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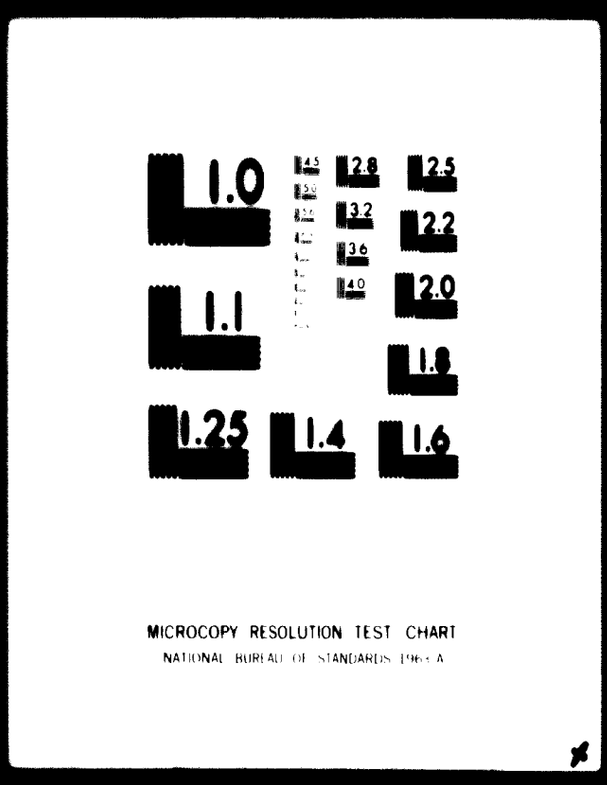
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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANISATION

MANAGEMENT CLINIC MISSION

WOOL INDUSTRY: PAKISTAN

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Contract 71/56

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

FINAL REPORT — MANAGEMENT CLINIC MISSION — Contract 71/56

WOOL INDUSTRY: PAKISTAN

Team Members: International Wool Secretariat, London, England.

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Date of Team arrival at U.N.I.D.O., Vienna;	17th November 1971	(Briefing)
Date of Team Departure to field (Karachi)	22nd November 1971	
Date of Team return to Vienna	9th December 1971	(debriefing and reporting)
Date of Team Departure to U.K.	18th December 1971	

INTRODUCTION

Management Clinic Team Objectives: Pakistan Wool Industry

(1) To demonstrate to management how to achieve maximum effectiveness in the prevailing environment.

(2) To identify the problems of the industry, both external and internal.

(3) To give recommendations for the solution of the problems, both short term (i.e. on-the-spot) and long term

(4) To make over-all management development recommendations in matters of organisation and planning

(5) To make an analysis of marketing, financial aspects and development of products

(6) To recommend technological improvements and suggest vertical or horizontal integration where applicable

Three woollen/worsted manufacturing concerns were selected as being typical of the industry and the team concentrated on these in the categories of a small company, a medium concern, and a large company.

Team activity is divided into a section on management, a section on marketing, and a section concerned with technology and productivity.

Pages 53 to 64 are devoted wholly to the subject of raw wool production, raw wool quality and raw wool marketing, both export and domestic markets.

In order to respect the confidence of the various managements and personalities interviewed during the mission, no names are given in the report and the mills used as case-studies are identified under the code designations of mill "x", mill "y", and mill "z". The report also contains a lot of background information gathered from several concerns other than those under the heading of mills x, y and z, which was obtained by the team leader during an earlier preparatory mission to the Pakistan wool industry.

<u>The External adverse influences</u> are identified as fundamentally:-

(a) Poor raw wool quality due to lack of planning in the raw wool production sector, and the indiscriminate mixing of good and bad qualities of wool at shearing and packing stations.

(b) The effect of the "Bonus Voucher" scheme of foreign exchange control.

<u>Internal adverse influences</u> are identified as management apathy, lack of the full utilisation of existing technological resources, ineffective employee-training schemes, lack of realistic cost control due to "Seller's Market" conditions in the domestic field, and for the same reason, failure to attack the export market with sufficient energy.

The Management Clinic Team gave on-the-spot advice on all the problems identified, and this report reinforces the recommendations with some enlargement which in documentary fashion is applicable in some measure to all concerns engaged in the manufacture of yarns and fabrics in the Pakistan Textile Industry engaged in the utilisation of both indigenous and imported wool.

This report emphasizes the need to improve indigenous wool quality, and that manufacturers should turn their resources to the maximum use of indigenous wool in preference to imported wool. Suggestions are made concerning how this should be carried out.

Pages 33 and 34 of this report concern an investigation by the team into the situation relevant to wool textile plant maintenance in the matter of difficulties in obtaining spare parts for foreign-made machinery.

This is a relatively minor adversity brought about fundamentally by foreign exchange shortage which inflates the cost of essential spare parts, but which nevertheless represents a very small portion of the total cost of wool textile production. Recommendations are made which will tend to alleviate the problem by utilisation of indigenous resources wherever possible.

The possibilities of greater use of man-made fibres in conjunction with indigenous wool are outlined in pages 65 and 66. Enhancement of existing wool products by this means could in certain cases reduce the cost of the finished product and assist in exportability.

The conclusions to this report give a summary of the problems and the recommendations embodied therein.

Mill "x" 23rd Nov/71 to 27th Nov/71 Classification: "Medium size"

In common with many other concerns studied by the team leader during the earlier exploratory mission, the principal complaint of the management of this concern was centred on the adverse external influence created by the Import/ Export monetary scheme of Government control over the use of foreign exchange. Undoubtedly the scheme creates difficulties by placing manufacturing concerns at a disadvantage in cases where raw material is imported, processed, and exported with value-added. The difficulties are related to the losses involved in the waste by-products for which there is no market, and which therefore constitutes a loss to the manufacturer. Such waste losses carry a high rate of import duty (i.e. as much as 200%), and as the cost of imported raw wool is internationally expensive, it is understandable that manufacturers should feel victimised. This is a passing reference to a situation concerning which the team can only offer the advice that every effort should be made to minimise waste losses, and remedies are given to this effect in the section headed "Technical" in this report.

It is worthy of mention that in cases where a manufacturing concern is importing raw wool for subsequent export in the form of finished goods, even the minimum essential waste by-product losses are costing a substantial portion of earnable profit, and rendering export activities uncompetitive in international markets. The fundamental objective therefore should be to turn to the use of more indigenous wool for subsequent sale as manufactured goods, both in the domestic and the export markets.

Cost Control & Costing Systems: This mill has an effective method of costing throughout all processes of manufacture. Improvements can however be made by the application of a "Standard Costing" system whereby every batch at every stage of processing has a standard calculated cost based on a reasonable estimate of the efficiency/cost relationship at each stage. Actual costs should be related to the standard costs on a weekly basis, with the productivity of each process as the guide. By this means it is possible to apply corrective

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Mill 'x' (Continued)

action in the minimum time in order that the actual costs conform with the planned forecast constituted by the Standard Cost system.

This sytem is a great advance over the traditional methods of calculating the actual costs on an annual or six-monthly basis when the information is largely historic and therefore beyond control.

Information was given to this company concerning a method of ascertaining the most profitable products where broad-range yarn count production is involved.

General Mill Administration: The state of complacency engendered by "Seller's Market" conditions in the domestic field has led to the belief by the management that the company is quite efficient. This is a dangerous state of mind which tends to obstruct the pattern of progress, and which can eventually lead to an increasing number of faults in the finished goods.

In point of fact, the management of this concern stated in the first interview with the team that they did not have any problems other than those created by external influences. The team carried cut an intensive study and discovered a great many management deficiencies which were classified under the heading of "Minor problems" of an internal nature. The deficiencies consisted largely of the lack of a comprehensive system of production control, poor housekeeping, indifferent machine maintenance, and the lack of an organised system of employee-training. Quality control application was also very inadequate. On each of these points the team gave on-the-spot advice which was readily accepted by the various levels of management.

The items on which advice was given are gnerally applicable to all branches of the industry, and it is the opinion of the team that almost without exception, all other woollen and worsted manufacturers in Pakistan can benefit by the application of the recommendations given by the team to the management of this mill.

FINAL REPORT

Mill 'x' (Continued)

The use of indigenous wool as the raw material is practically nil at this company. It was noted however, that some effort is being made to develop a product made from indigenous wool, and it is strongly recommended that this continues to be developed on an increasing scale. It must be noted that difficulties do exist however through the disorganised situation concerning the purchasing of indigenous wool for domestic consumption.

The company is making an effort to orientate marketing in the direction of exports by the appointment of a foreign agent. At this stage, the effort is minimal and considerably more energy should be devoted to forward planning for export. This particular company reports that an unusual situation of an external nature is envisaged in the near future which is relevant to the changes in the Government system of control over the imports of foreign wool.

When these changes take place, a method of "Value - Allocation" will be given to the importers of raw wool under the classification of "Worsted Manufacturers", based on previous annual wool consumption and installed spinning spindles. Worsted manufacturers thus given an annual licenced allocation of raw material will be freed from the present system of taxation through the "Bonus Voucher system", but will nevertheless continue to pay levies on the importation of foreign wools.

Mill 'x' is essentially an installation utilising the worsted system of wool processing, but because the products do not consist of worsted cloth, it appears that the concern has received an under-allocation of raw material value. If this restricted allocation is not changed by the time the new scheme comes into operation, the company could not continue to trade, and would eventually be compelled to close. The management were taking this so seriously that they had already made plans to diversify the use of their capital by engaging in activities other than textiles.

FINAL REPORT

Mill 'x' (Continued)

It was not possible for the team to check the accuracy of the statement made by the management of mill 'x' on this subject, and it is very unlikely that any advice could be given to alleviate matters. It should be placed on record however, that this mill is definitely in the category of a "Worsted Process" and the fact that the final products consist of knitting wools does not in any way alter the meaning of the term "Worsted".

A part of the installation in mill 'x' consists of the SFMI-Worsted process which is admirably suitable for the processing of indigenous wools. It is strongly recommended that the company exploit the potential of this equipment by the use of indigenous wool as the raw material in the manufacture of new lines in knitting wools.

Marketing Section

(i) Observational Research: Yarn Mill producing Hand Knitting yarns

(a) Types of yarns being produced:-

100% Acrylic; 25% Acrylic/75% Imported Wool;

30% Acrylic/70% Imported Wool; 45% Nylon/55% Imported Wool

100% Imported Wool and 100% Indigenous Wool.

Note: Wool predominates in all the blends.

(b) Yarn Numbers, (Counts), 36 Nm to 57 Nm.

This is a wide range complicated by further stages of production in two-fold, three-fold, and four-fold yarns in addition to single yarns. The variety and wide range of products coupled with the complication of yarns in small lots and various colours militates against maximum productive efficiency compared with a spinning mill producing a small range of undyed yarns. This feature has to be taken into consideration in terms of efficiency, as the unavoidable down-time losses in changing from one sort to another are endemic to the specialised type of processing undertaken by this mill.

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Mill 'x' (Continued)
Marketing Section

(c) Output Market: Bulk of production is for the hand knitting trade. The proportions are:- 60% Hand-knitting yarns, and 38% to 40% Machine-knitting Yarns. A small proportion of the output is in weaving yarns, but this is sporadic and minimal, (i.e. no more than 1 or 2%)

(d) Raw Materials: These are mainly imported raw wool from Australia, New Zealand purchased direct, in the categories microns 21.5; 22.0; & 24.0 in greasy wool matchings. Some crossbreds are also imported and a range of blended Wool/Synthetic fibre-tops containing 50% or more wool is imported from Japan. Note: Man-made fibres normally carry a customs duty of 150%, but provided the fibres are in a blend containing 50% or more wool, the tops can be imported "Duty-free". These imported/blended tops are usually coloured, (i.e. dyed or spun-dyed fibre)

(e) Dyeing: The company uses three basic methods; Hank, Tops, and Loose Wool.

(f) Marketing: Methods take three forms; (1) Direct to Retail
(2) Direct to Machine Knitters, and (3) Through agents.

(g) Exports: These are very small. It is claimed by the company that a lot of their output goes to customers who are active in the export field. Exported garments are therefore eventually produced from this company's yarns, but such goods are not exported by the company.

(ii) Recommendations: Management classified as 'Good'

(a) By European standards the amount of labour used is excessive, but as this is endemic to this part of the world, and by cost comparison with overall production costs, the proportion of labour to total costs is favourable for export competition. It is not proposed to recommend changes here, as the management appear to have the matter under control.

