



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

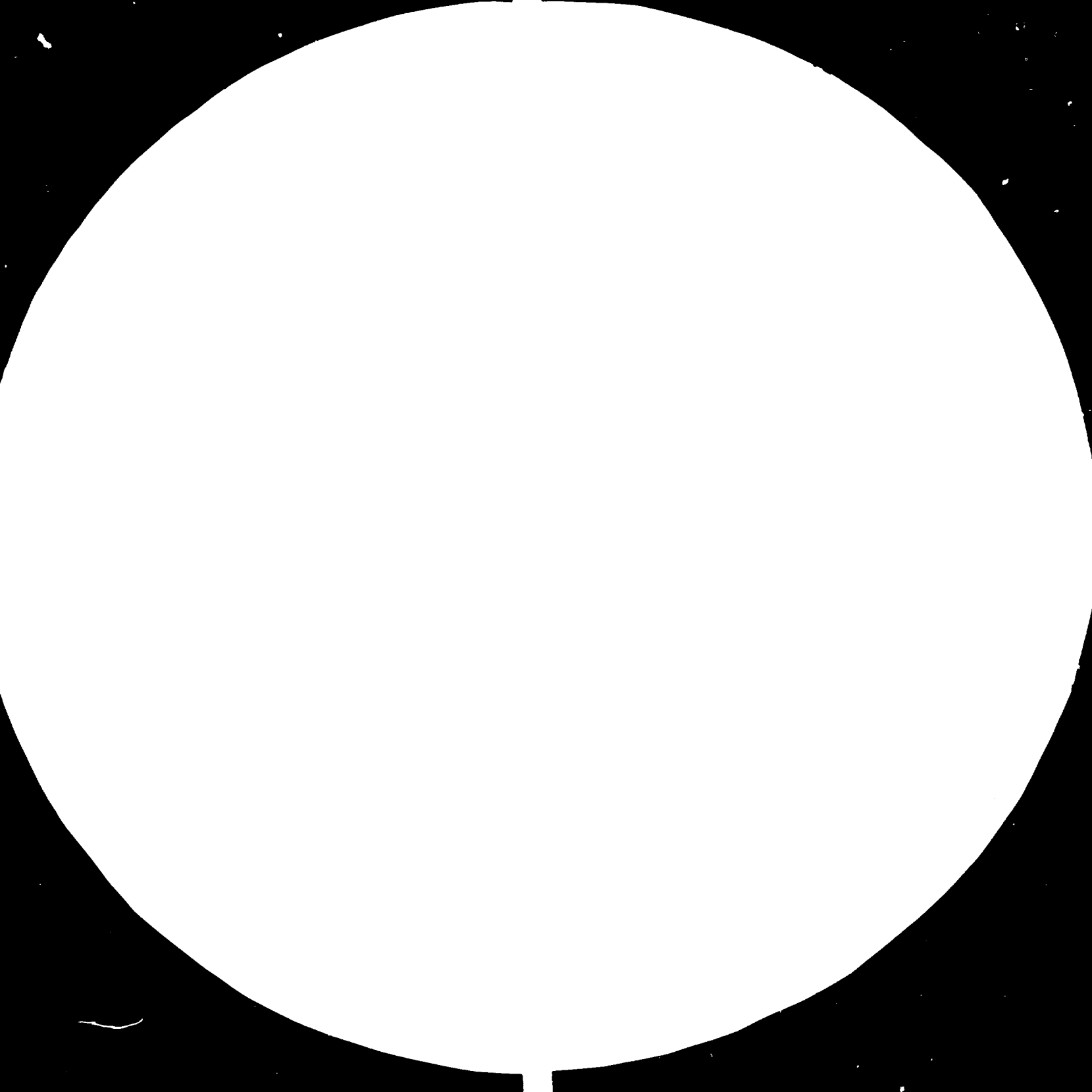
FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org





MICROCOPY RESOLUTION TEST CHART

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

14679

~~14679~~

RESTRICTED

JANUARY 1985



Sri Lanka

ESTABLISHMENT OF A TEXTILE TRAINING
AND SERVICE CENTRE

DP/SRL/79/054/11-03

Final Report

Prepared for the Government of the Democratic Republic of Sri Lanka

by

H. M. El-Missary
Weaving Adviser

for

The United Nations Industrial Development Organisation (UNIDO)
acting as Executing Agency for the
United Nations Development Programme (UNDP)

The views and opinions expressed in this report are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has been produced without formal editing.

ESTABLISHMENT OF A TEXTILE TRAINING
AND SERVICE CENTRE

DP/SRL/79/054/11-03

Final Report

Prepared for the Government of the Democratic Republic of Sri Lanka

by

Mr. H.M. El-Missary
Weaving Adviser

for

The United Nations Industrial Development Organisation (UNIDO)
acting as Executing Agency for the
United Nations Development Programme (UNDP)

The views and opinions expressed in this report are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has been produced without formal editing.

TABLE OF CONTENTS

	<u>Page No.</u>
I. <u>SUMMARY</u>	1
II. <u>INTRODUCTION</u>	5
II.1. Purpose of the Project	5
II.2. Duties of Adviser	6
III. <u>ACTIVITIES AND ACHIEVEMENTS</u>	8
III.1. Survey Visits to Weaving Mills	8
III.2. Consultancy Visits	8
III.3. Methodology Followed in Consultancy Work	8
III.4. Follow-up on Mill Visits	11
III.5. Letters of Appreciation	11
III.6. Seminars to Senior Mill Staff	12
III.7. Training Activities and Achievements	12
III.7.1. Training Promotion	12
III.7.2. Training Courses Held at T.T. & S.C.	12
III.7.3. In-Plant Training	12
III.7.4. Follow-up on Training	13
III.7.5. Training of Counterparts	13
III.8. Other Activities and Achievements	14
III.8.1. Advice on Purchase of Machinery	14
III.8.2. Commercial Advice	14
III.8.3. Purchase, Assembly and Commissioning of UNIDO Equipment.	14
III.8.4. Studies on Behalf of Ministry of Textile Industries.	15
III.8.5. Assistance to Mills Regarding Cloth Calculations and Fabric Analysis.	15
IV. <u>FINDINGS</u>	
IV.1. Major Difficulties	17
IV.2. Lack of Knowledge By Both Labour and Staff as Regards Their Duties and Responsibilities.	18
IV.2.1. Weavers	18
IV.2.2. Fitters/Mechanics	19
IV.2.3. Supervisors	22

	<u>Page No.</u>
V. <u>RECOMMENDATIONS</u>	27
V.1. <u>To N.T.C. Government-owned Mills</u>	27
V.1.1. Requirement of Proper Job-Organization Chart in a Weaving Mill.	27
V.1.2. Requirement of Properly Trained Staff	30
V.1.3. Introduction of Production Control Systems and Methods.	33
V.2. <u>To D.T.I. Weaving Mills</u>	33
V.2.1. Necessity to Get Looms Back to Their Original Automatic Status.	34
V.3. <u>To the Power Loom Sector (including D.T.I.)</u>	36
V.3.1. Necessity to Improve Work-load Allocation	36
V.3.2. Necessity to Train the Staff	37
V.3.3. Necessity to Develop Warp & Weft Preparatory Processes.	37
V.3.4. Necessity of Fabric Development	38
V.3.5. Necessity of Machine Development	40
V.4. <u>For Industry Consideration</u>	41
V.4.1. Necessity to Rehabilitate and Modernize Weaving Mills.	41
V.4.2. Necessity to Rehabilitate and Modernize Spinning Mills.	42
V.4.3. Necessity to Introduce Up-to-date Technical and Managerial Methods and Systems.	42
V.4.4. Necessity of Training	42
V.4.5. Necessity of Consultancy Assistance	43
V.4.6. Necessity to Promote Exports	44
V.4.6.1. Necessity to Develop the Mill to Export-Standards.	44
V.4.6.2. Necessity to Establish Export Promotion Committee.	44
V.4.6.3. Necessity to Produce Fabrics for Clothing Industry.	44

	<u>Page No.</u>
V.5. <u>For Government Consideration</u>	45
V.5.1. Introduction of Middle Level Textile Education Institutions.	45
V.5.2. Development of Textile College Graduates to Specialised Fields of Textiles.	46
V.5.3. Necessity to Send Educational Missions Abroad.	47

TABLE OF APPENDICES

<u>Appendix No.</u>	<u>Subject</u>	<u>Page No.</u>
I	Mills Visited During Survey Period	48
II	Results Achieved in Mills in which Advice and Consultancy were Offered After Implementing the Recommendations.	49
III	Letters of Appreciation	50
IV	Training Courses Held at T.T. & S.C.	54

I - SUMMARY

- I.1.0.0. The activities of the weaving adviser covered an extensive survey of the textile industry to promote the services and the training activities this project is providing for the industry. (III.1.).
- I.2.0.0. The adviser consulted 40 mills in 120 day visits. His methodology was not based on putting his remarks in a report and then leaving it to the mills to implement his recommendations on their own, but to take part in the implementation of the suggestions by practical demonstrations on-the-floor. (III.3.).
- I.3.0.0. The mills in which advice and consultancy was offered, received frequent visits at intervals in order to follow-up the implementation of the suggestions given in the previous visits, and to give further guidance to suit the new condition. (III.4.).
- I.4.0.0. Several letters were received in appreciation of the services given and the improved results achieved. (III.5.).
- I.5.0.0. One Seminar was held covering the new developments as shown at ITMA 1983, held in Milan, Italy. (III.6.).
- I.6.0.0. The training activities covered (a) holding 15 training courses in which 991 man days of training in weaving and related subjects were achieved (III.7.2.), (b) in-plant training of the staff in the mills which received consultancy visits. (III.3.). This also included the in-plant training of weavers, fitters, and supervisors as regards their duties and responsibilities. (IV.2.).
- I.7.0.0. The findings of this expert covered the main topic of lack of knowledge by both labour and staff as regards their duties and responsibilities. This has been elaborated regarding the major weaving jobs, i.e. weaver, fitter/mechanic, and supervisor. It has also been explained how the case of each job has been dealt with in actual tenure.

