand Loom	Madjalaja	Weaving
1/14	Travel to Tegal - Central Java			
1/15	D, T, B	Texin	Tegal	Spinning, Weaving, Finishing
1/16	D, T, B	Tjilatjap	Tjilatjap	Spinning
1/17	D, T	G. K. B. I.	Medari	Spinning, Weaving, Finishing
1/17	B	Setjang	Magelang	Spinning
1/18	D, T, B	Infitex (Induk)	Solo	Finishing (Warp Pres.)
1/18	D, T, B	P. T. Daja Manunggal	Salatiga	Weaving, Finishing (Printing)
1/18	D, T, B	Cooperative Center	Solo	Administrative
1/18	D, T, B	Hand Looms	Klaten	Weaving
1/19	D, T, B	Djantra	Semarang	Spinning
1/20	D, T, B	Hand Loom Operation	Pekalongan	Weaving
1/20	D, T, B	Batik Dyeing	Pekalongan	Dyeing (Pilot Knitting)
1/20	D, T, B	Hand Loom Operation	Pekalongan	Weaving, Printing

Appendix I

(continued)

Date	Consultants	Plant Name	Location	Type Operation
1/21	Travel to Surabaja Area - East Java			
1/22	B	Nebritex	Pasuruan	Spinning, Weaving
1/22	T	Grati	Pasuruan	Spinning
1/23	T	Lawang	Malang	Spinning
1/23	B	"Kasrie" Pabrik Tenun	Near Bangil	Weaving, Finishing, Dyeing
1/23	B	Kantjil Mas	Bangil	Weaving, Finishing, Dyeing
1/24	T, B	Ratatex	Surabaja	Finishing - (Printing)
1/24	T, B	Aseli	Surabaja	Knitting - (Garments)
1/26	T, B	Tohpati	Bali	Spinning
1/26	T, B	Gunung Wisesa	Denpasar	Knitting, (Garments)
1/26	T, B	Balitex	Denpasar	Weaving - Finishing
1/26	T, B	Hand Loom (2 operations)	Denpasar	Weaving
1/31	B	T. D. Pardede	Medan	Spinning, Weaving, Finishing and Knitting
1/31	T	Bekasi	Bekasi	Spinning
2/1	D, T, B	Finance Ministry (with other officials attending)	Djakarta	Administration

In addition, conferences and discussions were held with members of the U. S. Embassy on a number of occasions, during the first day and the last week of the KSA visit. A "country meeting" was held at the Embassy 1/30/68.

*D = Dr. Len Doyle

T = Gerald Turbyfill
B = Al Batts
} KSA Team

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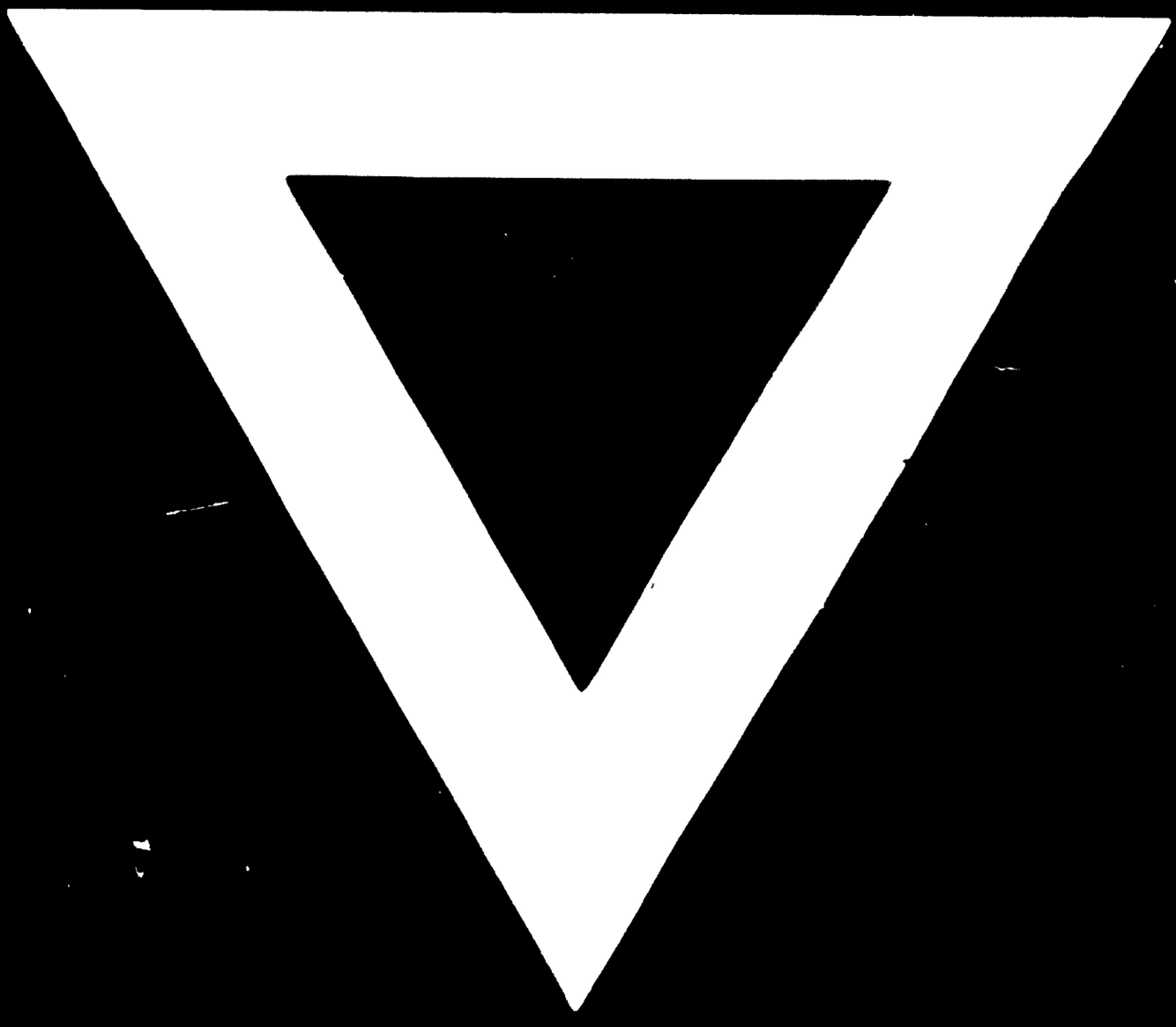

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