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Mill 'x' (Continued)

Marketing Section

(b) Machine spacing and materials handling could be improved and simplified by widening alleyways between machines in some cases. Rationalised paths of process flow and greater attention to safety, particularly with reference to the floor surfaces would help to increase efficiency. Floor surfaces require immediate attention by filling in holes. A high step between the spinning and winding rooms should be replaced by a gradual concrete slope. Under present conditions, operatives have to tread with caution to avoid accidents, and this naturally slows down movement. The use of larger wheels preferably made from rubber compound instead of iron, on materials-handling trolleys, are recommended to prevent further damage to the floors.

(c) Sales Activity: The company is enjoying "Sellers' Market" conditions in the domestic field. All sales are controlled by the Managing Director. Under the prevalent market conditions this appears to be satisfactory but it leads to an attitude of complacency in the satisfaction that the company is profitable. Forward sales planning should not only embrace the existing market, but should be projected to establish an ever-growing proportion of export business upon which a basis of expansion can be envisaged.

(d) Forward Planning: This should take into consideration the possibilities of diversifying into the field of knitted goods production, i.e. - "Verticalisation", thus producing knitted fabric or garments of their own manufacture in due course. This would also have the simplifying effect of reducing counts and colours to some degree, thereby enhancing overall productive efficiency.

(e) Exports: In the field of exports, the existing happy situation of relatively "Complaint-free" trading would suddenly deteriorate unless the following preliminary steps are taken to upgrade the products.

FINAL REPORT

Mill 'x' (Continued)

Marketing Section

(f) Quality Control: At present practically non-existent, should be fully implemented. Recommendations for equipment and methods are given in the technical section of this report.

(g) Presentation: This in its existing form is quite satisfactory for the domestic market, but airtight packaging will be necessary for export to retain proper conditioning of the yarns. More attractive wrappings, label data clearly stating the proportions of the various fibres, colour batch codes, and counts, and revised "Brand names" will be necessary.

(h) Raw materials: More indigenous wool should be used, and it is recommended that a "Quick-Knit" type of yarn could be produced using a blend of 75% indigenous wool/25% Acrylic fibre. This should find an acceptable export market and would be well-received in the domestic market also.

(i) Export Marketing: It is highly recommended that foreign agents be appointed at the earliest opportunity. Particular attention should be paid therefore to the "Hard Currency" areas. (It is noted that arrangements are being made to appoint the first foreign agent shortly. This should be reinforced by others in other areas as soon as possible)

(j) Sales Targets: The company have their own sales targets and it is anticipated that these will be fulfilled this year. This should be followed by more ambitious targets for next year incorporating export markets. Production expansion could be facilitated by the greater use of available machinery throughout the mill on all shifts.

(k) Development Plans: These should cover the next five years commencing immediately, with revisions every six months. This would give Directors and Staff the incentives required. In a progressive company enthusiasm is a prime

FINAL REPORT

Mill 'x' (Continued)

Marketing Section

requirement, and the formulation of new lines, and new products is a stimulant in the right direction. Only the oompany with full knowledge of available resources can perform this for themselves. The machinery expansion and replaoement necessary for forward planning should be incorporated in the anticipated oash flow.

Technical Section Classification: Medium size

Observations: The mill consists of modern plant embracing both worsted and semi-worsted equipment producing yarns for hand and machine knitting, also for weaving. The plant oonsists of Scouring, Carding, Combing & Spinning, with the necessary support machinery for the winding, reeling, balling etc., of the yarns for shipping purposes. Most of the material used is imported, about 50% of which consists of Australian type greasy matchings. The other 50% is of imported tops of wool and wool/man-made fibre blends, white and coloured. Some indigenous wool yarns are sampled.

There is ample capacity for prooessing the imported wool, together with semi-worsted capacity which could be utilised for the production of yarns made from indigenous wool, i.e. by Scouring, Carding, Auto-leveller Gill, followed by two passages of (a) Intermediate & (b) Finisher gills. Spinning can be carried out on a large-diameter sliver-to-yarn ring spinning frame of modern manufacture. This is followed by a heavy ring-twister, and a hank-winder. All the above-mentioned machinery is modern and in good running condition, being in use at present on imported raw materials.

Plant Layout. This is conveniently arranged so that short runs oan be executed with the minimum loss of productive capacity, thus permitting a wide range of counts and qualities.

Recommendations. A longer-term programme of machine loading would enable the plant to be utilised to a greater productive effect. The batches are too small for maximum economy.

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Mill 'x' (Continued)

Technical Section

Scouring. Existing bowl temperatures are 60°C: 56°C: 52°C & 48°C. These figures are considered to be too high, and in order to avoid damage to the wool fibre it is recommended that the highest temperature for the first bowl should not exceed 50°C, gradually reducing to 38°C.

Blending. After drying, the material is fan-ducted to the floor above and deposited in enclosed bins. When the blend is required for use, portions are removed from the stack, enveloped in a sheet, and weighed on a small platform scale. This is in order to ensure that the "Batch lot" is of the correct weight. Some improvement could be made here by the use of a larger-capacity sheet or bag, and a larger platform scale. The mixing stack bins contain about 2,000 lbs of material, therefore the quantity of blended material is ample.

Card Feeding. The cards are fed by hand from the selected blend by dropping the wool down a chute which leads directly into the card hopper. Operative error causes underloading and overloading of the reserve hopper with consequential variations in card sliver linear weight. It is recommended that some form of limiting signal should be devised such as photo-electric cells, or a swing door with limiting micro-switches. Operative ceases to feed when the signal lamp lights red, and commences to feed when the lamp lights green.

Carding. The fitting of an extra reserve hopper on the back of the existing one would also help to eliminate the defect of excessive and meagre alternating hopper loads. Card hoppers should always be kept about two-thirds full at all times. The hopper output scale pan should also be carefully timed to make depositions of material on the card feed apron without gaps, and without overlaps.

At present, both cards are being used for any purpose. It is recommended that one card only should be used for the undyed wool, and the other used exclusively on coloured materials. This will reduce the frequency of "fettling" between batches. If this is not totally possible, then one card only should be used

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Mill 'x' (Continued)
Technical Section

for undyed wools, with as many undyed batches in sequence as possible.

Some damage has been sustained by one of the card doffers. The doffer comb should be repaired/replaced to avoid further damage. The doffer should be revolved at least one complete revolution when setting takes place so that eccentricity of the clothing surface is allowed for. Grinding of the teeth should of course be done regularly.

Gilling. There is some evidence that the autoleveller could be producing variable sliver weights. The cone drum strap should be checked for tension/wear/oil-slick etc., and centralised on the drums according to the makers' maintenance instructions.

Combing. There is an excess capacity which could be fully utilised where applicable on combing and re-combing, thus widening the range of potential yarns. The layout is flexible and adaptable to rapid changes of counts and qualities. Some damage to the comb pins was observed. These should be straightened/replaced without delay where applicable.

Noil output appears excessive, and this apparently has been the subject of the machine-makers' visit without success. Variations in sliver feed diameters was observed, therefore with thick and thin varieties of slivers being fed simultaneously through the nippers, it is concluded that the lighter slivers are contributing to excess noil by permitting long wool fibres to escape nipper control, this becoming deposited as waste. (viz-a-viz Gilling)
The following points should be observed in combing: (1) All the material fed should be uniform. (2) Fibres fed should be as parallel as possible.
(3) The greater the package weights fed to the comber, the less the noil will be. (i.e. Fill up to max. capacity, all pre-gilling cans)
(4) Slivers should never be allowed to cross the path of the feed.
(5) The tuft of uncombed fibre projecting from the nipper, should be timed to

touch the first row of cylinder needles. (6) Top comb penetration should not be too deep. (7) Detaching roller should be as close to the advanced nipper as possible and should be parallel with it.

Drawing. After leaving storage, ball tops are given three passages of intersector gilling, followed by one passage of French Drawing on the "Continental" system of spinning from twistless roving. At this stage it was observed that white slivers were being pieced directly to bright blue slivers in process on the machine. The objective is to save time in colour/quality changing. The objective may be achieved, but whenever export business is involved, the dangers of colour migration will render this practice unprofitable. It is recommended, therefore that machines should be cleaned between every change, and that the practice of tip-to-tail piecing of different coloured ends should be discontinued.

Ring Spinning. Dry spinning rings are in use here, often with two steel travellers to obtain the required tension. It is recommended that Nylon travellers are used where applicable, and that the rings be changed for the "Oil type" wick or reservoir lubricated, particularly where Acrylics or Polyamides are being processed. This will give higher spinning speeds with better twist/yarn regularity. Top drafting rollers bear evidence of lack of grinding by a series of channels and grooves. A sequence of top roller grinding should be carried out without delay. Yarn quality will deteriorate rapidly unless this is done immediately. It is vital that all the top rollers on the same drafting unit are ground to equal diameters. They should never be interchanged between drafting heads once this is carried out. Spindle tapes should receive regular attention concerning renewal in cases where the tapes are slipping due to oil slick. Check that the spindle bolsters contain the correct grade of clean oil, and that they are filled to the correct level. Ring tubes appear to

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Mill 'x' (Continued)
Technical Section

be in a decrepit state in some cases. Keep tubes in good order by a system of renewal as damaged tubes can ruin the bearings of modern high-speed spindles due to running off balance.

Assembly Winding. Two machines are in use here, namely a "Murata" and a "Bernhardt", each machine uses a slightly different diameter of wooden core for the cheeses. These have become mixed with the result that soft and untidy cheeses are being made by both machines. It is recommended that the cores are sorted and identified by a system of different coloured paint, and that the correct cores are kept to the correct machine. Care should be taken to ensure that the yarn tension weights are identical on each of the yarns being wound. There is strong evidence of "Patterning" or "Ribboning of the wind. This leads to irregular tensions and irregular twist on the subsequent process. Attention should be paid to this, by consultation with the respective machine makers.

Semi-Worsted Spinning. The large-package spinner would benefit by the use of nylon travellers. Rings are short of oil. Check system of lubrication and ensure that an adequate supply of oil is in constant flow.

Heavy Twisting. Here again, the rings appear to be starved of oil. Waste losses are being created because the supply tubes from the spinning frame are of random length. Check and rectify pre-determined length of supply packages. Check spindle tapes and spindle lubrication as previously described. Discard/ replace damaged ring tubes and twister tubes.

Light Twisting. The assembly winders and the twisting frames are very close to each other, and there is the danger of colour migration due to this. Wider spacing, and/or the fitting of a plastic curtain between the two processes will help to eliminate this problem.

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Mill 'x' (Continued)
Technical Section

Packaging/Making-up. This is presently being carried out between machines by operatives working on the floor. This is probably traditional, but as a greater productive efficiency could be obtained by putting this section into a special room, it is recommended that tables be used, even if the operatives prefer to sit on them rather than at them.

Dyeing. Three methods are currently in use i.e. Hank, Tops, and Stock. The equipment is compact and modern, but non-automatic. Pre-programming equipment would be a positive advantage here. Vat-loading is by overhead electric hoists, and as these are vulnerable to power cuts, a reserve hand-operated block-and-tackle could be advantageous. Steam pipes should be lagged both for safety and to conserve steam. (heat loss). In hank dyeing, improvement of transportation from the dryer could be facilitated by mounting the dryer frame on wheels. The hydro-extractor is too small for the volume of work. This piece of equipment could be replaced with a larger one to advantage. In any case, it should be fitted with a lid in the interests of safety. Stock is dried in a fabricated chamber having no temperature control. A temperature control should be fitted in order to ensure that the material is discharged in the correct condition. The manual transportation of dyed hanks to either the warehouse or the winding department could be improved by the use of trolleys or frames to carry the hanks, thus avoiding the inevitable tangling due to too much manual handling. Containers on wheels, lined with replaceable paper linings are also an alternative suggestion for this purpose.

Colour-Matching, at present depends entirely on daylight which is naturally variable. A colour-matching unit of fluorescent + tungsten filament lamps in a section of a room from which daylight is excluded would enable accurate colour-matching to be carried out 24 hours per day, every day of the year.

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Mill 'x' (Continued)
Technical Section

Machinery Maintenance. This should be carried out on a routine basis, by the use of a definite system using a check-oard method to ensure that all the necessary points have been attended to. Each machinery maker normally issues a maintenance plan and this should be adhered to.