1.8.0.0. The Recommendations suggested covered the following:

1.8.1.0. For the Consideration of the NTC Mills:

1.8.1.1. Requirement to introduce a proper job-organization chart by:

1. Increasing the looms allocated to a weaver by bringing down the breaks per loom hour. (V.1.1.).
2. Training the fitters and maintenance staff to enable them to perform their duties in full. (V.1.1.).
3. Establishing the jobs of foreman and supervisor in the right understanding of these jobs. (V.1.1.).

1.8.1.2. Requirement of properly training the various levels of the staff as a continuing process as this is the only guarantee for success. (V.1.2.).

1.8.1.3. Introduction of effective production control systems and methods. (V.1.3.).

1.8.2.0. For the Consideration of the DTI Units:

To get the Chinese looms back to their original automatic status. (V.2.1.).

1.8.3.0. For the Consideration of the Power Loom Sector

(Including DTI units until recommendation 1.8.2. is implemented):

1.8.3.1. Necessity to improve work load allocation by taking corrective action in order to reduce yarn breaks. The low investment cost of a powerloom unit should not be out-balanced by increasing its labour utilization unnecessarily. (V.3.1.).

- I.8.3.2. Necessity to train the staff as they generally do not have any previous educational or training background. (V.3.2.).
- I.8.3.3. Necessity to develop and improve warp and weft preparatory processes. This is not only necessary in cases where the equipment is primitive and obsolete but also a pre-requisite to bringing down the high rate of yarn breaks of the loom to acceptable norms. (v.3.3.).
- I.8.3.4. Necessity of developing new fabrics in order to allow mills to move out of the limited variety of their present products which is currently resulting in severe competition between the mills and a low margin of profit, if any. (V.3.4.).
- I.8.3.5. Necessity of developing machinery in order to improve its performance by introducing warp stop motion and optical weft stop motion to the looms, and by the development of the preparatory equipment. (V.3.5.).
- I.8.4.0. For the Consideration of the Industry:
- I.8.4.1. Necessity to rehabilitate and modernize the weaving mills especially the MTC mills. This action is required in order to bring the mills into a better position as regards exporting their products (see V.4.6.3.), and to be competitive in the world market by the increase of productivity per machine and labour and the raising of the quality to norms and levels equal to those of competitive countries. (V.4.2.).
- I.8.4.2. Necessity to rehabilitate and modernize the spinning mills as this should go in parallel with the modernization and development of the weaving mills in order to make available the supply of internationally accepted norms and prices of spun yarns. (V.4.2.).
- I.8.4.3. Necessity to introduce up-to-date technical and managerial methods and systems. Such staff management aids are essential in a modern mill to assist the management to make the right decisions in running the mill. (V.4.2.).

- I.8.4.4. Necessity of training the staff and labour to enable them to achieve optimum performance. (V.4.4.).
- I.8.4.5. Necessity of encouraging consulting assistance especially in the power loom units until their staff will gain the required training and know-how. (V.4.5.).
- I.8.4.6. Necessity to promote exports after developing the mills to export requirements. In this respect the establishment of an export promotion and marketing committee will be a necessity for the smaller weaving units who cannot afford to undertake such major functions. (V.4.6.1. & 2.).
- I.8.4.7. Necessity to produce fabrics for the local clothing industry. The clothing industry is a potential export market for the weaving industry which, if made competitive, will not only fill the orders for all the looms but also industrial expansion of many fold will become necessary. (V.4.6.3.).
- I.8.5.0. For the Consideration of the Government:
- I.8.5.1. Necessity of middle level textile educational institutions to supply the requirement of the industry with skilled workers to fill the jobs of loom fixing and loom maintenance. They will also, after acquiring the required experience, be ear-marked to fill the jobs of foremen and supervisors. (V.5.1.).
- I.8.5.2. Development of Textile College graduates to specialised fields of textile study and also to study for a B.Sc. degree in textiles. (V.5.2.).
- I.8.5.3. Necessity to send educational missions abroad to fill the shortage of B.Sc. & M.Sc. textile engineers who, after gaining practical experience and knowledge, should be ear-marked to fill the higher level technical managerial posts.

II - INTRODUCTION

This is the final report, Project Number PP/SRL/79/054, covering the full period of this expert's assignment in the Textile Training and Service Centre (TT & SC), Colombo, Sri Lanka as Weaving Adviser.

The assignment covers the period from 24th January 1983 to 11th February 1985.

II.1.0.0. Purpose of the Project:

In an agreement between the Government of Sri Lanka and the United Nations Industrial Development Organization (UNIDO) and the United Nations Development Programme (UNDP), the request for technical assistance to establish a Textile Training and Service Centre project in Colombo was provided.

This UNIDO project commenced on June 1982.

The Objectives of this project are:

1. To strengthen the textile industry's performance through mill-level investigational work, training and consultancy services.
2. To establish a unit for trial; spinning, weaving, knitting and processing on behalf of industry, thereby making industry more competitive.
3. To establish suitable preventive maintenance schemes with a view to improving machine productivity.
4. To formulate and introduce training courses to upgrade the levels of skill of middle and lower management personnel. Also, to establish worker training schemes.
5. To establish a textile library and a textile machinery data-bank.

II.2.0.3. Duties of the Adviser:

As a member of a team of experts provided by UNIDO, the expert's task is to improve the operational efficiency of the weaving factories and simultaneously train the counterparts, under the guidance of the Chief Technical Adviser (CTA). Specifically, the expert will be expected to perform the following duties:

1. Assist the weaving mills in Sri Lanka to improve quality and productivity.
2. Advise the weaving industry on the techno-economics of converting staple yarn and filaments to woven fabrics.
3. Advise on practical ways and means of undertaking consultancy and investigational projects, with a view to raising standards of quality, efficiency and productivity in weaving mills, and participate in such in-mill or in-centre investigations.
4. Offer short seminars to senior weaving personnel on any aspect of his work which the adviser may feel would benefit the weaving industry as a whole.
5. Confirm where required, and make suggestions for improvement if necessary in the work already proposed on centre-offered training programme for middle and lower management personnel to be held at the Centre. Participate in lecturing and practical work in these courses, if required.
6. Advise on the implementation of in-plant worker training schemes, i.e. use of training bays, training methods and programmes. Also, on Centre-offered instructor training programmes for weaving mill supervisory staff.

7. The adviser will also be expected to prepare a final report, setting out the findings of the mission and recommendations to the Government on further action.

III - ACTIVITIES AND ACHIEVEMENTS

III.1.0.0. Survey Visits to Weaving Mills:

As the Weaving Industry in Sri Lanka is limited in capacity it was planned from the start to survey, visit, and assist as many weaving units as possible including both the cotton and the synthetic sectors. The mills visited at this stage are shown in Appendix I. The objects of these visits were as follows:

1. To get acquainted with the methods, systems, equipment, and machinery used in the various mills.
2. To introduce to the industry the technical services and assistance the T.T. & S.C. can provide to the mills.
3. Although the mill visits were for a short period, discussions were held with the management and the technical staff to brief them on the possibilities to attain better production, to improve the cloth quality, and to save on the cost of production.

III.2.0.0. Consultancy Visits:

Having visited many mills during the survey phase, some of them have asked this expert to proceed for a thorough and detailed study of their weaving installations. These mills along with others which were approached in later stages were given more time for fact findings, discussions, consultancy, and in-plant training work.

III.3.0.0. Methodology Followed in the Consultancy Work:

During the consultancy work the whole plant was surveyed, i.e. from the blow-room up to the processing departments in order to allow the expert to know the kind of mill he

is dealing with. He would then concentrate and give more time to study and diagnose the condition of the yarn preparatory and weaving departments. He would study the available machinery, its productivity/efficiency, the programme of manufacturing, the construction and quality of fabrics woven, the level of experience of the technical staff, methods and systems of running the various departments, the running condition of the machines, their adjustment and setting, whether any gauges or fixtures were being utilized, their preventive maintenance systems if any, labour and machine utilization, the management chart, training systems if any, etc. This knowledge was necessary for discussing and commenting on the weaving yarn preparatory processes and the weaving department, and to be also acquainted with the conditions in the departments before and after preparatory and weaving processes.

The expert also investigated and studied the processing difficulties and problems which were raised up by the mills.

For all the mills visited the comments and findings were discussed with the management and the technical staff to cover each individual process.

The expert's method during his consultancy work was not based on putting his remarks in a report, (except in the case of Pugoda Textile Mills, according to the request of the mill manager), and to leave it to the mill to implement improvements on their own, but also to take part in the implementation of his suggestions by practical demonstrations on-the-floor. In the weaving shed, he would demonstrate his recommendations on one or more looms to set up an example of the proper adjustment, setting, use of gauges and fixtures etc., in order to be continued accordingly by the mill staff on the remaining looms. He would, however, put in writing his suggestions and recommendations such that its implementation could be followed-up

by the management. The objective of this methodology was as follows:

- i. To convince the management and the technical staff that the expert is not an outsider who is only making criticism and offering remarks here and there basing his logic on theoretical or technical explanations, by demonstrating the implementation of his remarks and suggestions on the machines. He shows them that he has also the practical background and capabilities that avails him to assist them with the practical solution to their problems, which is actually what counts to them.
- ii. When appreciating the results achieved on some machines, completing the implementation of the suggestions on all the machines will be fulfilled with conviction. The management will be then convinced that improvement is gained and the T.T. & S.C. is fulfilling its role of helping the industry.
- iii. The process of showing the faults, anomalies, and malpractices on the running machines, discussing them and demonstrating on-the-floor the correct methodology that should be followed, was also aimed at being a process of in-plant training to the staff and the technical personnel.
- iv. To train the counterparts not only on the practical mill conditions and problems which vary from one mill to another, but also on the systems and methods to approach and deal with the different people in the industry.

Mill consultancy is not an easy task. Unless mill men are convinced that the counterpart knows his job thoroughly, is highly experienced and trained, and is convincing in his

recommendations and suggestions, they will not listen to him or follow his recommendations. It was, therefore, considered that the counterparts accompanying the expert during his consultancy visits to the mills, is a major phase of their training.

III.4.0.0. Follow-up Mill Visits

The mills, in which advice and consultancy were offered, received frequent visits at intervals for the following reasons:

- i. To continue the assistance from one process to another and from one department to the one following it until all the departments were covered.
- ii. To follow-up the implementation of the suggestions given in the previous visits and to give further guidance and suggestions to suit the new conditions.

Most of the mills who received repeated follow-up visits were found to have co-operative and willing management who were interested to take-up the advice and to implement it especially when being encouraged by the results achieved.

Appendix II shows the results achieved in the mills in which advice and consultancy were offered, after implementing the recommendations. It also shows cases where almost optimum results have been achieved.

III.5.0.0. Letters of Appreciation Received:

Although mill management are generally reluctant to put in writing their appreciation to the services given and the improved results achieved, this expert has received letters

of appreciation from the following mills:

1. J.B. Textile Industries Ltd.
2. Manufacturers & Knitting Co. (Industries) Ltd.
3. H & T Textile Industries Ltd.
4. Ambalangoda Textile Weavers Co-operative Society Ltd.

The letters received from the above mentioned mills are shown in Appendix III.

III.6.0.0. Seminars to Senior Mill Staff:

One Seminar was held covering the new developments in yarn winding, warping, sizing and weaving machines as shown and demonstrated at ITMA in Milan, Italy. The Seminar was followed by a session in which questions were asked by the delegates attending the Seminar.

III.7.0.0. Training Activities & Achievements

III.7.1.0. Training Promotion

Mill visits, meetings, and discussions with mill officials, staff and directors to promote the concept of training were continuing since the start of the project.

III.7.2.0. Training Courses Held at T.T. & S.C.

The acute shortage of national staff, whose main task was to hold training programmes, constituted a hindrance to holding more training programmes. The training programmes shown in Appendix IV were, however, held despite the heavy commitment on the in-plant training and service aspect and other various activities.

III.7.3.0. In-Plant Training:

In-plant training was provided along with the consultancy activities in almost all the mills which received repeated visits (See III.3. & IV.2.).

III.7.4.0. Mill Follow-up on Trainees

In many cases the performance on the trainees who had attended the training courses at T.T. & S.C., or had received previous in-plant training was followed-up on-the-floor in the mills. (See III.4.).

III.7.5.0. Training of Counterparts

This expert had only one full time counterpart. Another counterpart was appointed in June 1984 but has not been of much assistance as he was deputised to work with the Knitting Adviser until his counterpart was recruited. He then went on a Fellowship for 3 months from November '84. Two Workshop Instructors and one Assistant Training Officer were appointed only in November '84.

The training of counterparts - albeit counterpart availability was limited - was organised through the following:

- i. During mill visits to get them acquainted with the varying conditions from one mill to another, and also to get them familiar with the proper settings and running conditions of the machines by the follow-up of practical demonstrations on-the-floor during consultancy and in-plant training work.
- ii. In the follow-up discussions in the advisory sessions held in the various mills, in order to make them familiar with the correct methods and systems of running, and managing the mills.
- iii. To get them to know the ways to approach the personnel in the industry in order to get them to follow the recommendations.
- iv. Technical discussions in the office.

- v. Practical training during the period of installing, assembling, setting and adjustment, commissioning, and running the various preparatory and weaving machines now housed in the weaving work shop at the new premises of T.T. & S.C.

.. III.8.0.0. Other Activities and Achievements

.. III.8.1.0. Advice on Purchase of Machinery

Some mills have asked the guidance of the T.T. & S.C. for advice on the purchase of new or used machinery. When such advice has been required in the field of yarn preparation and weaving, this expert has made available his expertise.

One mill, studying the purchase of up-to-date preparatory and weaving equipment for a terry towel project, was seeking the continuing guidance of this expert on the purchase and specifications of the required machines.

.. III.8.2.0. Commercial Advice

As the CTA was keen to see some mills exporting, attention was given to this aspect of technical assistance. Where it was felt that quality was of export standard and fabric costs could be brought down to international levels, advice was given to a few mills on the most sought after fabrics by importers and a few buyers names and addresses were given.

.. III.8.3.0. Purchase, Assembly, and Commissioning of UNIDO Equipment

- i. Specifications were prepared for the following equipment:

- (a) One Sizing Machine and Size Cooking Installations.
- (b) One Shuttleless Weaving Machine and its accessories.
- (c) Three Conventional Shuttle Weaving Looms.
- (d) One Two Spindles Pirn Winding Machine.
- (e) One Six Spindles Cone Winding Machine.

- (f) One Skein Winding Machine.
- (g) Boiler Installation for the supply of steam to the Sizing Installations and the fabric processing equipment.

- ii. Offers received were thoroughly studied and negotiated with the suppliers and our evaluation on offers of equipment was forwarded to PAC in Vienna Head Quarters.
- iii. Preparation of the lay-out drawings for the machinery which will be housed in the weaving work-shop in the new premises of the T.T. & S.C.
- iv. Supervision of the installation, assembly, and commissioning of the ordered equipment.
- v. Supervision of boiler/steam pipe/chimney installations and commissioning.

III.8.4.0. Studies on behalf of Ministry of Textile Industries:

Study and reporting on the five year investment programmes for each of the National Textile Corporation Mills (NTC) with weaving facilities (or planned weaving facilities) were prepared on behalf of the Ministry of Textile Industries.

III.8.5.0. Assistance to Mills Regarding Cloth Calculation and Fabric Analysis:

The following information was supplied on request from some mills:

- i. One mill was supplied with the calculations of yarn required for the weaving of a number of fabrics.

- ii. One mill has requested the complete analysis of a sample to reproduce a honey comb design as per sample supplied.
- iii. One mill has requested the analysis of a semi-canvas fabric required for the production of hand bags.
- iv. Some mills have requested the weaving department to analyse fabrics having jacquard type dobby designs combined with coloured striped effects.
- v. Other mills have requested the analysis of fabrics containing long repeats of coloured stripes and asked to be supplied with the methodology to reproduce such coloured striped effects on the direct beam warper and on the sizing machine.

IV - FINDINGS

Although this expert is pleased about having made a considerable contribution to develop the situation in the weaving sector, it would be ridiculous to think that any further development is not necessary.

IV.1.0.0. Major Difficulties:

Despite the following difficulties which this expert met since joining this UNIDO project in January 1983, he had a rather congested programme covering; mill visits, consultancy work, report writing, in-plant training, holding training courses at T.T. & S.C., Seminars etc., but he is able to comment on some 'findings' as follows:

- i. The problem of smuggled goods has affected the weaving industry in Sri Lanka and has caused the closure of many units either partially or totally because they were unable to compete.
- ii. Due to the partial running of the mills, the management was mostly interested in running the stopped looms rather than introducing to their mills new suggestions for increasing the efficiency or improving the quality.
- iii. Unwillingness of some mills, mainly those run by foreign management, to accept technical advice from others.
- iv. Use of old and, in some cases, obsolete equipment that limits the viability of the units.
- v. Unavailability of genuine spare parts.

IV.2.0.0. Lack of Knowledge-by Both the Labour and Staff as Regards their Duties and Responsibilities:

It was clear to this expert from the start that not only the technical knowledge is lacking, but the labour and staff lack, in the first place, the knowledge of their job duties and responsibilities. Although the Centre's Bulletin which is distributed among the textile mills and issued every three months publishes the job description for each and every job, it seems that many mills are not really making use of the valuable information given therein. The following is illustrated:

IV.2.1.0. Weaver:

Loom stoppages are inevitable but what counts is the rate or breaks per loom hour, the higher the rate of stoppages/ yarn breaks the lower the efficiency and the quality of the cloth. Faults in yarn spinning, in the yarn preparatory processes, in machinery setting, adjustment and maintenance, the human factor, and other aspects of production all contribute their share in the incidence of loom stoppages. It is the job of the management to keep an eye on the quality in each process through close supervision and by the aid of quality control norms and methods. The job of the weaver, however, is to keep his looms running and to attain optimum results. The way the weaver is seen working almost in every mill visited is that she is running after the stopped looms, piecing up the broken ends/picks, or changing a discharged pirn. When all her looms are running again, she assumes that now she has no work to do and she stands idle in front of the looms allocated to her. waiting for another loom to stop or a weft pirn to be discharged. The main task of a weaver, however, to run her looms efficiently, is to prevent potential loom stoppages through systematic patrolling. The current practice of waiting at the front of the looms for an end to break and a loom to stop is unacceptable, especially so when many of the causes of loom stoppages can be eliminated entirely by anticipating

them at the back of the loom during the patrolling cycle of the back side of the loom. She should avert end breakages by re-arranging and straightening crossed and rolled ends, cutting short any long knot tails, tightening loose or slack ends, separating oversized or sticking ends, removing accumulations or beads of fibres, taking up spare or wild ends etc.