Waste Control. Operative "Hand waste" is usually controlled under this heading, and is best facilitated by the provision of a specially marked container for each operative. The containers should be identified by whatever type of waste it is to hold, and colours should be segregated. Card sliver, gill box slivers, Drawing rovings, yarn wastes etc. should all be kept separate at the source. It is often a good plan to weigh the waste made by eaoh operative at the end of every shift, and to record the weights produced under the name of the producer. The objective is to reduce waste losses by this method. Rewards should be given to those who produce low figures. This will also eliminate the need for an employee to painstakingly attempt to separate the wastes afterwards.

Housekeeping. This is a matter of keeping the factory neat and tidy at all times. Alleyways should be kept clear of obstructions. Ring tubes should be kept off the floors. Oil spillages should be cleaned up immediately, and the floors need to be kept in first-class order. Change gears should be retained apart from machines in a special room or cupboard.

Operative Training. The practioe of placing a new entrant with someone who is skilled at the work is traditional, but to expect trainees to learn by simply watching the operation performed is slow and inefficient. It is recommended that selected operatives be trained how to teach by the breaking down of each element of the job into a series of separate steps. The trainee should be encouraged to master each step before being allowed to prooeed to the next. Safety should also be embraced by the training programme.

FINAL REPORT

Mill 'x' (Continued)

Technical Section

Quality Control. This hardly exists in the mill under survey. It must be introduced without delay on the following lines:-

(1) Regular checks to ensure that card hoppers are correctly filled.

(2) Card Slivers (Slubbings) to be checked regularly against the stabilised standard.

(3) Check Card slivers when changes in quality are made. Correct/rectify as needed.

(4) Comber noil output should be checked and rectified as necessary on a routine basis, i.e. weekly. Adjust all noil percentages to an average (Stabilised) level.

(5) Dyed tops: Check for regain prior to drawing and spinning. Check Drawing roves at specific intervals.

(6) Check spun yarn for counts on a routine basis. Check and certify at every quality change. Keep records at all stages. Colour/batch control can be recorded by means of a circular knitter which clearly identified differences in colour/yarn character.

Quality Control Recommendations.

(a) Raw materials and blending: each purchase of raw materials should be checked against a quality standard for physical characteristics; i.e. staple length, fibre fineness, cleanliness. After scouring, calculate yield, compare with acceptable tolerances. Take samples of blend and check for fibre distribution. Waste introduction to blend should be under control; 10% max. waste allowable to avoid yarn weakness due to broken fibres.

(b) Carding: Check slubbing (sliver) weight by weighing measured length, record on chart attached to machine. Register any mechanical adjustments made for next shift information. Maintain feed hopper at 2/3rds full at all times. Close hopper intake with metal or plastic sheet when running out card. The use of an automatic "Mis-weigh" device is recommended. This provides an automatic shut-off for the feed rollers. (Obtainable from Wellington Ltd. U.K.). Schedule all

FINAL REPORT
Mill 'x' (Continued)
Technical Section

cleaning, fettling and mechanical maintenance. Establish a grinding programme for workers, swifts and doffers. Limit the introduction of waste slubbings (slivers) that are faulty due to mis-weighs. Return wastes to blend in bulk.

(c) Combing: Control noil/top production by taking weekly noil weights made and weighing them against tops produced. Schedule inspection of comb settings, cleaning and maintenance. Recommend a minimum of 48 hours conditioning of combed tops before further processing. Construct fibre diagrams from random selections. Take moisture tests at random intervals to ascertain correct moisture content. (Use a moisture meter). Weigh tops in and out of store to ascertain moisture content.

(d) Drawing: Take daily checks at autoleveller to ensure correct operation. Register results and all sliver weight and quality changes. Check drafts and number of ends in process (i.e. "doublings"), faller speeds, daily.
Schedule routine cleaning and maintenance, inspection/settings/cleaning:
Operative responsibilities consist of the following:-

(1) Quality of piecenings
(2) Brush waste
(3) Observe for slubs
(4) Observe for oil, excess moisture, dirty, light or heavy slivers
(5) Variations in supply and doffed package weights, above or below a standard tolerance.

Supervisor to check: Worn leathers/bent or broken fallers/overheating/mixed lots/badly set guides.

(e) Spinning: Check spinning counts at the start of every new count or quality. Record results. Take regular checks of T.P.M. (by calculation)/by physical test. Take random samples of 4 ring tubes for laboratory tests, i.e. counts, strength, regularity, T.P.M. Check and correct as required. Operative responsibilities: Correct piecenings/report high end breakage ratio/segregation of wastes/dirty yarn/

FINAL REPORT
Mill 'x' (Continued)
Technical Section

dirty roving/bad bobbin build/cleaning drafting zone. Machinery defects: Drafting apron wear/worn or grooved rollers/worn or unlubricated rings (where applicable)/borken, slack or oily spindle tapes/mixed lots or counts. Winding/Twisting: Schedule twist test of folded yarns/assembly yarns. Bring all cheeses and cones to a standard weight of full package, and make random checks. Operative responsibilities: Proper knots/guides and clearers correctly in use/ waste segregation/dirty yarns/correct tension weightings/mixed lots/wrong counts. Supervisor to check: Damaged guides/clearers/tensioners/unlubricated rings/wrong bobbin sizes/damaged bobbins & tubes/poor spindles drives/slack, oily tapes. Reeling and Ball winding: Weigh off batches as a control for counts/length. Use a platform scale conveniently placed for the operator.

(f) Humidity control: Check with sling psychrometer (Hygrometer) three times daily in all departments and maintain a register of results. Check/correct that humidifyers are not ejecting drops of water. Ensure that the humidity i.e. Standard atmosphere, is maintained in the testing laboratory at all times.

(g) Textile testing laboratory equipment: Recommended:-

(1) Wrap reel: 36 inches or one metre: 4 ends up: standard traverse: metric length control. 40 yd(or metric hanks) for strength testing.

(2) Hank strength tester to 750 lbs or 400 Kg breaking strength.

(3) Chemical balance (i.e. Precision balance) Oil damped to work in fractions of a grain. Keep in glass-fronted case even when in use.

(h) Recommended procedure for routine testing:-

Take four samples of yarn on tubes from the same spinning frame at specified intervals. i.e. Daily. The tubes should be selected from random positions on the frame - not all adjacent tubes.

FINAL REPORT

Mill 'x' (Continued)

Technical Section

Check weight in grains or grams of measured length and test for counts. Record in a book or other permanent means of recording. If defect is found - retest. Maintain a graph record of the trends of each frame, count and quality. Only make adjustments to count when there is absolute certainty that a gear change is needed.

Check yarn strength. Record in graph form as above.

Calculate mean trends in all cases. Calculate count-strength product by multiplying the mean counts by the mean strength. This establishes a level for all yarns which should be used as the standard to be maintained.

Calculate coefficient of variation and use this as a tolerance for future standards.

The above test routine is the absolute minimum required to maintain a feasible quality control system. Other equipment may be added as sophistication becomes necessary. A twist tester for turns per metre may be included in the above as a fourth item, but calculation at the spinning or twisting frame is accurate enough. i.e. Check the length per minute delivered by the front roller

Check the spindle speed in revolutions per minute

Divide the spindle speed by the length delivered per minute, in metres.

The answer is in turns per metre.

Record test results at all times.

FINAL REPORT MANAGEMENT SECTION

Machinery and Spares: All managements make the complaint that machinery and spare parts for existing machinery carry a high import duty imposed by the bonus voucher system. They state that the necessary equipment and spare parts are not available in Pakistan, therefore machines are often rendered inefficient or unusable due to this fact.

The team decided to approach local machinery manufacturers in order to ascertain whether it was possible to have machinery and spare parts made in Pakistan. Meetings were arranged with the following executives of local engineering firms:-

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The difficulties experienced in the past have been connected with the fractionated demand for spare parts of a specialised nature from the wool manufacturing industry in Pakistan. It was obviously unprofitable for any engineering concern to undertake the manufacture of "One-off" items and no individual engineer could

possibly be aware of the total number of similar items required from different sources within the wool textile sector.

It was recommended that the Engineering Manufacturers Association should act as a "Clearing House" for the acceptance of spare parts (and even new machinery) orders. The central organisation thus formulated could then issue the orders in bulk according to demand, to the selected engineering concerns who were willing to co-operate. This was readily accepted by the members present at the meeting.

FINAL REPORT MANAGEMENT SECTION

Mill 'y' (29th Nov/71 to 3rd Dec/71) Lahore

The greatest problem experienced by this concern is undoubtedly lack of the proper equipment with which to produce the goods planned for home and export markets. Management enthusiasm is not lacking, and the only outstanding virtue of the concern is the fact that it is using a large percentage of indigenous wool for its products.

The team made an intensive study and formed the conclusion that even though the equipment is inadequate, some improvement could be made if the management would turn its attention to the proper maintenance of existing equipment, and to the planning of production on less haphazard lines.

Costing and Cost Control: The management claim to know exactly what the costs are at all stages of processing, but investigation proved that this is mainly theoretical rather than practical. Running efficiencies are considerably lower than the targets set by the management, and production flow is extremely fractionated, having no recognisable pattern.

Quality Control does not exist except in the most primitive manner.

Recommendations are made by the team in the matter of upgrading the state of existing installed equipment. Some alternative suggestions are also made concerning the lines on which this mill could be re-equipped.

The most outstanding feature about mill 'y' is the fact that indigenous materials are being used to the best advantage, even though the method is slo' and inefficient. The intake of indigenous wool is washed and sorted into various grades of quality, and the resulting yarns and materials/fabrics produced, illustrate to some extent that indigenous wools can be used for a variety of saleable products other than carpets.

FINAL REPORT

Mill 'y' (Continued)

Management Section

Given a relatively modern semi-worsted processing line, this concern could provide an example to the trade in general, and be an object-lesson in the maximum exploitation of the various grades and types of indigenous wool, together with the use of other indigenous fibres/yarns.

In common with many other concerns, the management plan to export, but have made very little effort to put their plans into practical use.

Marketing Section

Observational research

Products: (1) Yarns made from 100% indigenous wools, counts up to 5s Nm on the Woollen system.

(2) Small narrow carpets/rugs/mats made from Jute & Wool

(3) Praying mats made from reclaimed Rayon & Wool

(4) Cut Pile fabrics made from Wool with cotton warps.

(5) Corduroys from Wool & Cotton + all cotton

(6) Furnishing fabrics and two-tone tweeds/Wool & Cotton & 100% cotton

(7) Tweeds using 100% indigenous wool, also from imported wool yarns bought from a local manufacturer.

Output Market. Indigenous wool yarns, sold locally for the manufacture of hand-made carpets, cotton and rayon blend fabrics for the domestic market.

Exports. Nil at present, but it is reported that many enquiries are being received from foreign sources. The management are of the opinion that the present products do not conform to a high enough standard for export.

Merchanting. Management advise that a merchanting company has been formed for selling the "proven" materials produced by the company. It is also intended that "ready-mades" will form part of the output in the form of shorts, shirts, blazers, donkey jackets, and trousers. The company will also operate a yarn export programme in foreign markets not yet defined.

FINAL REPORT

Mill 'y' (Continued)

Marketing Section

Forward Planning. An ambitious programme of development is envisaged by the management involving the purchase of new dyeing and finishing equipment and ring spinning to replace the existing mule. 9 new Japanese looms (4 x 4 colour box) are also planned for delivery in the near future.

Raw Material. Management complain that it is very difficult to accept forward orders due to the difficulty of obtaining consistent supplies of garnetted rayon wastes.

Commissioned services. Management complain that this is too expensive in terms of having the company's fabrics dyed and finished outside.

Remarks. Having no quality control whatsoever, the possibility of export is very remote. General management supervision is lacking and the machinery is in very poor condition. This is not always due to the age of the machines, but to lack of planned maintenance. There appears to be no co-ordination between processes. The operative staff are unskilled in the engineering side of machine maintenance. Most machines are working at a very low efficiency, for the following reasons:-

(a) Poor quality yarns

(b) Continual breakdown of machines due to bad maintenance

(c) Untrained labour

(d) Bad fabric constructions

(e) No skilled supervision

Recommendations

(1) Plan on a more constructive basis, reducing the range of materials to be made.