In many cases the duties of the weaver while patrolling the back of the loom was demonstrated practically by this expert during his mill visits. It was gratifying to notice in follow-up visits, that having achieved less loom breakages and improved production through the back patrolling process the weaver has now adopted the system through conviction. It should be mentioned that the results were enhanced due to the fact that the looms allocated to her are limited in number.

IV.2.2.0. Fitter/Mechanic:

In almost every mill in Sri Lanka there did not exist a preventive maintenance system. The fitters usually work in shifts. Their main task is to repair mechanical loom breakdowns. If the loom runs when it is restarted after its repair the fitter considers the breakdown work is complete and moves to another loom which needs his attention. He does not check the proper setting or tune the looms. He generally does not appreciate the difference between the performance of a loom which is properly set and tuned and a loom which could only run no matter how inefficiently.

Although it was alleged in some mills that the looms were checked at time of beam change, when this expert checked such looms it showed that such a task was not performed.

This condition, of not giving the proper services to the looms, due to lack of training the fitters, and their understanding of their job duties, has not only resulted in the frequent and major breakdown of the looms, but also in a loom which is not maintained and tuned properly and which is a potential to low performance and eventually low production. It has also resulted in a high rate of labour utilization and a high cost of production.

It was recommended to the mills that preventive maintenance should be the main task of the fitter and not the repair of the breakdowns. If the looms were properly maintained and looked after in a systematic way, the chances for breakdowns not only will be minimized, but also the major loom breakdowns will be more or less eliminated. It was also recommended that this system, in order to be successful has to be based on the following:

i. Accountability:

As mentioned previously the actual task of the fitter was to move from one loom which requires repair to another. He considers the loom repaired as long as it can be made to run again. If it breaks down after that no one will know whose mistake it was and actually no one follows-up, because there is no system of accountability.

In the introduction of a preventive maintenance system accountability has to be involved as explained in the following actual tenure:

A power loom unit having 48 looms had 2 fitters per shift and one head fixer in the general shift. The unit runs 2 shifts. The two fitters instead of working on any of the 48 looms were re-organized such that each fitter was to work only on 24 looms i.e. the department with respect to the fitters was divided into 2 sections. Since there were 2 fitters in the 2 shifts for each section of 24 looms, the responsibility of preventive maintenance was again divided between them in a specific manner i.e. the first fitter to be responsible for the maintenance of the looms numbered from 1 to 12 and the second fitter for looms numbered from 13 to 24. The fitter would stop one loom per day out of the looms allocated to him, to check, align, and correct the setting points, one after the

other, according to the directions and setting instructions of the head fixer. He would tighten the loom nuts and bolts, change or repair any loom parts which could be a potential of breakdown, etc., i.e. to get the looms allocated to him to run in a good mechanical condition and to be properly set and adjusted. In this example the looms would receive a preventive maintenance cycle every 12 days. He would also patrol the 12 looms allocated to him at least 2 times during his shift, one time at the beginning of the shift, and the second at the middle of the shift.

ii. Training of the Fitters:

Although most looms, other than those in the 3 MTC Government mills, are of the power loom type, which are synonymous of their simple and uncomplicated executions, unlike those of the nowadays sophisticated shuttleless weaving machines, the fitters were unable to run them properly due to their lack of training.

The task of in-plant training of the head fixer as well as the shift fitters was undertaken by this expert during his mill consultancy visits. The expert would check the looms and point out the wrong alignments, settings, clearances etc., and at the same time demonstrate the corrective action. In almost all cases alignment and angle measurement gauges were suggested to be used.

Training of the head fixer was important in the sense to be the trainer for his group of fitters. He would check the looms which has been maintained by his fitters in the 2 shifts i.e. to check 4 looms daily: 2 looms in the morning shift while their fitter is present, and the other 2 looms in the afternoon shift such that if he finds any wrong settings he would point them out to the concerned fitter and ask him to correct it under his guidance and instructions. As this

job was repeated daily, the fitters soon became trained to do a proper job.

iii. Introduction of an Overhauling System:

Since there exists some major maintenance work which could not be done by the shift fitters, e.g. reconditioning of the slay and race board, reconditioning the 4/1 box motion etc., the head fixer with his crew in the general shift would take care of such task.

It is gratifying to mention that with better care and proper adjustment of the machines, improved results have been achieved. More important, the fitter knows now what to look for and how to check his looms and what measurements to use. He is now taking pride in his work, as he considers the looms allocated to him as belonging to him because it reflects and shows his efforts. When this expert went for follow-up visits he has perceived a fitter re-checking one of his allocated looms, a case which was never seen before.

The preventive maintenance system pays back in the form of less stoppages due to loom breakdown, and ends down, and consequently results with higher efficiency and better cloth quality.

The above example only with varying numbers of looms allocated per fitter, was advocated to almost all mills which received consultancy work. It has resulted with the achievement of much improved results. (See Appendix II).

IV.2.3.0. Supervisors

The supervisors were not performing their duties and responsibilities properly as these were found to be vague and unclear to them. They were of the opinion that their task is limited to; arrange labour at the beginning of the shift in place of those absent, implement changes in work programme

at loom beam change, ... etc., instead of using their efforts to achieve optimum productivity and quality. Since they are usually people of no previous theoretical background, and mostly being weavers previously, they lack the knowledge and the know-how of managing their work. They do not know what to look for or what to do when they go around the looms.

In some of the mills visited, feeling the importance of the job of the supervisor the management has requested the training on their duties to be carried out in-the-plant with explanations on how to perform their duties effectively. The following is a case of a mill in which the shift supervisors received in-plant training:

Although many recommendations were suggested in warp and weft preparatory processes and in improving the setting and fixing conditions of the looms, the improved results obtained were much below those expected. When going around the looms it was clear that the new improved running condition of the looms should have produced much more production than they were actually obtaining. The following was noticed:

1. When the supervisors were informed about their duties, they disclosed that the weavers were limiting the increased production, which followed the implementation of the recommendations, in order not to have to work more. They would make excuses to leave the looms stopped. They would start the looms late at beginning of the shift and would leave them early before the end of the shift. They would slow down on piecing up the broken ends/picks etc., while the supervisors were not taking any positive action.
2. They were asked to keep an eye on the drawn-in beams to be, when gaited, free as much as possible from crossed ends, and not to accept the condition as it comes without showing the drawing-in department and the sectional warping department the faults of

their production such that corrective action will be taken by these departments. In some cases they were receiving drawn-in beams with damaged reeds in the selvage area, and instead of asking the drawing-in department to use good reeds they used to move the selvage more to the inside of the cloth, i.e. away from the damaged part, by taking out a number of ends thus causing their entanglement and introducing a potential of excessive breakages at the selvages. Moreover, the cloth width becomes less than that specified. It was, therefore, instructed that any difficulty or anomaly in warp preparation should be corrected at its origin and that they should not cover for a faulty practice by sacrificing the loom productivity.

3. Although there exists more than an adequate number of loom gaiters, a loom will be stopped for gaiting for over 4 hours, instead of between 1 to 2 hours only.
4. In case of a loom break-down, or a loom which requires a minor repair, it will stop for a long time, because of lack of supervision, until it is attended by the loom mechanic.

They were instructed that their main task is to achieve optimum productivity, consequently if a loom stops for repair or for beam change it should be brought back to production with the least possible down time.

5. On some box looms the weft fork stop motion was removed, consequently when a weft breaks/expires the loom did not stop and if not noticed and stopped manually by the weaver, the other box would later come in working position and the cloth was woven from its shuttle causing an open space in the weft and an irregular weft pattern. The weaver when realising what happened, stopped the loom and pulled off the wrong picks until she got the correct pattern. Her production did not only suffer on this loom, but also on the other looms allocated to her, as they had to wait stopped until she became free to attend to them.

They were instructed that it is their responsibility to check the mechanical condition of the looms not only in the sense of not being run with missing motions or mechanisms e.g. the weft fork stop motion, but also in making sure that the looms are maintained and set at optimum mechanical condition.

6. They were instructed not only in their duties and responsibilities, but also of those of any other staff who is working under their supervision in the weaving department i.e. weaver, fitter loom gaiter etc. They were also informed of the duties and responsibilities of the staff in the preparatory departments as a major task of their job is to make sure while patrolling their sections that everyone is performing his duties properly.

It must be mentioned in this respect that this process of in-plant training of the supervisors took 5 visits to this mill. The time was being shared between:

- i. The weaving department, where they were shown the anomalies, condition of looms, condition of crossed and entangled ends, labour not attending their duties in the proper way etc. They were also shown in later visits the improved running condition of the looms which was not accompanied by showing improved productivity figures.
- ii. Discussions in the conference room within the presence of the management.

The management has also taken the following action:

1. Have issued orders for the purchase of the missing parts and motions as they were not aware of its implications.
2. Having realised that the workers were not encouraged for more production, have introduced an incentive system to get them production motivated.

This mill was running at an average production of 10 meters per loom per shift. It is now enjoying an average production of 14 meters per loom per shift after the training process of its supervisors, i.e. an increase in production of 40%.

V - RECOMMENDATIONS

V.1.0.0. Recommendations for the NTC Government Owned Mills

Despite the fact that the National Textile Corporation Mills are weaving cloth structures which could be termed as easy-to-weave-fabrics, the mills are running their looms under rather low efficiencies of 50-70% and at low work load allocation of about 8 to 12 looms per weaver. This condition is attributed to a number of causes and anomalies starting from the selection of the cotton grade and continuing in the yarn manufacturing processes, the weaving yarn preparatory processes, and the weaving shed. The result is a high rate of breakages per loom hour, much beyond the limit a weaver can attend, despite the limited number of looms allocated to him, consequently affecting his productivity and efficiency.

When discussing this low performance with the management they were giving the following reasons:

- i. Old machinery
- ii. Machines are of cheap execution

Although this is true in the sense that these machines were not of the best makes that could have been purchased at the time, but such machines if maintained, serviced and run properly should be able to achieve an efficiency of about 90% at a loom allocation of over 20 looms per weaver.

This expert's point of view is given by the following recommendations:

V.1.1.0. Requirement of Proper Job-Organization Chart of a Weaving Mill:

1. Most people believe that the most important job of a weaving shed is the weaver, Under this belief they employ a big number of weavers in the mill, allocating a limited number of looms per weaver.

A loom, in order to produce efficiently, should first of all be given the required services. It should be supplied with a properly prepared warp beam and a properly wound weft pirns. It should be maintained in a proper mechanical condition and should have its motions properly set and adjusted. Otherwise, a high rate of end breakages and stoppages will take place at the loom.

It is, therefore, recommended to do every effort to bring the breaks per loom hour to standard norms as this, when achieved will show a healthy and successful weaving shed.

2. Although the looms allocated to the fitter are low, his general low standard of knowledge due to lack of proper training and experience makes him unable to set or service his looms to acceptable condition. As mentioned in (IV.2.2.) a loom fitter is only attending the repair aspect of servicing the looms, which is only a part of his job description. Other important aspects of his job e.g. preventive maintenance, setting and tuning, patrolling his looms, etc. are not attended.

Therefore, it is recommended that the fitter should be given the required training in order to enable him to perform his duties in full and not just one aspect of it.

3. (a) The job of a weaving foreman/overlooker, in the right understanding of its job description is not known in Sri Lanka.

The shifts are generally in the hands of a number of jobbers (sometimes called line-foremen), each being in charge of a line of looms. This man is generally only an experienced weaver and sometimes can do repair work for his line. On top of him there is no effective follow-up or supervision.

There might be in some cases in the shifts a supervisor or an assistant to the weaving manager, but in practice these are usually nothing more than shift co-ordinators.

The role of a foreman in a weaving mill, is actually the most important to guarantee the success of a weaving shed. He is usually responsible for a section of looms per shift (e.g. 100-120 looms). He is responsible for the quality and production in his section. He manages the fitters, the weavers and the labour in his section and ensures that everyone is performing his task according to the proper duties of his job description. He controls the causes of stoppages and loom break-downs to make it possible to achieve optimum results.

Due to the importance of this job the foreman is selected to have a good knowledge in weaving technology. He should have a background of experience and thorough knowledge on loom fixing, setting, and repairing. He is responsible for following-up the training of his weavers and fitters and to make sure that as a group they could achieve the optimum envisaged results. A foreman is not only a man with experience but also a man who possesses commanding personality as it is not enough to know what should be done as much as to get his staff in his section to get things done the way he wants it done.

- (b) A shift supervisor/superintendent in the right understanding of this job is not known in Sri Lanka. He is the top man in the shift. His main task is to supervise the number of foremen running the various sections of the shed, to patrol the whole shed and to make sure that every one is attending and doing his job properly. He is usually a man having a higher theoretical background and having a thorough mill training and loom

fixing knowledge and experience, as well as having a thorough insight on the weaving preparatory processes. He is also a person possessing commanding personality.

These jobs which are the backbone of a successful weaving industry are not really found in this country, consequently the weaver is overloaded with a high rate of yarn breaks on his looms despite the fact of being allocated a limited number. He is generally the one who is taking the blame for the low efficiency and quality of the department.

It is therefore, strongly recommended that the establishment of such jobs should be planned from now such that when made available a proper job-organization chart to guarantee the proper running of the mills would be implemented. (Also see V.4.1.2. & 3.).

V.1.2.0. Requirement of Properly Trained Staff

Training is considered the backbone of progress and the only guarantee for success.

Although there exists training cells in some of the NTC mills, they are either not functioning, or only partly functioning when shortage is felt in a certain job such that they have to train new recruits.

It must be mentioned, however, that seeing the condition of the machines and the personnel during their work, it is clear to this expert that training of the personnel should be considered as an urgent requirement for the progress of the industry.

A fitter for example cannot be considered trained by just attending a training course in a class-room. He could be shown the loom motions, and some theoretical background could be explained to him. When he goes to the shed, however, he finds himself facing

different conditions; varying practical conditions in the mill, different personnel to deal with, varying conditions from one loom to another due to wear and tear, etc. Moreover, being a beginner he still lacks the speed, the experience, and most of all the guidance of his instructor. Having not yet been really qualified as a fitter, the loom parts break more due to his lack of experience, looms condition is not improving and consequently he loses faith in his training and starts to manage his work the way the other fitters are doing it, i.e. just a repair fitter whose task is only to change a broken part or to repair a defective motion and to start the loom again no matter how, just to make it run. There is no one to ask him later if a wrong or a bad job has been done. He moves around from one loom in the shift to another. He is not allocated any specific looms to attend to, consequently accountability does not exist. If one checks any two looms they are never of the same settings, as each loom is set in a different way depending upon the fitter who attended it.

Training, therefore, does not end by just having^a trainee to attend a training course. He should be followed-up by his instructor in-the-plant while attending the job on his looms i.e. the looms allocated to him (See IV.2.2.). His training should not be limited to train him on loom repair work, as much as to train him while performing his preventive maintenance task on the loom, i.e. attending his looms in a daily sequence, checking and adjusting its motions according to the instructed measurements and adjustments, and through the aid of the loom gauges and fixtures. The instructor staying with the trainee while performing the job not only makes sure that he is doing it properly, but also in the right sequence and methodology such that the job will not be done in a longer time than necessary. A fitter who is allocated e.g. 20 looms to systematically check and set in a cycle of 20 days i.e. at a rate of one loom per day, while due to his lack of dexterity, as he has to have time to do other jobs on his looms, e.g. patrolling and any necessary repair work ... etc., cannot finish in this cycle except say 10 looms, the remaining 10 looms will not be attended to on time and consequently his 20 looms will suffer and will not run at optimum mechanical condition.

Since, however, setting one loom after another is repetition work, the instructor while observing his trainee on-the-job transfers to him the proper indoctrination and skill until he is satisfied that the fitter has now got the know-how and has built confidence in himself and has become qualified to do the job on his own.

The relation between the training and the weaving departments should never end. It should be a continuing relation.

Moreover, the training instructors should be called into the shed whenever it is felt necessary to follow-up the training of certain fitters, not necessarily on every aspect of setting and fixing of a loom, but sometimes on one motion when it is found that the fitters are not tackling it properly, e.g. transfer mechanism, shuttle box alignment, picking motion and picking force ... etc. This is necessary not only because the foremen and supervisors in the shifts are not qualified instructors, but also because they are usually busy with their work in attending the production such that they do not have the time for training the others. The instructor's job, however, is to train and to get the trainees to get the job done in-the-plant as has been instructed by him.

Although the above is related to the training of fitters, the same methodology should be applied to other jobs, not only in the weaving shed but also in the preparatory processes.

It is also recommended that in order to launch a successful training process the following should be acquired:

1. Conviction of the management that without a training process for the personnel, improved and optimum results cannot be achieved.
2. Availability of qualified trainers/instructors.

Now, when the T.T. & S.C. completes the appointment of well experienced and qualified technologists, and with the installation of a complete line of preparatory machinery and looms it can provide the facility not only for class-room and theoretical

background, but also to undertake the function of the training work to the weaving industry as an on-going-continuing process, as well as the training of trainers.

P.S. : The training courses at T.T. & S.C. should, however, be considered as a stage which should be followed-up by in-plant training of the trainees in their own plants as a following phase of their training process. This follow-up by competent mill staff and the assistance of the T.T. & S.C. technologists is a vital phase of the training.

V.1.3.0. Introduction of Production Control Systems and Methods:

Although some mills make breakage analysis studies for some preparatory processes and for the looms, they are generally made for recording purposes only.

The mill staff do not appear to have the time to make use of the information the analysis provides and determine the causes of breakage of the ends and take or plan corrective action.

Moreover, there does not exist a quality control function to check the correctness of the settings, and adjustments, i.e. the mechanical condition of the looms. This is required in order to follow-up the work of the fitters, and also for use in certain incentive schemes.

The quality controller checks the looms according to a special check list, covering the various loom motions and mechanisms such that when sent to the department it points out which settings and motions require corrective action to be taken.

V.2.0.0. Recommendations for the DTI Weaving Units

It is known that most of the weaving units which were previously owned by the Department of Textile Industries have been sold to the private sector.

The DTI project containing about 3000 looms (of which 2500 looms are of the automatic shuttle change type) was made up of 12 weaving

units each having a preparatory installation containing a direct warper and an air drying sizing machine of Chinese make to supply sized warp beams to a total of about 250 looms, which are scattered around in the surrounding area, in smaller units of 24 - 48 looms for socio-economic reasons.

V.2.1.0. Necessity to Get the Looms Back to their Original Automatic Status:

The DFI looms which are of Chinese make and of 44 inches reed width, run at a weaver allocation of 2 - 4 looms because the automatic looms had been transferred to power looms when the automatic shuttle changing mechanisms had been put out of action.