(2) Have a complete re-appraisal of the plant & equipment to conform with the requirements of the finished products planned.

(3) Completely reorganise production flow throughout.

FINAL REPORT

Mill 'y' (Continued)

Marketing Section

(4) Re-arrange management putting one Director in charge of production, and another in charge of selling/marketing.

(5) Recruit a technical Graduate, giving him experience training in a large textile organisation where he can receive practical training for at least a year. The graduate could then be appointed weaving shed manager.

(6) Order new machines, but take care that the machines are of the correct type. e.g. 9 new looms are programmed for delivery but these are in three different widths. They could have been all the same width, thus introducing a measure of standardisation and reducing maintenance costs.

(7) Completely reorganise maintenance by introducing a planned scheme.

(8) Establish sources of raw material supply for forward planning of orders.

(9) Sales Director to forecast sales & purchase raw materials accordingly.

(10) Arrange to have agencies throughout Pakistan for selling in the domestic field. This should also be done in the export field, increasing the number of active agencies as the company expands.

(11) Work within the finance available.

(12) Obtain professional advice locally on the best methods of product presentation, particularly in export markets.

(13) The Directors should put their verbal enthusiasm into practical terms on the lines suggested herein.

FINAL REPORT

Mill 'y' (Continued)

Technical Section

Recommendations for re-equipment to spin an export grade of carpet type and other yarns on the Woolen system. This company is a small semi-mechanised rural industry. It employs a low grade of operative and lacks shop-floor technicians with depth of experience. All wool sorting, scouring, drying, dyeing and finishing processes are carried out in the open air, there is no mechanised blending or oiling.

One part of the factory weaves velvet corduroy pieces on six new Takoda looms. The other part has old narrow looms, three weaving warp-rib cotton fabrics, one 26" carpet loom, (stopped), the last is in scrap condition. There is also a quantity of doubling and winding machinery unused.

The indigenous wool is carded on a 60" Cliffe Semi-Continental card, the basic condition is reasonable but it requires extensive renovation. Spinning is carried out on a woollen mule, originally of 370 spindles, it now has only 190 operative of 3" gauge. The mule condition is very poor.

3 alternatives are recommended:-

(1) To have the carding machine and mule brought up to an improved condition for which it has been established facilities exist in Pakistan.

Carding Machine present production from 72 "good Ends" at $2\frac{3}{4}$ (2.75 Nm) 33 lb/hr. estimated eff. 50% gives 16.50 lbs/hr.: Slubbings are very irregular.

Requirements: Re-clothing, scribbler and Carder. Renew removeable back and spiked lattice for hopper feed. Scotch feed: new overhead lattice and layering shuttle. New set of condenser tapes. Recond.Peralta Rolls. In addition, much detail work necessary to gears and drives.

FINAL REPORT
Mill 'y' (Continued)
Technical Section

MULE Present production: from 190 spls., = 47 lbs/hr., at 50% eff. 23.50 lbs/hr at 3.75s Nm. Yarn very irregular.
Requirements: plain bearing spindles, drafting rolls, spindle bands, squaring bands, quadrant teeth-rebuild. To establish complete requirements a thorough mechanical examination is necessary.

(2) To re-equip the plant, to manufacture an improved quality of carpet yarns and other yarns up to 10s Nm. from local wools, reclaimed wool and wool/manmade fibre blends. A production of 23,000 lbs. per 6 day week of 144 hours., at nominal 80% eff, is envisaged.

The measure of production being one ring spinning frame of 144 spls, 5½" rings, 18" lift, 3.0 lb. package from suppressed balloon spindle @ 4,000 r.p.m.
Two carding machines, 72" width, double hopper feed for stabilising lofty blends, strongly clothed, about 30/40/20 on scribbler first part, and 120/11/28 on carder back end. A traversing creel to hold wide pitch condenser bobbins, taking off 108 good ends. Semi-continental layout, breast and swift on scribbler, scotch feed, two-part carder. Gear driven eccentric motion on condenser.
Keith drives on the scribbler and carder motors. These are Hydraulic drives.
Estimated production from each card 120 lb/hr., on carpet yarn counts @ 100% eff.

Continuous blending system, of the Oddie-Radcliffe principle equipped with large size weighing scale, vortex oiling, and fan ducting of blends direct to the card hopper feeds. Alternatively, a sheeting-up machine could be incorporated, (this is virtually a bagging machine for reserve feeding) Bag. weight 200 lbs.
Assembly Winding/Uptwisting. Using the "Two-for-One" principle of uptwisting for doffed packages of about 12 lbs., (6.0 Kg.) followed by high-speed hank reeling using pre-set length meters and automatic stop motions, direct from tag-ended cones on a separate bank/creel. This should be supported by an assembly cheese winder, which should be a "sample-size" machine of from 6 to 8 drums, 6" traverse.

FINAL REPORT
Mill 'y' (Continued)
Technical Section

Hank scouring and Dyeing of sufficient capacity to support the spun yarn production, should follow the above-mentioned installation. Output deliveries of the finished yarn would therefore be in hank form.

(3) The Semi-Worsted system

(a) Double-hopper automatic feed carding machine, 72" wide (190 cm), totally enclosed/metallic clothing throughout, double doffer/two coiler output slivers. Approximate production should be 300 lb/hr. (136 Kg/hr).

(b) High-speed gilling, i.e. Auto-leveller, Intermediate and Finisher boxes, deliveries to be in sliver cans of large capacity, (40 lbs.): (18.2 Kg.nett).

(c) High-Draft spinning frame 120 spindles, 23" (58cm) lift, 5" (127mm) rings, Automatic ring lubrication, Nylon travellers @ 120 in./sec.(183 m/min.)
Fed from sliver cans ex. finisher gill box. Doffed package weight 5 lbs (2.25 Kg)

(d) High-speed twisting with creel to feed from ring tubes, 2, 3 or 4 tubes per spindle, to produce 2, 3 or four-fold yarns. Four small machines or two-double-sided machines totalling 240 spindles, 7½" (190 mm) rings, 58 cm lift., spindle speed approx. 3,000 r.p.m. Automatic ring lubrication.

(e) Hank winding from the twister packages weighing approx. 10 lbs (4½ Kg) each, to produce hanks of the same weight as the twister packages. (Croon+Lucke type hank winder)

Note: the semi-worsted system of this type is the most economical and productive system available. It is admirably suitable for Pakistan indigenous wool carpet yarns.

Quality Control. The following constitutes a standard system applicable to all types of woollen and semi-worsted manufacture:-

(a) Carding. Weigh measured length of slubbing/sliver using a quadrant balance to check counts produced at start-up of every quality/count change. Re-check after interval of one hour. Correct as necessary. Check also at the end of each shift. Maintain records, note all adjustments.

FINAL REPORT
Mill 'y' (Continued)
Technical Section

(b) Autoleveller. As for carding. Check/maintain/calibrate cone drum regulator system at regular intervals. Keep cone strap in perfect condition.

(c) Spinning. Use a Wrap-Reel to obtain standard measured length of yarn from four ring tubes taken at random from the frame. Weigh each wrapping on the quadrant balance and average the results of the four tests. Adjust/correct draft as required to maintain correct counts. The frequency of this test should be as follows:- At each start - up after a count or quality change. At the end of every shift. Record results and adjustments made.

Turns per metre can be checked accurately by ascertaining the spindle and roll delivery speed, and dividing the spindle speed in r.p.m. by the front roll surface speed in metres/min. This can also be carried out periodically by theoretical calculation from the twist gears in use. In all cases, the frame should carry written information on the frame-end denoting the quality, counts, draft and twist gears in use. It may also denote the batch-weight required from a particular lot.

(d) Hank weights should be checked continuously using a platform scale. The mean results of the recorded weights in conjunction with the standard length of each hank will give a constant check on the counts produced. (Note: there will be some variations in the lengths delivered by the twisting frame, as there is no known means of absolute accuracy in terms of lengths delivered by roller systems) This is why it is necessary to take average or "mean" weights of a number of hanks in each case.

Moisture content. Controlled humidity throughout all departments of processing is the criterion for the maintenance of a regular level of moisture content. It also helps considerably to facilitate good processing and ensures that the finished product is of the correct count and standard needed for international competitiveness. Checks should be taken on the relative humidity in all processing departments by the use of a sling pschychrometer (Hygrometer) to establish the pattern of conditions over a period of each 24 hrs.

FINAL REPORT
Mill 'y' (Continued)
Technical Section

It should be noted that many of the buildings in Pakistan are far from adequate in this respect. Well-insulated roofing, and double glazing of all windows is necessary to alleviate insulation during the hot season, and to minimise heat losses during cold seasons. Store rooms for grey yarns and finished goods should also be maintained at the standard atmospheric level.

Production Control

(a) Woollen system. It is essential from the start, that a system of measured length is used to keep carding and spinning in balance in a mill where the runs are normally short in accordance with a series of small orders. Condenser bobbin flanges should be of a large enough diameter to carry a yardage of slubbing sufficient to completely fill the ring tubes at every doff. The weight carried by each ring tube is the weight required for each slubbing on the condenser bobbin, therefore the card should have a length meter which can be set to deliver the correct weight/length to correspond with the weight of yarn on the ring tube. This establishes a "one-to-one" system of production control and gives full utilisation of the machinery on an organised basis. In all cases from the card onwards the processing sequence will be dealing with a full package to full package principle of operation, simplifying the procedure and minimising waste losses, down-time, and inter-process storage. Piecings and knots are also very much reduced by the use of this method of production control.

(b) Semi-worsted system. As above, but in terms of the length of slivers in cans instead of slubbings on condenser bobbins. In this case, the sliver lengths should be calibrated in terms of multiples of the ring frame full package weight. (i.e. a full can of sliver weighing 40 lb nett, would thus contain eight doffings of ring tubes of 5 lbs per tube). It should be noted that one of the merits of the semi-worsted system is that considerable time is saved, and even fewer piecings are made where multiples of tube weights are embodied in one can of sliver. The package to package system is continued throughout the milling processes through to the ringframe.

FINAL REPORT

Mill 'y' (Continued)

Technical Section

Documentation of production control, should consist of information cards attached to the front of each machine, indicating the batch code number, the batch weight required, and the weight produced by each shift recorded and certified by the shift supervisor's signature. Completed cards are forwarded to the stock control office where accurate recording can be projected through to final delivery to the customer. Individual mill managements will design their own information data in this respect according to their needs, but it is essential that in all cases the above minimum information should be maintained.

Waste Control. as per mill 'x'.

MANAGEMENT SECTION

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Mill 'y' (Continued)

Management Section

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Technical Section

General Observations (Weaving Technology)

(1) **Warping.** In order to economise in weaving faults, loom down time, and with a view to improved quality and productivity, the following recommendations are made:-

(a) Efficient warping and beaming is of fundamental importance.

(b) Issue the warper with a correct and clearly understandable warping plan on the piece ticket.

(c) Place the bank in the proper sequence for one repeat of the warp pattern

FINAL REPORT

Mill 'y' (Continued)

Technical Section

(d) Check that sufficient yardage is on each cone to complete the total warp length.

(e) Measure the length of the section carefully to ensure accurate and consistent build.

(f) Check that all ends are running under controlled tension through the guides and tensioners.

(g) Ensure that the beam flanges are at the proper centres, straight, undamaged.

(h) Beam off under controlled tension, insert lease rods, and clearly identify by attaching the weaving ticket.

(2) Documentation. Consists of the weavers ticket with the numbers of the pieces on the beam is issued to the yarn department which weighs out the warp and weft. The same ticket should contain the loom particulars, setting, design, warping plan, draft, and colour plan with the weights of the individual counts and colours of the warp and weft yarns. Small swing tickets with consecutive piece numbers should acoompany the piece ticket for attaching to each woven piece coming off the loom. The weaver's ticket remains at the loom until the last piece is woven.

Added information on the loom should consist of:- Time of start-up and pick number. Time of completion and pick number. These details should be entered on the ticket by the Weaving Department Foreman. It is then returned to the production department for costing, wages and efficiency analysis.

(3) Quality Control in Weaving. Shop floor procedure should include regular checks on loom width, picks per inch, design and colour plan. At the start-up of a new warp, the design department is recommended to pass the first repeat of the pattern woven as a regular routine, and make spot checks thereafter. The setting, reed, picks per inch, warp and weft counts should be checked against the weaving particulars at least once per day by the loom tuner, or the department foreman.