Although the shuttle changing transfer mechanism has been superseded by a pirn changing arrangement by all manufacturers of shuttle looms, including the Chinese manufacturers (One Chinese loom with pirn transfer is available at T.T. & S.C. weaving work-shop), the shuttle change mechanism is still working in many countries including China itself with satisfactory results.

The weaver, when having these narrow width Chinese looms serviced properly and its shuttle transfer mechanism functioning, should be able to run 16 to 24 looms which would result in a drastic change in the cost of production that could make such units profitable. The only challenge to achieve such an objective is training. When discussing such a recommendation with one of the new owners of one of these units, he mentioned that when he tried to run the automatic shuttle changing motion, he had the shuttles broken due to the unsuccessful transfer of the shuttles. He, consequently stopped such efforts as the shuttle is an expensive part to replace often. Moreover, he mentioned that this mechanism requires a large number of shuttles per each loom, which he has to supply.

The following should, however, be stated:

- i. The DTI units are situated in remote places where there do not exist trained fitters for automatic looms. One cannot, therefore, imagine that a fitter - having a limited knowledge and experience on power looms - to be able to run the shuttle transfer mechanism on the Chinese loom without receiving the proper training.
- ii. Since there does not exist any training facilities for training the fitters, or there is available any fitter trainers, this motion was made to be non-functioning and the looms were consequently transferred and made to operate as ordinary power looms.

It is therefore, strongly recommended that the automatic Chinese looms be returned back to their original automatic status to save on cost of production and to make the running of such units viable.

- The main requirement is to make available to the technical staff, especially the fitters, the opportunity to attain the necessary training, giving specific attention to the shuttle change automatic transfer mechanism.

With the training facilities and technical services available at the T.T. & S.C. it could be planned to arrange the required training for the personnel in the DTI units. The T.T. & S.C. is specifically equipped to offer such short, modular, courses and indeed the aim of the Centre is to offer courses in specific areas of training.

V.3.0.0. Recommendations for Power Loom Sector (Including DTI Units)

The power loom sector constitutes an important sector of the weaving industry in Sri Lanka. It contains a total of about 5000 looms of which there are about 1300 looms on the manufacture of continuous filament fabrics. It is, unfortunately, a sick sector. There are units which have totally stopped, while others are only partly working. The units (24-48 looms) are loaded with a heavy burden of over-head charges and expenses due to the limited production they produce. This burden, accompanied by low productivity per employee and machine becomes more serious when the machines are partly running, which is now the general condition. The owners and management of these units are complaining of the competition of smuggled goods, of high custom tariffs on imported filament yarns ... etc. The following remarks and recommendations must be, however, mentioned for the consideration of the management of the power loom units:-

V.3.1.0. Necessity to Improve Work Load Allocation:

The number of looms allocated per weaver is very low, being a maximum of 4 looms. In many mills it is only 2 looms and in other cases it is even only one loom. Despite this very low loom allocation the efficiency runs as low as 30-40 percent. The yarn breaks are very high. The technical management, instead of analysing the causes of the yarn breakages and taking corrective action, leave things as they are, and only reduce the number of looms allocated to a weaver. This usually does not help, on the contrary it increases the cost of production and renders such units rather unviable to run.

It is, therefore, recommended that a power loom unit, which evidently utilizes more labour compared with an automatic loom installation, should not out-balance the advantage of its low investment cost by increasing its labour requirement unnecessarily. Instead, corrective action should be taken to reduce the yarn breaks and to utilize only the necessary requirement of labour (Also see V.3.3.0.).

7.3.2.0. Necessity to Train the Staff

Except in very few cases, the technical management, the fitters and the weavers, have never had any previous educational or training background on their jobs.

Due to the nature of these units being very small in capacity, and usually situated in far away places, they cannot afford to employ an experienced technician, or even attract same. It has been seen in many cases where the person who is really in charge of running the unit is the head fixer who was an experienced weaver and has learned the job on loom fixing by trial and error. One cannot imagine that with such a staff, optimum results can be achieved.

It is to be recommended that such units should take advantage of the training facilities available in the T.T. & S.C. to train the head fixers in their plants while on-the-job. They will, after being trained, function as trainers to train the shift fitters.

7.3.3.0. Necessity to Develop Warp and Weft Preparation Processes:

Warp and weft yarn preparation processes are not given due consideration, consequently the loom beams produced lack the essentials required for a properly prepared warp beam and thus result in an extensive rate of breakages at the looms. The loom beams contain major defects, e.g. crossed ends, entangled ends, lost ends, slack ends, bad knots ... etc., which render it very difficult to weave.

The weft pirn is badly wound. It is of irregular build, softly wound, not properly filled with yarn i.e. not utilizing the full capacity of yarn that could be wound on the pirn which is an important aspect in power loom running.

Although this expert has helped many power loom units to improve their warp beams and their weft pirns and to achieve much improved loom productivity, there were cases where almost obsolete and primitive equipment were hindering any chance for improvement; e.g. use of a platform filled with sand - in which the warp yarn spools were buried in it - as a warp creel, use of a wooden 'V' creel with cones placed on the floor, use of pirn winding machines in which the pirn is filled between two rotating conical drums etc. In such units they believe that by using such primitive machines they are saving on investment costs, whereas they are ignoring its implications on the higher cost of production at the looms due to the high rate of breakages and consequently lower production and inferior quality.

It must be clarified, however, that the difference between a power loom and an automatic loom lies only in the fact that the former does not include the automatic weft replenishing mechanism and in some cases the warp stop motion, otherwise both types of looms are basically the same. The power loom is, therefore, a simpler machine only in that sense. It has, however, the disadvantages that it requires labour to watch the warp for a broken end and to change the pirn manually, when it expires, by a full one. In both cases, however, a properly prepared warp beam, and weft pirn are essential requirements for achieving optimum results.

It is, therefore, recommended that in power loom units, warp and weft preparatory processes should be given due consideration, otherwise a high rate of yarn breakages at the looms will be inevitable. Advice in this respect could also be acquired from the T.T. & S.C.

2.2.2.2. Necessity of Fabric Development:

Almost the same fabrics are produced in all units. In synthetic mills there are generally 3 fabric varieties:

- (a) Sarong with 60/2 polyester cotton blend for the warp and 150 denier polyester texturized yarn for the weft.

- (b) Saree with 20 denier monofilament nylon yarn for the warp and 70 denier polyester yarn for the weft.
- (c) Shirting fabric with 75 denier polyester yarn for the warp and 40^S cotton or 45^S polyester cotton blend for the weft. This fabric is usually woven with 2 colours in the weft to produce a check effect.

In cotton mills it is mainly 20^S x 20^S constructions.

The competition between the mills for survival is very severe and the margin of profit if any is, consequently very limited.

The only recommended break-through is, therefore, the following:

1. To move out of the limited variety of the present products, by developing, and introducing new creations of fabric structures.

Fabrics made of polyester blends for suitings, safari suits, poplins, semi-poplins, striped and dobby shirtings are not produced, yet they are available in the market but alleged to be of smuggled goods.

2. To introduce sized warps using single yarns instead of the expensive ply yarns.
3. To use polyester blended yarns in the woven fabrics as such is more suitable to the local climate than the fabrics made of continuous filament yarns.

It must be mentioned, however, that in parallel with fabric development, the mills themselves have to develop their methods and systems, train, and develop the knowledge of their personnel to become quality conscious. In this respect they could acquire the technical assistance and guidance now available to the industry at the T.T. & S.C.

V.3.5.0. Necessity of Machine Developments:

Although as previously mentioned that the power loom industry is considered a sick industry, the following is noticed:

- i. Some units equipped with developed power loom machinery and equipment are not suffering as the others and have all their looms in production,
- ii. In some units where they acquire developed power looms as well as ordinary power looms, the former looms were continuously loaded with orders, while the latter looms were run only partly.

It is recommended that to improve productivity and quality and lower the cost of the woven product the following should be introduced:

1. To develop the power looms by adding to it the following aids:
 - (a) Loom warp stop motion.
 - (b) Optical weft stop motion to stop the loom automatically when the weft expires.
2. Development of warp and weft preparatory equipment. (See V.3.3.0.).

The weaver, being relieved from having to keep an eye on a broken end or to watch for the expiry of a pirn when such automatic aids are installed, could be allocated more looms and at the same time, will have more time for back patrolling thus preventing potential causes of warp breaks (See IV.2.1.0.). The quality and production improves and the cost of production is reduced making such power units viable. Moreover, one cannot imagine that such units which have been introduced into the country since about 20 years ago can continue to survive without development to match the up-to-date competitive market requirement and conditions.

An up-to-date power loom having the above mentioned developments and including a double cylinder dobby for making a cross border design is available and could be seen at the T.T. & S.C. weaving work-shop.

V.4.0.0. Recommendations for Industry Consideration:

V.4.1.0. Necessity to Rehabilitate and Modernize the Weaving Mills:

Most weaving mills especially the NTC Government Mills are equipped with looms over 20 years old of East Europe and China origin and which have been badly handled. They are also suffering from shortage of genuine spare parts.

It must be stated that the looms in these mills i.e. Textima, Kovo, and the Chinese looms were manufactured during that period out of light construction and were of a rather cheap execution such that it could be sold at a cheap price. Although these looms have enabled the weaving industry to realise a lot of profits in the past, it must now be stated that at that time the fabrics produced could be easily sold at a good profit. That sellers market has gone and will never come back. It must be also realised that the textile industry has vastly expanded in many of the so called developing countries (such as Africa & South East Asia) and that competition for the survival of the mills in Sri Lanka is not only severe in the world market but in the local market also. Furthermore, due to competition of smuggled and imported goods, survival will only be left to those mills who can provide quality fabrics at competitive prices. The local textile mills, therefore, will not be able to meet the challenge of modern times by their present old machinery and equipment. They have in order to survive to rehabilitate, renovate, and modernize their equipment. They have to envisage the increase of productivity per machine and labour and the raising of the quality of the production to norms and levels equal to those of competitive countries. Such drastic action is recommended.