FINAL REPORT
Mill 'y' (Continued)
Technical Section

The weaver has considerable responsibilities under the heading of quality control by the avoidance of faults and damages. These include the following:-

Drawing - in broken ends in the wrong sequence.

Draw-ins or loops at the selvedge

Thick or thin weft bars.

Big knots

Ends and picks missing

Oil stains and dirt on the fabric

Known faults should be marked by strings at the selvedge to facilitate darning.

(4) Loom Maintenance. Lost production and sub-standard quality can be frequently attributed to lack of loom maintenance. A system of planned maintenance is recommended as follows:-

(a) Make a check list similar to that described for spinning, incorporating an analysis of each loom motion to be examined.

(b) Make a faults analysis giving the type of fault and causes. Instruct weavers in the observation of loom defects.

(c) A reporting system for the use of the weaving foreman on shift, should detail the maintenance carried out, faults in the cloth, warps in and out, and stopped time.

(d) All maintenance should be in production time. Week-end maintenance is unreliable due to indifferent supervision.

Maintenance may be in two forms:

(i) Preventative maintenance

(ii) Corrective maintenance

(i) Preventative: The benefits derived from routine loom checks are usually long term, particularly in the case of older looms. The looms must be first brought up to the required standard and maintained as such on a routine basis. Individual mills must work out their own schedules with detailed definitions of check points and frequencies. The schedule should include primary and secondary

FINAL REPORT

Mill 'y' (Continued)

Technical Section

loom motions. For example, an automatic weft change plain loom should adopt the following routine:-

(a) Shed timing and size of shed.

(b) Picking. Strength, timing, length and direction, shuttle-box swells and slides.

(c) Condition of shuttles. Tips and all surfaces, threading and tensioning devices.

(d) Reeds, condition of dents, care and storage.

(e) Sley alignment, backlash, bearings and connections.

(f) Warp let-off, tension control, height and alignment of backrest, condition of beam brake.

(g) Catches on cloth take-up mechanism.

(h) Warp protection - check condition and position of frog.

(i) Warp stop motion - Timing and setting.

(j) Weft stop motion - Timing and setting of weft fork for knock-off. Relate motion to sley and yarn.

(k) Automatic weft supply. Settings of feeler and connections to circular battery. Shuttle-to-bobbin timing at transfer, setting and timing of weft cutter and transfer mechanism.

(l) Driving belt (or chain) tension. Brake and clutch mechanism.

(m) Condition of temples, heald shafts, straps, pickers and picking sticks.

(n) Systematic cleaning and lubrication.

Factors influencing this routine will include:-

(a) Make and type of loom

(b) Variety and frequency of weaving faults

(c) Rate of mechanical depreciation

(d) Operative standards and skill

FINAL REPORT
Mill 'y' (Continued)
Technical Section

Corrective maintenance

The "Repairing Maintenance" which is the responsibility of the loom mechanics. This should be carried out by engineers sufficiently skilled to be able to perform repairs that do not require further attention after the initial work has been completed. The standard of engineering must be equal to that originally performed by the loom maker.

(1) Costing and Cost Control

This mill has an excellent cost control system based on the American-orientated standard cost system. The management were closely questioned in the preliminary visit of the team leader in order to ascertain whether the system was being used effectively and the answers given were highly satisfactory.

Production Control is well organised in this company, yet some of the machinery is not fully utilised due mainly to installed imbalance, e.g. the top-making (combing) plant is far in excess of the utilised capacity. Conversely, the spinning department is under-installed, with the result that the weaving section is limited to 2/3rds of available productive capacity. To bring this plant up to full efficiency it is obvious that additional spinning spindles are necessary. This would also have the effect of providing greater utilisation of the top-making plant.

Waste Control. The management feel that the output of operative wastes is much too high (i.e. 4.2% as compared with standard wastes losses of 2.0%) This is attributed to the low standard of operative employed by the company, but it is emphasised as a recommendation, that a proper system of operative waste control should be introduced on the lines suggested for Mill 'x'.

Operative Selection & Training. A very great pool of unskilled labour exists in the location of this mill. It is recommended that labour intake for training purposes should be carried out on a selective basis, by aptitude testing in the first instance to ascertain the level of intelligence of the applicant. This need not be too involved but should consist of a few simple tests such as the ability to learn how to tie a weavers' knot, and the ability to read or write the necessary data for identification of processing information within the mill.
Training should be carried out by selected teachers rather than by merely placing the trainee with a skilled operative for an unspecified period. The method recommended is that firstly, an intelligent skilled operative be instructed to

divide his operation in specific jobs. Each job should then be broken down into a number of steps in which each movement is demonstrated. The trainee should view the steps from the same angle as that performed by the teacher (i.e. it is a common mistake to demonstrate a task with the trainee viewing the work upside down). The trainee should perform each step until the teacher is satisfied that he can perform the operation, however slowly. A period of private practice should follow this, with encouragement being given by the teacher, and correction applied where necessary.

Follow-up to the initial training stage should be that of building up speed by repeated practice, for the trainee to increase speed until the job is performed as quickly as the skilled operative does. Any safety precautions should be included in the early stages of training too. If the trainee is using a knife, the safety precaution is that the sharp edge of the blade should always be facing away from the body).

Each job in the whole operation should be treated in this manner until the trainee is fully able to carry out the work with appreciable skill at the correct speed.

Element timings concerning the speed of each step, and the final speed of each operation can be obtained by timing the teacher initially with a stop watch to ascertain the number of seconds required for normal speed of operation. Care should be taken to ensure that speeds are not set too high. An average element speed taken from the timings of a number of operatives is recommended.

Records of the trainees' progress should be kept on a daily basis, so that finally the new employee successfully trained has a complete record file of the progress and effectiveness of the training.

Trainees who fail to respond properly after two weeks of such training should either be allocated a simpler task, or discarded as unsuitable.

Management Section

The normal length of time taken to train a skilled operative by this training method is approximately three months for a spinner or a weaver. Other operations may take longer or shorter. The mill will arrive at its own level in due course. The advantage is that the management are quite sure at the end of the training period that the trainee is fully skilled and has been taught in accordance with the needs of that particular mill.

In all cases it is necessary that the whole training scheme should be under the control and supervision of a member of the management staff.

Quality Control. This mill has a comprehensive system of quality control. The team recommend that it is applied with close supervision and properly recorded as described in the technical section of this report.

Technical Problems associated with this mill have been dealt with under the appropriate technical section.

MARKETING SECTION

Products: Woollen and worsted yarns, Tweeds, Blankets & Apparel Fabrics

The home trade marketing methods used appear to be satisfactory, in view of a prevailing "Seller's Market". Adjustments recommended are that improvements should be made to market research, and efforts should be made to be more specialised by reducing the number of items being made. The object should be to discard the most uneconomical lines where small orders have been accepted. Salesmen should be guided to concentrate sales on the profit-making lines. They should be encouraged to explore the market, and to "feed back" market trends regularly, together with possible style and fashion changes, directly to the Marketing Director. Regular meetings should take place between the Marketing Director and the sales staff to discuss forward plans, and in particular "Range presentation". A conference of all salesmen should be arranged prior

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Marketing Section

to the new season's range being put into the market, at which the Marketing Director should address them giving the full merits of the range of goods to be sold, and inviting criticisms and suggestions.

Export Potential

The company should be in a good position to develop an export business, especially in tweeds and apparel fabrics, but in order to do this effectively, considerable improvements should be made to the quality standards, as these are presently far below those required for export. In all sections of manufacture - and in particular in weaving and finishing, quality standards must be raised. The fabric constructions are also somewhat suspect.

Recommendations:

(1) A Management and operative training scheme should be introduced immediately.

(2) A quality control section covering all processes should be immediately developed and suitable equipment and methods initiated.

(3) Marketing Director should immediately initiate market research in selected export markets and decide on the types of material on which the efforts should be concentrated. Verification should be made on the styling and colours required for a particular market.

(4) Arrangements should be made for the establishment of suitable agencies in the countries selected for the sales drive.

(5) Professional advice should be sought from export/sales agencies in Pakistan concerning the best methods to be adopted in relation to pattern presentation, hanging scale, trimmings, labelling, selvedges, make-up and if selling to a make-up, the possibility of supplying sew-on labels. If brand names are introduced in attacking new markets, enquire if advertising can be arranged in trade magazines appertaining to the relevant markets.

(6) The Marketing Director should budget the expenditure allocated to each market.

Marketing Section

(7) The professional advisers could also be asked to suggest any additional marketing information/aids. It is very important that the first impact on the export market should be very substantial to have the required effect.

(8) The introduction of indigenous wools into the tweed range should be possible, and if a three shift system could be introduced in weaving, approximately 2,300,000 lbs. (1m Kg) of yarn could be utilised per annum. A large proportion of this could be of indigenous wools.

TECHNICAL SECTION

Problems reported

(a) Irregular scouring (b) Nep formation (c) Fabric Instability

(d) Excessive static electricity generation on finished fabrics (suitings).

Recommendations:-

Irregular scouring. Stricter temperature and speed control is necessary in order to cleanse wool of all residual grease. The temperature for the first scouring bowls should not exceed 125°F (52°C). The second bowl about 100°F (37.7°C) max., and the third bowl should not exceed 90°F (32.2°C).

Peak movement should be "forwards slowly" and "backwards quickly" to avoid felting of the wool and unnecessary agitation of the scouring liquor.

Detergents for the scouring of imported wool are (a) Soda ash, (b) Soda ash with a small percentage of soap if the wool is exceptionally dirty. Reduce this to half quantity at the second bowl in both cases. The last bowl should contain only pure warm water.

Nep formation. The neps are more apparent in the finer wools in process, and the frequency should be judged by two standards, i.e. (a) the actual number of neps/square inch in the sliver, (b) the amount of fibre breakage in carding.

It is concluded that the neps are initially formed at the carding process, and the number of neps will be increased by the gilling process. Furthermore, the excessive neps generated will result in a greater noil output at the comber than

the percentage budgeted for. The presence of residual wool grease at the card will be a fundamental cause of nep formation therefore attention should be paid to the scouring process in the first instance rather than at the card. This should take the following form:-

(1) Special care should be exercised to avoid any milling action when delivering the scoured wool from the washing process. This usually occurs at the squeeze rollers. Pressure should be controlled to avoid felting - the roller coverings should be well maintained and changed frequently.

(2) At the card, check settings at the working contacts i.e. Worker/Swift/ relationship. Too wide settings here may lead to nep formation by the rolling of fibres caused by lack of resistance to the carding action. Neps are caused by the longer fibres becoming broken therefore care of settings and clothing on the forepart of the card will help to avoid neps. The stock should be well-opened and presented to the last part of the card with the fibres undamaged.

Note: The formation of neps may not necessarily be apparent in the card web, but the fibre breakage executed in the carding process will be manifested as neps at the subsequent gilling process.

(3) Gilling should not normally be a source of nep-generation, provided that the faller combs are in good condition, and that the speed is not too high for the type of machine and the material in process. Care should be taken however to ensure that the settings are just within the staple length of the wool in process. It can readily be seen that broken fibres caused by bad card settings will in effect result in a shorter staple length than the length originally estimated for the purpose of gill box settings.

Fabric Instability. Problems are being experienced by the inability of the finished cloth to retain creases and draping qualities during wear.

Recommendations:-

(1) Controlled humidity throughout the Raw Finishing section is of basic importance. Quality control is responsible for taking regular readings and relating the information to department testing.

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Mill 'z' (Continued)

Technical Section

(2) Recommended routine for finishing worsted suiting fabrics made from Merino tops (Australian): Normal specification for such fabrics is:- finished width 150 cms. Weight per running metre = 500 grms.

(a) Examination: Knot and mend in grease, pull knots to back, untie and lace in. Replace thick/thin yarn, darn in missing ends and picks, identify thick/thin weft bars.

(b) Crabbing: To help to stabilise cloth against cockling, creasing, and water-marks by establishing a permanent setting of the wool fibres.

Procedure Wrap the cloth at full width under tension on to a cylinder after passing through water at a temperature of 99°C., i.e. well above scouring temperature.

(c) Scouring: Scour in warm water (approx. 40°C), add soda ash to first run, soap may be added to the second run to give improved handle to the cloth. Wash off well with clean water, first warm, then cold.

(d) Pin-Tenter: Observe for static. Do not over-dry. Ensure that complete relaxation results in an accurate finished width.

Quality Control at this point is of vital importance, to observe for surface knots, curled selvedges and scouring defects. Width must be checked. An illuminate examination table is necessary to assist in the detection of weaving faults.

(e) Brush and Steam: (To raise pile preparatory to cropping).

(f) Cropping: Cut face, ensure that the blade setting is accurate across the bed.

(g) Decatising: (Steam Blowing): Face and back should be thoroughly treated, to condition the cloth for the final pressing process.

(h) Pressing: Two types of pressing operation are in common use:-

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Mill 'z' (Continued)

Technical Section

(1) The vertical paper press finish is recommended for appearance and stability, but requires considerable operative skill. In particular, the filling of the press and cuttling of the cloth between the press papers.

(2) The Rotary Press: This is a simpler process, the fabric being guided directly into the heated rollers where a glazed finish is applied.

Note: Either of these two methods of pressing are highly recommended in preference to primitive methods of hand-pressing.

(i) Cloth relaxation and conditioning unit: To establish optimum regain and to enable the fabric to retain its finished quality. Also as an anti-static precaution, the fabric should be passed slowly through an atmosphere of high humidity at a speed of no more than 3 Metres per minute at a temperature of approx. 40°C. Allow to cool naturally.

Quality Control Inspection: Examine on poles for any clean darning required, and pass to warehouse for width and length measurements. Insert strings as required. Fold and weigh. Remove a quarter of a Metre for reference records. Attach swing ticket with piece number, shade, length, width, weight, and date. Take into stock.

Observations and recommendations: The worsted suiting cloths manufactured from the Merino quality tops are a long way from the appearance and handle associated with a cloth made from this quality of wool. The reason for this is that the yarns are probably being too tightly twisted, both in the singles and the two-fold stages, which does not allow the finishing department to effectively improve the handle of the fabric.

The wool is not being sufficiently well-opened in the earlier stages of the worsted carding, and contains a large number of neps. The combing has not removed the neps, and this is causing the yarn to have a woolly and dull appearance. Without the neps, the yarn would have a more regular appearance due to fibres being more parallel, thus making it possible to obtain a regular

yarn without resorting to excessive twist.

This yarn would allow for an improved and more lustrous finish to be obtained by the finishing processes, improved drape and "handle".

Weaving: On the assumption that improvements have been carried out to the regularity and quality of the yarns in use as described above, it is recommended that attention is paid to fabric construction.

The setting of the cloth should be related to the counts of the warp and weft in use. It is possible that if the existing yarns do contain too much twist, that the effective yarn diameters are somewhat increased, with the result that "beating-up" on the loom is too heavy in an effort to achieve the calculated cloth construction. This would result in a fabric of dull appearance and having a "boardy" handle. A twist reduction in an improved yarn will therefore enable the correct construction to be attained without the need for excessive force in weaving, and give the results desired to enable the finishing processes to carry out their work to the greatest possible advantage.

In substantiation of the foregoing, too much twist and heavy beating-up of the yarns will introduce latent energy into the cloths which will tend to resist all attempts to establish good draping qualities, the satisfactory introduction of pleats and creases, and to some extent, contribute to the retention of static electrical charges when worn in a relatively dry atmosphere.

The weaver has considerable responsibilities under the heading of quality control by the avoidance of faults and damages.

These include the following:-

Drawing-in broken ends in the wrong sequence

Draw-ins or loops at the selvedge

Thick or thin weft bars

Big knots

Ends and picks missing

Oil stains and dirt on the fabric

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Mill 'z' (Continued)

Technical Section

Known faults should be marked by strings at the selvedge to facilitate darning.

Loom Maintenance. Lost production and sub-standard quality can be frequently attributed to lack of loom maintenance. A system of planned maintenance is recommended as follows:-

(a) Make a check list similar to that described for spinning, incorporating an analysis of each loom motion to be examined.

(b) Make a faults analysis giving the type of fault and causes. Instruct weavers in the observation of loom defects.

(c) A reporting system for the use of the weaving foreman on shift, should detail the maintenance carried out, faults in the cloth, warps in and out, and stopped time.

(d) All maintenance should be in production time. Week-end maintenance is unreliable due to indifferent supervision.

Maintenance may be in two forms:

(i) Preventative maintenance

(ii) Corrective maintenance

(i) Preventative: The benefits derived from routine loom checks are usually long term, particularly in the case of older looms. The looms must be first brought up to the required standard and maintained as such on a routine basis. Individual mills must work out their own schedules with detailed definitions of check points and frequencies. The schedule should include primary and secondary loom motions. For example, an automatic weft change plain loom should adopt the following routine:-

(a) Shed timing and size of shed.

(b) Picking, strength, timing, length and direction, shuttle-box swells and slides.

(c) Condition of shuttles. Tips and all surfaces, threading and tensioning devices.

(d) Reeds, condition of dents, care and storage.

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Technical Section

(e) Sley alignment, backlash, bearings and connections.

(f) Warp let-off, tension control, height and alignment of backrest, condition of beam brake.

(g) Catches on cloth take-up mechanism.

(h) Warp protection - check condition and position of frog.

(i) Warp stop motion - timing and setting.

(j) Weft stop motion - timing and setting of weft fork for knock-off. Relate motion to sley and yarn.

(k) Automatic weft supply. Settings of feeler and connections to circular battery. Shuttle-to-bobbin timing at transfer, setting and timing of weft cutter and transfer mechanism.

(l) Driving belt (or chain) tension. Brake and clutch mechanism.

(m) Condition of temples, heald shafts, straps, pickers and picking sticks.

(n) Systematic cleaning and lubrication.

Factors influencing this routine will include:-

(a) Make and type of loom

(b) Variety and frequency of weaving faults.

(c) Rate of mechanical depreciation

(d) Operative standards and skill

Corrective maintenance

The "Repairing Maintenance" which is the responsibility of the loom mechanics. This should be carried out by engineers sufficiently skilled to be able to perform repairs that do not require further attention after the initial work has been completed. The standard of engineering must be equal to that originally performed by the loom maker.

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Mill 'z' (Continued)

Technical Section

GENERAL OBSERVATIONS (Weaving Technology)

(1) Warping: In order to economise in weaving faults, loom down time, and with a view to improved quality and productivity, the following recommendations are made:-

(a) Efficient warping and beaming is of fundamental importance.

(b) Issue the warper with a correct and clearly understandable warping plan on the piece ticket

(c) Place the bank in the proper sequence for one repeat of the warp pattern

(d) Check that sufficient yardage is on each cone to complete the total warp length

(e) Measure the length of the section carefully to ensure accurate and consistent build

(f) Check that all ends are running under controlled tension through the guides and tensioners

(g) Ensure that the beam flanges are at the proper centres, straight, undamaged

(h) Beam off under controlled tension, insert lease rods, and clearly identify by attaching the weaving ticket.

(2) Documentation: Consists of the weavers ticket with the numbers of the pieces on the beam is issued to the yarn department which weighs out the warp and weft. The same ticket should contain the loom particulars, setting, design, warping plan, draft, and colour plan with the weights of the individual counts and colours of the warp and weft yarns. Small swing tickets with consecutive piece numbers should accompany the piece ticket for attaching to each woven piece coming off the loom. The weaver's ticket remains at the loom until the last piece is woven.

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Technical Section

Added information on the loom should consist of:- Time of start-up and pick number. Time of completion and pick number. These details should be entered on the ticket by the Weaving Department Foreman. It is then returned to the production department for costing, wages and efficiency analysis.

(3) Quality Control in Weaving: Shop floor procedure should include regular checks on loom width, picks per inch, design and colour plan. At the start-up of a new warp, the design department is recommended to pass the first repeat of the pattern woven as a regular routine, and make spot checks thereafter. The setting, reed, picks per inch, warp and weft counts should be checked against the weaving particulars at least once per day by the loom tuner, or the department foreman.

MANAGEMENT SECTION

Machinery and Spares: All managements make the complaint that machinery and spare parts for existing machinery carry a high import duty imposed by the bonus voucher system. They state that the necessary equipment and spare parts are not available in Pakistan, therefore machines are often rendered inefficient or unusable due to this fact.

The team decided to approach local machinery manufacturers in order to ascertain whether it was possible to have machinery and spare parts made in Pakistan. Meetings were arranged with the following executives of local engineering firms:-

Allied Engineering Co.	Mr. C.M. Ishoque
F.W. Fabrication	Mr. S.M. Tufail
Zulsham Engineering Co.	Mr. S.M. Qureshi
Kausar Engineering Works	Mr. M.D. Sheikh
Beco Industries Ltd.	Mr. M.A. Chaudhary

The meeting took place at the office of Mr. Shafquat, Deputy Director of Industries, Lahore, on the 2nd December 1971. Visits were also made to the works of Beco

Industries Ltd., and also to the establishment known as P.I.T.A.C. (Pakistan Industrial Technical Assistance Centre), which is a training establishment concerned with precision-engineer training. P.I.T.A.C. also assists the engineering industry by manufacturing special presses, dies, jigs and tools for the manufacture of items such as would be needed for the textile industry.

The meeting disclosed that there is ample resources for the supply of spare parts for existing textile machinery. Complete new machines are also available locally. The team examined an excellent cotton-type loom made by Beco Industries and declared that small modifications are all that is necessary to enable the loom to be used in the wool industry.

The difficulties experienced in the past have been connected with the fractionated demand for spare parts of a specialised nature from the wool manufacturing industry in Pakistan. It was obviously unprofitable for any engineering concern to undertake the manufacture of "One-off" items and no individual engineer could possibly be aware of the total number of similar items required from different sources within the wool textile sector.

It was recommended that the Engineering Manufacturers Association should act as a "Clearing House" for the acceptance of spare parts (and even new machinery) orders. The central organisation thus formulated could then issue the orders in bulk according to demand, to the selected engineering concerns who were willing to co-operate. This was readily accepted by the members present at the meeting.

Mr. David D.F. Lennam assigned to study problems connected with the Pakistan raw wool industry in terms of the preparatory mission interim report, with particular emphasis on the optimum utilisation of indigenously available resources embracing: (1) raw wool (2) sorting, grading and scouring (3) utilisation of capacity (4) development of capacity (5) export of raw wool (6) development of resources.

Background & statistical information: Numerous qualities of indigenous raw wools are produced in various provinces of Pakistan composed principally of "carpet quality". Prior to 1949 no wollen mills existed in Pakistan and textile production on a mechanised scale was carried out only in the cotton sector of the textile industry. The Cottage industry of hand spinning and weaving was however quite prevalent, particularly in the processes of wool carpet and rug production. The bulk of raw wool produced was exported and was the third highest foreign exchange earner from raw commodity sources, amounting to 70M rupees per annum (1960/61). Prior to 1954, official statistical records are difficult to trace. Records of imports and exports of raw wool and manufactured goods have however been collected by different Government Departments since that date, and the Agricultural Marketing and Grading Research section have published relevant statistics. The Central Co-operative and marketing department issued information on the marketing of wool in Pakistan in 1960. A further technical Field Survey was completed by them in 1964 entitled "A scheme of Investigation and Research on Pakistan Wool". The statistical data obtained from field surveys is largely based on estimates and it is unlikely that more accurate figures could be obtained relating to this period.

Although the Field Survey report appears to be comprehensive and lucid, covering almost every aspect of wool production, the recommendations contained therein do not appear to have been carried out. During the past 10 years very little progress appears to have been made. This is borne out by the Management Clinic's initial visit to various mills where reports were received concerning adverse influences caused by the failure of wool suppliers to deliver raw wool sorted, graded, and clean. There is evidence however, that some work has been done in connection with animal husbandry and stock breeding to which reference is made in another section

of this report. Although little wool can be exported at present the following comments are relevant:-

Wool Grading and marking Rules, 1953. The Pakistan Wool Grading Scheme was introduced in 1954 applying to unmanufactured wool exported from Pakistan. Under these rules no wool consignment can be exported without passing the prescribed tests for quality, colour and fineness, and a "Certificate of Quality" bearing the Government seal is issued against every consignment passed for export. The result of this scheme has been a marked improvement in market prospects, average yields are generally much higher than the minimum prescribed. It is regrettable, however, that the "Certificates of Quality" were often [illegible] 4-6% lower in official yield than identical tests done abroad. This can only lead to abuse and serious loss of foreign exchange earnings. Foreign buyers have been much concerned in recent years by the lack of supervision displayed by Wool House inspectorate staff who have failed to reject consignments containing [illegible] cotton, cotton waste and threads, and other extraneous material including grass, iron, baling hoops, wood etc. The presence of cotton in raw wool can remain undetected until white specks show up in the finished dyed material resulting in rejection of the complete line of production. Extraneous matter like pieces of iron and stone can cause serious harm to expensive machinery. Stricter supervision by the Wool Test House staff at all stages between shearing and final packing is imperative if indigenous wool in to take the place of imported wool. This also applies to wool for export if any surplus is available.