The same is also said for the Power loom industry. (See V.3.5.0.).

V.4.2.0. Necessity to Rehabilitate & Modernize the Spinning Mills:

The yarn produced in the spinning mills is not up to the quality required for attaining optimum results in weaving. The C.V. and U% are usually high, the RKM/lea count product is usually low. The mills due to the high price of cotton use lower grades and recycle the waste, to reduce their costs, but in a way to make the yarn almost unsuitable for warp use in weaving. This condition is further aggravated by using old yarn processing and yarn winding-equipment.

The polyester blended yarns are not in any better condition.

It is, therefore, strongly recommended that in order for the weaving industry to be revived, every effort should be made to make it more competitive in the export market. This goal, however, cannot be achieved without making available to the weaving industry the supply of internationally accepted norms and prices of spun yarns i.e. modernization and development of the spinning mills should go in parallel with the modernization and development of the weaving mills.

V.4.3.0. Necessity to Introduce Up-to-date Technical and Managerial Methods and Systems:

Departments like industrial engineering, quality control, production planning and development etc., have to be established. Such departments and functions are essential in a modern mill to assist the management to make the right decisions in day to day work and to develop and maintain the performance of productivity per machine and labour and also the cost of production at optimum conditions.

V.4.4.0. Necessity of Training:

Training of the staff and labour especially the technical staff such as fitters, loom fixers and supervisors, are not given due consideration. The present system of training is that the workers/fitters are placed side by side with the older workers/fitters from whom they pick-up their bad habits and inefficiencies. In addition, they introduce also their own bad habits. In this

system the worker/fitter is not given any guidance while performing his job, and is left alone to teach himself by learning through his faults. He is usually very slow to pick up the job and will never attain the required standard or the proper know-how. Due to his ignorance and low standard of knowledge he produces defective fabrics, low efficiency, and causes breakages of loom parts. This system of running the machines with staff who have not acquired the proper know-how of their jobs and duties cannot be accepted today where optimum machine and labour productivity should be attained.

Training of the staff and labour is, therefore, a vital essential requirement for the success of the weaving industry. It is an investment in the human element. A properly trained person will apply the correct methods and systems of performing his job in the minimum time, and will be able to achieve optimum quality and efficiency at acceptable norms of work load allocation. Moreover, he is trained to prevent the mishandling or breakage of machine parts and accessories and also the waste of material. (See V.1.2.0.).

2.4.5.0. Necessity of Consulting Assistance:

Due to the low standard of technicians in the mills especially the power loom units and the fact that they are working on the same systems and methods they have been following since the textile industry started in the country over 20 years ago, experience and knowledge are limited. Until each mill can provide skillful staff who are properly trained and who have gained enough experience, training, and knowledge in their jobs, the present alternative to develop the mills is to consult and acquire the know-how from specialised advisers in order to guide them during the present stage.

When the T.T. & S.C. completes the appointment of well experienced and qualified technologists it will be in a position to give this kind of assistance.

The efforts of the T.T. & S.C. should, however, reach each an every mill in the country such that modern systems and techniques of running and managing the mills could be followed everywhere.

V.4.6.0. Necessity to Promote Export:

V.4.6.1. Necessity to Develop the Mills to Export Standards

As previously mentioned in V.3.4.0. the competition between the mills in the limited local market has resulted in many mills closing down or running only partly.

The recommended break-through for the mills to survive is to divert to the larger export market. They, however, have to prepare themselves for the export requirements, i.e. to produce quality fabrics at international competitive prices.

It is envisaged that such a challenge to the mills could be only achieved when the previous recommendations i.e. V.4.1.0., 2.0., 3.0., 4.0., & 5.0. will be implemented. When such has been implemented, as a starting point for exports, possibly a section of the factory could be geared up to produce export quality.

V.4.6.2. Necessity to Establish an Export Promotion Committee

Most mills especially those of smaller size do not have, because they simply cannot afford, such departments as export marketing and sales departments. It is suggested, therefore, that an export promotion and marketing committee should be established and whose objective will be to promote the export sales of the member weaving mills.

V.4.6.3. Necessity to Produce Fabrics for the Clothing Industry:

The clothing industry in the free zone represents a successful industry in Sri Lanka despite the fact of being established only few years ago. Its success is proved by its rapid rate of growth. It is expected that this high rate of growth will also continue in the coming years.

The material used in the clothing industry is, however, almost totally imported. It is, therefore, envisaged that when the mills are developed in order to become competitive in the international market (See also V.3.5.0. & V.4.6.1.), sales to the clothing industry will be guaranteed.

The clothing industry due to its large requirements of fabrics, not only will fill the orders for all the looms, but expansions of many folk. will become necessary. It is an export market which although it is situated within the country is unfortunately at present out of the scope of the marketing possibilities of the local industry.

V.5.0.0. Recommendations for Government Consideration:

V.5.1.0. Necessity of Middle Level Textile Educational Institutions:

There do not exist any organised training institutions or centres to supply the requirements of the textile industry with skilled workers, who are required to fill the jobs of fixing and maintenance of the machines. In weaving mills, mechanics and fitters do not have any educational background and have limited scope to conciliate with the machines or to deal with automatic motions or sophisticated equipment. They thus constitute a limiting factor for the progress of the textile industry.

It is, therefore, suggested to introduce such a new category of skilled young men to the textile industry, who will be when graduated very beneficial to its progress. It is also suggested that the applicant should have a G.C.E. (O/L) education and should then receive his technical education in the proposed Textile Institute for a duration of 3 - 4 years. The first year will be for general science, engineering technology, and work-shop practicing, while the last 2 - 3 years in specialisation in weaving technology and loom fixing with special emphasis to the practical aspect.

Such graduates who will receive middle level technical education, when appointed in the mills should receive a subsequent on-the-floor training in order to be qualified to fill loom fixing and loom maintenance jobs. (See V.1.2.0.).

The graduates, when gaining practical experience and knowledge through being on-the-job as loom mechanics and fitters for some years, as well as gaining commanding personalities, the best of them will be promoted to fill the jobs of foremen and from the best of them the jobs of supervisors will be filled. (See V.1.1.0.).

V.5.2.0. Development of Textile College Graduates to Specialised Fields of Textiles:

The teaching programmes given at the sub-department of Textile Technology of the University of Moratuwa for a duration of 3 years; (one of which is in the mills) is a rather general programme which it is envisaged, gives the student a coverage of the different fields of the textile industry. The graduate who is granted a diploma in Textile Technology is one who has only gained a general and diversified knowledge of the various textile activities. He is not by any means a specialized weaving graduate who has had a thorough and deep indoctrination in weaving educational background.

It is, therefore, suggested for the development of the industry in order to be in a position to cope with the practical requirements of today, to educate the students for specific specialised textile fields.

A weaving graduate it is also suggested should study for a B.Sc. degree over a 4 year period. The first and second years being for engineering and scientific education, while the last two years being mainly for the field of his textile specialisation, i.e. weaving.

It must be stated here that there are limits to the extent to which a crafts-man can be upgraded to higher levels which evidently require a broader knowledge and a background of scientific education.

Moreover, the industry is in great need of employing specialised textile engineers, especially in the long term, who can become, after acquiring the proper training, and gaining practical experience an asset to the textile industry.

V.5.3.0. Necessity to Send Educational Missions Abroad:

There is shortage of B.sc. and M.Sc. Textile graduates in Sri Lanka. There is no Textile College at present that can grant a B.Sc. degree. Such level of graduates, after practicing and being on-the-job for some years in order to gain practical experience and knowledge, should be ear-marked to fill the higher level technical managerial posts in the mills.

It must be stated that if the present management in the mills are unable to run the present relatively simple machines at optimum conditions, it would be out of the question to suggest rehabilitation or renovation with up-to-date complicated and sophisticated equipment without preparing in parallel a new generation of highly educated and trained engineers to take up the challenge of running the new envisaged machines at optimum performance. The return on investment cannot otherwise be justified.

It must be also stated that although the MTC Government mills are now run by foreign management, the day when its management will be back in local hands, has to be anticipated for, from now.

It is, therefore, suggested that a new generation of properly educated and trained selected young engineers, who have been sent to overseas colleges and universities to work for B.Sc. and M.Sc. level degrees (or equivalent) in weaving education should be arranged from now. This arrangement is necessary to fill the higher technical managerial jobs, such that when the time comes they would be in a position to take over the responsibilities.