Exports of raw wool: These have declined steadily since 1954 due to internal influences affecting exports which are as follows:-

(a) Government policies, and

(b) Rising productivity of home manufacturers using indigenous wool.

No effective measures have been introduced by the Government to apply the Wool Grading Scheme to wool used for internal consumption. The adverse influences affecting home users of indigenous wool are now similar to those which affected

the export industry before the Wool Grading Scheme was introduced. Government policy reducing the "Bonus Incentive Scheme" rate from [illegible]% to 10% has had a disruptive effect on the export trade. This was necessary in order to increase internal production of value-added goods from indigenous wool which can be ultimately exported.

Balance of trade: Although exports of raw wool have steadily declined from approximately 50 M. lbs p.a. to 8 M lbs., it is noticeable that imports of the finer qualities of wool and wool tops have increased, mostly for the worsted and knitting industry. Imports in [illegible] were 4.5 M. lbs compared with 2 M. lbs in 1964/65. This adverse trade balance should be partially by the increased usage of indigenous wool by the woollen section of the trade where possible as indigenous wool building up for worsted purposes will have very little export outlet (due to reduction in the bonus rate) [illegible] exchange earnings.

Smuggling of raw wool: A situation of serious [illegible] disruptive elements are at work, i.e. the smuggling of raw wool across the Afghan border. It is estimated some 11M lbs of wool worth [illegible] million rupees are lost in foreign exchange per annum. This loss will steadily increase unless growers are encouraged by more attractive prices to market their wool crops legally.

Factors affecting the raw wool industry:

(1) Government policy emphasis on manufactured textile wool products.

(2) Increasing requirements of the local textile industry, therefore-

(3) Declining export trade in raw wool brought about by Government policy.

(4) Lack of proper marketing facilities and guidance to home users of indigenous wool.

(5) No compulsory Grading or sorting of wool for home consumption.

(6) Lack of confidence in the Wool Test House "Certificate of Quality".

(7) Lack of incentive to producers of indigenous wool to market their product in local markets.

Raw Wool Section (Continued)

These factors have resulted in:-

(a) Loss of foreign exchange earnings

(b) Loss of potentially good quality wool through smuggling

(c) Unnecessary difficulties for local industry and producers of raw wool.

RECOMMENDATIONS FOR RE-ORGANISATION OF PAKISTAN RAW WOOL INDUSTRY

Raw Survey: A further survey should be undertaken to determine any rise or fall in sheep population and wool production.

Wool Marketing: It is obvious from the Management team's observations that the present system of marketing raw wool in Pakistan is out-of-date and modern marketing techniques should be adopted. It is further recommended that a raw wool marketing expert team should be detailed to study this aspect of Pakistan's deficiency in countries where modern methods are used, so that a suitable system can be recommended for use in Pakistan. Once a suitable system has been accepted it is recommended that the raw wool industry should be RATIONALISED under the control of a PAKISTAN WOOL MARKETING BOARD.

Wool Auctions: A WOOL MARKETING BOARD would organise wool auctions at regular intervals during the seasons. Buyers could obtain their requirements at suitable auction locations. Surplus carpet type wool (if any) could be sold for export under Government Control. This would ensure that no foreign exchange earnings were lost.

Incentive scheme to growers: It is believed that the growers of raw wool in Pakistan obtain only a fraction of the value of their produce due to the many middle-men involved in every transaction. If producers could be assured of a fair and steady income receipt from their flocks based on a sliding scale according to quality, colour, length of staple and fineness, no wool would leave the country illegally and growers would welcome Government advice and training in order to improve their flocks.

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Raw Wool Section (Continued)

Prices: On a Nationalised basis, the Government could guarantee a fair price to growers, and furthermore review prices every 12 months. Auction prices would fluctuate according to demand. Local users would obtain their requirements at competitive prices with exports without the "on-cost" payable by shippers. A Wool Marketing Board should be self-supporting and capable of creating a surplus profit for the benefit of the raw wool trade and in particular for the benefit of growers.

Wool Grading Scheme: The Wool Grading Scheme applicable for export wool should now be also adapted for use by the home industry. If the recommendations to Nationalise the wool industry were accepted then it should follow that the Wool Grading Scheme should be under the control of The Pakistan Wool Marketing Board. The following recommendations apply to the present Wool Grading Scheme:-

( ) The training programme (if any) should be reviewed with a view to raising the standard of personnel on the Wool Grading staff.

( ) Improve training centres and increase field work in animal husbandry, shearing, land management etc.

(4) Train flock owners to wash sheep/fleece before shearing.

( ) Organise trained shearers in teams to visit shearing centres at time of clip.

(5) Train shearers to remove belly wool first, and the remainder of the fleece in one piece.

( ) After shearing the sheep should be dipped in disinfectant.

(7) Branding should be done next with hot iron or with a branding liquid soluble in soap and water - not fast dyes, or tar.

(8) An initial sorting should be done at shearing stage by "skirting" the fleece before it is despatched for classing. Bellies and skirtings should be packed separately.

( ) Effective [illegible] for fine, medium and coarse wool should be done before [illegible] scouring.

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Raw Wool Section (Continued)

(10) Before export or manufacture, all wool should be hot water scoured and disinfected. (A separate note on scouring follows)

(11) Pressing and bagging should be done in premises and areas totally free from cotton especially and other extraneous material.

(12) No materials other than those required for the pressing of wool should be allowed on the floor of the press packing box.

(13) Wool Grading Certificates should be slightly modifed to include description standards suitable for the manufacture of textiles other than carpets. It is estimated that 25% of Pakistan Wool production could be classified between 44s and 50s quality, provided sorting, grading and marketing were improved.

Fellmongering Industry: During the team's visit to various mills, a high proportion of "skin wool" or "pulled wool" was detected in wool described as pure clipped. The Wool Test House rules provide for a separate description on the "Quality Certificate" when wool is"mixed" but the local industry have no protection from this deception practiced by merchants.

Fellmongering is in itself a very old industry and takes account of about one-eighth of all the raw wool produced in the world. This figure might be higher percentagewise for Pakistan. The team did not have the opportunity of visiting the fellmongering fraternity but the author of these notes has had some previous experience of the Pakistan industry.

The marketing of fellmonger wool should be kept quite separate from clipped wool for the following reasons:-

(1) The methods adopted by the fellmongering trade in Pakistan to free the wool from skins requires corrective and modernised methods.

(2) "Skin or pulled wool" is very inferior due to brittleness and discolouration of the staple.

(3) Staple roots are usually not free of dead skin.

(4) When liming is used, wool contains lumps of lime.

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Raw Wool Section (Continued)

(5) Considerzble worm infestation is apparent

(6) The wool has an unhealthy smell.

(7) Skin or pulled wool which is not properly treated contaminates clipped wool which can be very swiftly destroyed by moth and other vermin.

The above faults, apart from being unpleasant to handle, cause wastage at all stages of processing and considerable problems at dyeing stage of production.

Scouring:

It is recommended that all indigenous wool in Pakistan should be scoured and disinfected prior to use in the local industry or if any wool is to be exported. This process would enhance the value of the raw material, reduce cost of freight and benefit local users.

Home manufacturers who have already installed modern scouring plant would buy their requirements of properly graded wool from auction centres for process in their own plant.

Smaller manufacturers and the cottage industry are at a disadvantage and the Government should help these people along the following lines:-

A survey should be made of all existing willey machinery and scouring plant in Pakistan. This should not be difficult as only a few modern mills have installed these, and existing willey machinery is known to be very old and decrepit.

In order to conserve foreign exchange the Government should encourage owners of modern scouring plant to utilise their machinery to capacity on a 24 hour shift by commissioning space capacity to those who can use it. Private owners would require some incentive and the Government should consider paying a subsidy to owners of scouring plants which could be recovered from the smaller manufacturer.

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Raw Wool Section (Continued)

New Plant: It is probable that existing private scouring plants are located in places which would not necessarily serve all the wool producing areas. It would be advantageous therefore if additional scouring plant were purchased and set up in selected localities, the cost of which could be recovered over a period of time from the users.

Consideration should also be given to the purchase of modern bailing or bagging presses for the sole use of the raw wool industry which could be set up alongside Government sponsored scouring plant.

Wool Centres: It would be advantageous to locate modern scouring plant and bagging/baling presses near auction localities where sorting, and grading could also be undertaken under controlled conditions. Possibly three places from the following list would meet the need:-

Montgomery - Multan - Jhang - Lahore - Karachi - Quetta - Rawalpindi.

Note:- If little or no surplus wool were available for export, wool purchased for intended consumption could be bagged at little cost although internal freight rates would be higher than the fully pressed packed wool. It is imperative that wool should not be press packed in the same presses as those used for cotton.

Sheep farming: Pakistan has 13 well-defined breeds of sheep which can be found in specific areas of the country. Due to migration habits some areas may have more than one breed while practically all areas have inter-bred species. The migratory flocks are mainly located in the desert regions of S.W. Baluchistan, and the central Cholistan range of the former State of Bahawalpur. The flocks move from one locality to another in search of food and water.

The general practice of moving sheep from place to place, and crossing one breed with another has accentuated admixture of bloodstock, and great diversity of breeds and types has resulted. None of the flocks exhibit pure bred characteristics, and most breeders are unaware that mixing flocks has an adverse effect on sheep and

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Raw Wool Section (Continued)

wool alike. Indiscriminate and random mating occurs in most parts of the country except in a few Government-managed and private farms. Selection of stud rams is rarely practiced, although some work of this nature is already being carried out in West Punjab by the Provincial Government. Unrestricted mating exposes the breeding ewes to mating with under-age rams, as well as the mating of lambs at first heat (i.e. at the age of 9-10 months). Some ewes come into heat after lambing, and after being served result in the birth of a second lamb during the same year.

A high mortality rate exists among lambs due to lack of food and milk when grazing is scarce, and the surviving young ewes suffer in health, fertility and wool production.

Sheep farming is not practiced as a major industry except in the migratory areas. Due to the semi-arid conditions, sheep farming is the main source of livelihood, but the nomadic shepherd has little knowledge of modern sheep-farming methods. In the irrigated areas of central West Punjab sheep farming is of secondary importance to cash crops. Farmers may own flocks averaging from five to 25 sheep. Usually a villager acts as shepherd for the whole village herd and is responsible for their protection while grazing outside the village.

Government sheep-farms: The importance of sheep in the pastoral economy of Pakistan has led the Government to introduce several projects to conserve land and to start sheep farms under scientific conditions with a view to increasing the production of mutton, wool and skins. Government managed farms already exist in some of the principal wool growing districts. It is understood that results have proved beneficial in helping local farmers with flock management and breeding problems as well as general pasture improvement and soil conservancy. Almost all selected rams are specially bred and distributed for inter-breeding with selected breeds.

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Raw Wool Section (Continued)

Kalabagh Livestock Farm: In 1955 the Management of Kalabagh Livestock Farm (which is one of three similar Government managed farms in W. Punjab) decided to evolve a breed of sheep which would produce a fine quality wool and survive under local environmental conditions. The result of this experiment is a new breed named "Baghdale". This flock is now located in Jamba, W. Pakistan, and is the source of rams for breeding the first-generation of cross-bred ewes.

The following is a comparison between the original local breed "Damani" and the "Baghdale" stock.

	Birth Weight lbs.	Fleece Greasy wt. lbs.	Medulated Fibre%	Fibre Length in inches	Microns
Damani	4.4 - 4.9	3.2 - 4.0	47.43	1.9	45u
Baghdale	5.1 - 5.7	8.2 - 12.6	0.03 - 0.40	3.5	21.7u

As judged by Australian standards, Baghdale wool is between "super clothing" and "Super X" bred grade. By American standards the grade is "fine".