APPENDIX I

LIST OF MILLS VISITED FOR SURVEY

S. No.	Name of Mill	No. Looms	Material	Location	Remarks
1	Wellawatte Spinning & Weaving Mills.	700	Cotton	Colombo	State Sector (Closed down)
2	Veyangoda Textile Mills.	560	Cotton	Veyangoda	Managed by Tootal Consultants.
3	Thulhiriya Textile Mills.	560	Cotton	Thulhiriya.	Managed by Bombay Dyers.
4	Pugoda Textile Mills	600	Cotton	Pugoda	Managed by Lakshmi Textile Exporters.
5	Power Loom Project	88	Cotton	Galle	Represent 3000 Similar Looms.
6	Power Loom Project	48	Cotton	Kalutara	(DPI)
7	Textile Weavers Co-op Society.	24	Cotton	Galle	Represent 1000 looms.
8	Kandy Textile Industries Ltd.	250	Cotton	Kandy	Private
9	Lakweave Textile Mills.	280	Cotton	Kandy	Private
10	Welwoven Textile Mills.	288	Cotton	Kandy	Private
11	Ceylon Silks Ltd.	240	Synth.	Colombo	State Sector
12	Swastik Industries	90	Synth.	Colombo	Private
13	Syntex Ltd.	300	Synth.	Colombo	Private
14	Hybro Industries Ltd.	88	Cotton	Colombo	Private - Represent 900 Looms.
15	Ceyma Silk Ind.	48	Synth.	Jaffna	Private
16	Sakthy Textile Mills.	48	Synth.	Jaffna	Private
17	Sri Rams Textile Processing Co. Ltd.	48	Synth.	Jaffna	
18	M.P.C.S. Union Ltd.		Synth.	Jaffna	
19	Rajan Textile Punnalikkduvan.		Synth.	Jaffna	
20	District Weavers Co-op Society.			Jaffna	

APPENDIX II

ESTIMATED AND ALREADY ACHIEVED RESULTS FROM CONSULTANCY VISITS

S. No.	Name of Mill	Location	Original Eff. %	Estimated Eff. %	Already Achieved Eff. %	Remarks
1	Veyangoda Textile Mills	Veyangoda	65	87	80	
2	Thulhiriya Textile Mills.	Thulhiriya	40	87	55	
3	Pugoda Textile Mills	Pugoda	65	88	N.A.	
4	Swastik Industries	Colombo	55	88	65	
5	J.B. Textiles	Colombo	87	92	92	Opt.Res.
6	Kuruwita Text. Mills Ltd.	Kuruwita	50	85	75	
7	M.K.C. Industries Ltd.	Colombo	45	90	90	Opt.Res.
-	Cyntex Ltd.	Colombo	55	85	N.A.	
9	Duro Synth. Textile Mills Ltd.	Colombo	50	92	94	Opt.Res.
10	Ambalangoda Textile Weavers Co-op Soc.Ltd.	Ambalangoda	45	85	68	
11	H. & T. Textile Industries Ltd.	Colombo	65	92	92	Opt.Res.
12	Velona Group of Companies.	Colombo	40	85	N.A.	
13	Sigiri Weaving Mills	Colombo	40	90	90	Opt.Res.
14	Paragon Textile Industries Ltd.	Colombo	65	85	80	Closed
15	Kundanmal Industries Ltd.	Colombo	65	85	80	
16	Maradagahamula Co-op. Society.	Maradagahamula	45	90	80	
17	Madampella Co-op. Soc.	Madampella	70	90	85	
18	Matara Textile Weavers Co-op. Soc.	Matara	50	87	N.A.	
19	Weligama Textile Weavers Co-op. Soc.	Matara	45	87	N.A.	
20	Koggala Textile Weavers Co-op. Soc.	Galle	47	87	N.A.	
21	Elpitiya Tex. Weavers Co-op. Society.	Galle	50	87	N.A.	

J. B. TEXTILES INDUSTRIES LTD.

FACTORY:
33, MEEFOTAMULLA ROAD,
WELLAMPITIYA.

TELEPHONE: 572213
572339

DEPT
REP



Please address all correspondence to
P. O. BOX 1199
COLOMBO.
CABLE: "DURIE" COLOMBO.
TELEX: 21103 CE-TEJAPP-COLOMBO

Date 1st April 1983 19

Jack Woolfenden Esq.,
Chief Technical Adviser (UNIDO)
Textile Training & Service Centre,
40, Stratford Avenue,
Colombo 6.

APPENDIX III - 1

Dear Sir,

We have pleasure in informing you that although Mr. Hussain M. El-Massary visited us only on two occasions so far his practical advise and observations have resulted in the following improvements :

- (1) Our Weaving Shed efficiency has gone up from 89% to 93%.
- (2) He has got us to overhaul our winders and after overhauling we are now running a lesser number of pirn winding machines thereby saving on electricity and labour apart from improving the quality of the pirn and the woven cloth.
- (3) We are still repairing the warping machines according to his instructions and assume that better warp beams will result in greater production and good cloth.

This gentleman has still to give us guidance on our Weaving machinery.

We wish to record that the UNIDO is doing a great service to the Textile Industry by giving expertise of a very high order which has increased production, quality and reduced costs.

Thanking you and Mr. Hussain for this assistance.

We remain,
Yours faithfully,
J.B. TEXTILES INDUSTRIES LTD.

[Signature]
Director.

AS.



Manufacturers & Knitting Co., (Industries) Limited

Manufacturers and Processors of Knitted Fabrics Woven Fabrics. Hosiery & Ready made Garments

Telex - 21759 FIRMZ CE

Phone - 20285

Table - "EMERALD"

38, SECOND CROSS STREET,
COLOMBO-II. (Sri Lanka)

24th December, 1983.

Mr. G. Woolfenden,
Project Manager,
Textile Training & Service Centre
C/O, UNITED Nations Development Programme,
P.O.Box:- 1505,
Colombo

APPENDIX III - 2

Dear Sir,

We are forwarding this letter to express our gratitude and appreciation for the great help the TTSC is providing for the textile industry.

The technical assistance and guidance we received from the UNIDO weaving Adviser Mr. Hussein M. El-Missary has been very helpful and fruitful. Through his guidance and practical demonstrations we have learnt how to perform the weaving process correctly. He has shown us and drawn our attention to many anomalies and technical faults which we never have observed ourselves.

In the previous production programme through Mr. El-Missary guidance our weaving production has increased from 55% to 85%. In the present programme in which we use special delicate yarns and constructions, Mr. Hussein M. El-Missary has once again guided us to handle the new varieties. Production is improving and better results are showing on the looms where the suggestions has been implemented. We expect to reach the previously achieved high standard of results quite soon when his recommendations will be fully implemented on all the looms.

We thank UNIDO for availing us such a high caliber of Adviser which we are sure is not only most beneficial to us alone but to the whole weaving industry in Sri Lanka.

Yours faithfully,
MANUFACTURERS & KNITTING CO.(INDUSTRIES) LTD.

Managing Director.

C.C. Mr. Hussein M. El-Missary
(Weaving Adviser)
Textile, Training & Service Centre
40, Stratford Avenue,
Colombo - 6.



H & T Textile Industries Ltd.

Factory & Office:- 17, Templers Mawatha, (Off: Templers Road) Mount Lavinia.

Phone:

712615

712018

Mr. Jack Woolfenden (Project Manager)
Textile Training & Service Centre,
40, Stratford Avenue,
Colombo-6.

APPENDIX III - 3

Dear Sir:

We write to record our appreciation of the service rendered by Mr. Hussein El Missary in his capacity as Weaving Advisor.

His expertise has brought out a tremendous improvement in our production and put us on a sound footing for the future.

While expressing our sincere gratitude we hope that we would be able to obtain his guidance again.

Yours sincerely,

H & T. TEXTILE INDUSTRIES LTD

[Handwritten Signature]
K. S. SIVARATNAM
10/1/69

MANUFACTURERS OF QUALITY SYNTHETIC TEXTILE FABRICS

සමාජික

අම්බලන්ගොඩ පේපකාර්මිකයින්ගේ සමූහකාර සමිතිය

AMBALANGODA TEXTILE WEAVERS CO-OPERATIVE SOCIETY LTD
VILEGODA - AMBALANGODA

ලි: ප: අංක: } 00/1984
Reg: No: } 30.08.1979
දුරකථන }
Tele phone }

පිටුපත, අම්බලන්ගොඩ

13th December 1979

Chief Technical Adviser,
Textile Training & Service Centre,
38 Stratford Avenue,
Colombo.

APPENDIX III - 4

Dear Sir,

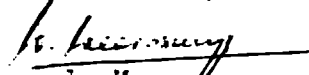
With reference to your letter SRC/79/054 TSC/ML/C/8 of 19th October, 1979, I take the pleasure of thanking you for sending us your instructors to rectify our power loom machines. Now I noticed a great improvement in the production.

I have completed the adjustment of the looms as per your instructions.

If there are any other improvements to be done, I shall be much obliged to you to call on here and do the needful.

Please give me an appointment giving sufficient time to adjust my time table.

Yours sincerely,


General Manager.

APPENDIX IV

TRAINING COURSES HELD AT T.T. & S.C.

S. No.	Subject	Date Started	Date Completed	No. of Participants
1	Yarn and Woven Cloth Calculations.	31.01.83	05.02.83	11
2	Introductory Course for non-textile yarn preparation and weaving processes.	10.05.83	10.05.83	22
3	Woven Cloth Defects	12.05.83	12.05.83	17
4	Yarn Winding	08.08.83	10.08.83	9
5	Warping and Warp Beaming.	03.10.83	04.10.83	24
6	Sizing Technology	30.01.84	05.04.84	20
7	Fabric Structure and Cloth Analysis (I).	03.04.84	05.04.84	14
8	Fabric Structure and Cloth Analysis (II).	24.04.84	26.04.84	14
9	Loom Mechanisms (I)	18.06.84	22.06.84	27
10	Loom Mechanisms (II)	16.07.84	20.07.84	26
11	Fabric Analysis and Cloth Calculations related to it (I).	15.10.84	19.10.84	28
12	Warping; Direct and Sectional.	29.10.84	31.10.84	20
13	Yarn Winding	14.12.84	16.12.84	
14	Fabric Analysis and Cloth Calculations related to it (II).			
15	Preventive Maintenance in Weaving.			