Recommendations: Fair average specimens of the "Lohi" breed with 66/100% blood are found in Multan, Montgomery and Jhang districts of West Punjab. An extension of the Kalabagh project into this area based on Montgomery or Multan would enhance the quality of an already well-developed wool. The local farmers are anxious to improve their flocks, and arising from their co-operation a worthwhile scheme to improve the quality of Pakistan wool should eventually result in saving foreign exchange and reduce imports of wool. It should also provide a surplus of finer wool for export.

This mill does not import raw wool. Imported wool yarns are bought however which have been manufactured from imported worsted tops. The total production of this mill is sold on the domestic market. Exports are nil at present.

Mill 'y' used 70% of its raw material from indigenous sources, raw wool amounting to 140,000 lbs per annum in finished products. (This figure is an estimate made by the team from composite statistics given by the management.) The management buys indigenous raw wool from the local market in "Greasy Fleece" form. Wool is also bought in other areas when the need arises. Complaints are made that wool bought "by type" from producing districts through merchants varies considerably throughout the year. The management makes use of the Wool Test House to ascertain the yield when disputes with merchants arise, but reports that the Wool Grading Scheme is ineffective in up-country markets. The management also considers that a local communal scouring plant established in producer markets would contribute effectively to the production of better grading, providing that the Wool Test House grading methods are applied in the same manner as those used for the export of raw wool.

Wool processing at mill 'y'. After the clipped wool is purchased from the market, it is "Cold washed" in an open tank and left to drain until the following day. The wool is then carried manually up a decrepit ladder a matter of some 25 feet to a roof where it is scattered and left to dry in the sun. This process would be carried out with greater safety and efficiency at ground level. Sufficient space could be made available for this if the plans for an ornamental lawn were abandoned in favour of processing space.

Water supplies are ample, being obtained from a tube well using an electric pump to a reserve tank at ground level.

After the wool is dried, it is "Graded" by relatively unskilled labour for colour only, i.e. segregated into Yellow and Grey batches, or into White, Yellow and Grey batches according to the clip season. After sorting in this manner,

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Mill 'y' (Continued)

Raw Wool Section

the wool is mixed with garnetted waste (mostly willow waste), then treated by passage through a Willow machine to extract the dust content. The stock is carried manually from the Willow to the Carding process. Wool washing, drying, and willowing are located in separate sections of the mill, therefore no semblance of a process flow system on rational lines is applicable under present conditions.

Remarks

In view of the small production, no modern processing techniques can be economically recommended. Even though existing methods are primitive and labour-intensive, they are costing less than the amortisation cost of a sophisticated plant which would not be fully utilised under the present circumstances.

The use of Man-Made fibres in conjunction with wool

The use of various types of man-made fibres in blends with wool could be exploited to advantage particularly in the manufacture of carpet yarns and carpets. Mill 'x' is an outstanding example which serves to illustrate the attractive and hard-wearing varieties of products that can be made from the intelligent use of such blends.

Unfortunately there are no manufacturers of the requisite types of man-made fibres in Pakistan, consequently it is necessary to import the fibres needed. An anomaly exists in this respect where wool tops consisting of fine wool/ man-made fibre blends can be imported without the payment of customs duties relevant to the man-made fibre content of the blended tops.

This tends to encourage the importation of fine wool tops even though plant and machinery exists in Pakistan which could perform the function of top-making, and the function of manufacturing man-made fibre and wool blends. A typical example of this is evident in the apparent excess capacity of top-making, (combing) equipment installed in mill 's'. It should be pointed out here, that top-making is a function of the treatment of carded wool by a process of combing and additional gilling. It is necessarily an added cost, therefore the importation of wool tops involves the drain of foreign exchange by importing a commodity that can be made in Pakistan. Mill 'x' is in point of fact also equipped with excess combing capacity, yet this very same mill is importing prepared tops consisting of combed wool simply in order to obtain supplies of Polyamide and Polyester fibres without the payment of duty.

The recommendation suggested is that blends of wool and man-made fibres should be subject to the full customs duties applicable to the importation of pure man-made fibres, and draw-back facilities should only be granted to exporters of goods manufactured from such blends. A supporting suggestion is that man-made fibre tow could be imported duty free by a manufacturer of continuous filament rayon

[redacted] (Continued)

who could install tow-to-top staple cutting machinery. Man-made fibre tops could then be obtainable from within Pakistan at competitive prices for the purpose of blending with either imported or indigenous wools.

Both of these suggestions should be examined with caution.

The first tends to discourage the use of man-made fibre blends except for exports. The second could result in the excessive use of man-made fibres to the detriment of the raw wool industry.

Nevertheless, a plan of action on the lines suggested is necessary to encourage the maximum utilisation of existing wool-combing plant where a loophole in the foreign exchange control system can cause the plant to stand idle.

The use of wool/man-made fibre blends can enhance the manufactured products in certain applications. Semi-worsted carpet yarns made from 80% indigenous wool and 20% Polyamide fibres for instance, are potential exports.

[redacted]

[redacted]

(1) [redacted] Poor raw wool quality for domestic use due to the indiscriminate mixing of wool types and colours at the raw wool production sources. Dangers of sheep flock quality decline owing to lack of controlled sheep-breeding with consequential wool quality deterioration.

[redacted]: Extension of the "Palmark" scheme used at present exclusively for exported wool, to a similar scheme for the domestic wool markets. Establishment of grading, scouring and packing stations at strategic locations under Government sponsorship. Nationalise the raw wool industry under the control of a Wool Marketing Board. Upgrade the Wool Test House performance. Extension of the Government controlled "Kalabagh" sheep-breeding station's activities is strongly recommended.

(2) [redacted] High working capital costs due to the effects of foreign exchange control methods.

[redacted]: Use indigenous wool wherever possible. Export in the form of manufactured yarns, fabrics and goods with value-added. Export imported wools in the form of manufactured goods with value-added. Restrict the importation of woollen and worsted manufactured goods. Reduce waste losses. Use all available installed plant. Obtain machinery and spare parts from indigenous sources wherever possible. Attract foreign investors to install semi-worsted carpet yarn-making plant by offering incentives subject to the export of a large proportion of output. Incentives could consist of specific-term tax concessions, employee-training grants, and prepared building sites.

(5) [redacted] Management equity

[redacted] Improve "housekeeping". Improve standards of quality control and standards of quality. Establish effective cost-control with standard-cost comparison schemes. Institute effective employee-selection and training schemes. Establish a determined export drive. Appoint foreign agents in the countries in which export markets are to be attacked. Experiment with wool/man-made fibre blends for export. Establish effective production control to fully utilise all installed machinery. Aim to achieve maximum productivity in all departments of the plant. Utilise the expertise of existing foreign-trained management staff. Associate with other wool textile manufacturers at conferences to discuss problems, explore new products and new developments.

[redacted] It is recommended that an expert in wool textile technology and textile management should remain resident in Pakistan for a period of not less than two years to assist in the implementation of the recommendations embodied in this report. The expert nominated should provide additional advice and guidance where applicable, and operate in liaison with the relevant Government Departments and the Private Sector of the Wool Industry.

[redacted]

[redacted]

[redacted]

Years	Est. Sheep population (A)	Av. wt. of greasy fleece with hair	Total raw wool production & yield	Annual Exports mil.lbs.	Others	Export Value mil.Rs.
1960/61	9.0 million	44.0 m. lbs	31.0 m.lbs	20.5 m.lbs	-	70.0
1970/71	11.4 "	51.5 "	35.0 "	8.0(1)	11.0*	19.0(2)

References: (1) - United Kingdom: 6 m. lbs; Others: 2 m. lbs
* - suspected losses through smuggling
(A) Not including Azad Pakistan. (Grade of wool to poor)

Internal Consumption	Mil. lbs. p.a.
1960/61	8.5
1970/71	17.0*

* - United Kingdom: 9 m. lbs
Others: 8 m. lbs

Refs. (2) - source: Department of Fisheries & Grading, Pakistan.

[redacted]

[redacted]	Total Nos.
[redacted]	970,000
[redacted]	705,000
[redacted]	99,000
[redacted]	145,000
[redacted]	125,000
[redacted]	615,000
[redacted]	770,000
[redacted]	2,000,000
[redacted]	200,000
[redacted]	1,000,000
[redacted]	600,000
[redacted]	[redacted]
	9,705,000

Figures obtained from Pakistan Dept. of Fisheries Intelligence.

Data obtained from survey taken 1960/61

Note: There is no evidence in statistical publications to confirm that the sheep population of 1970/71 is 11.4 m. The figure given is based on the assumed wool weight of 3½ m lbs.

[redacted]

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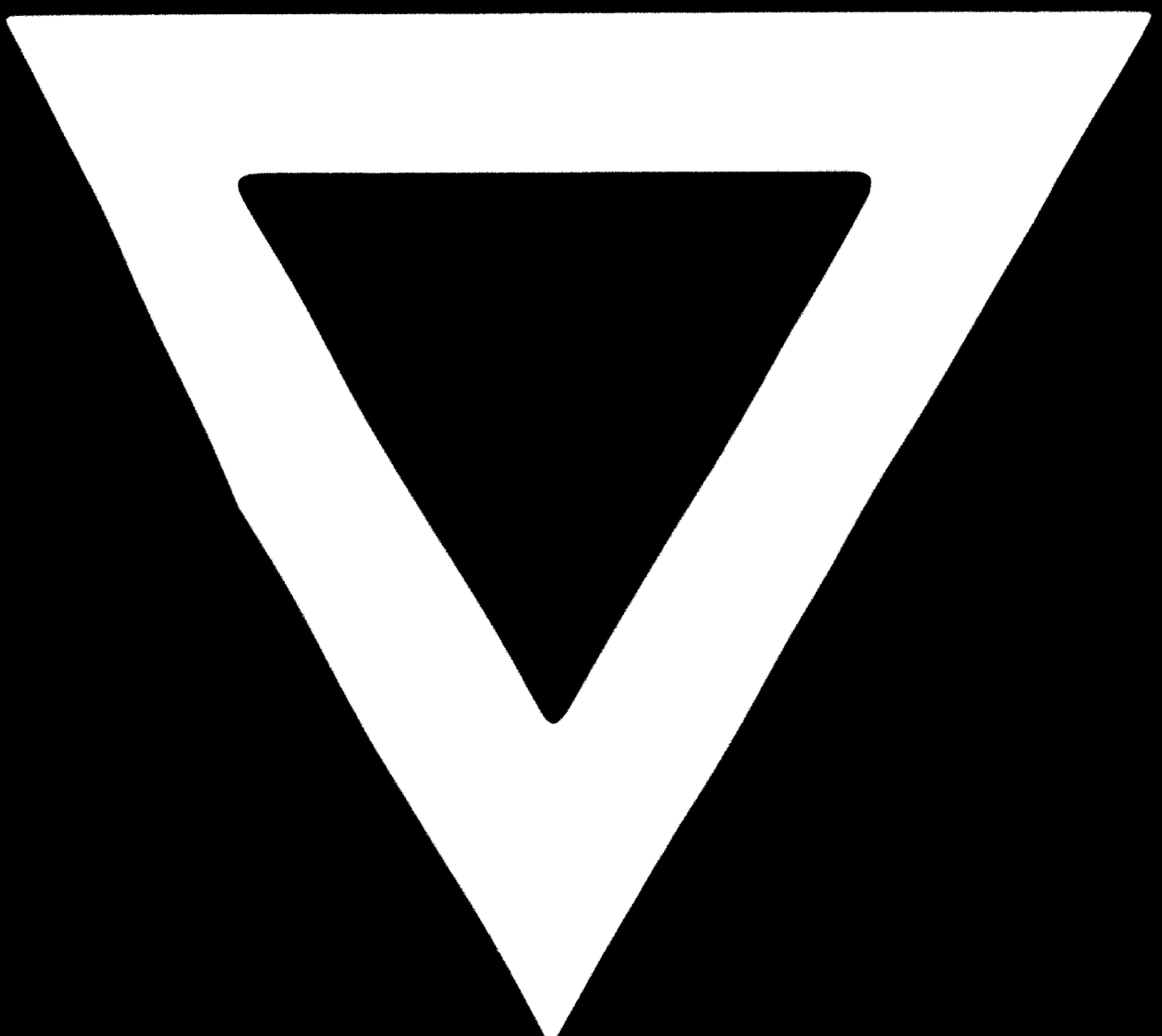

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