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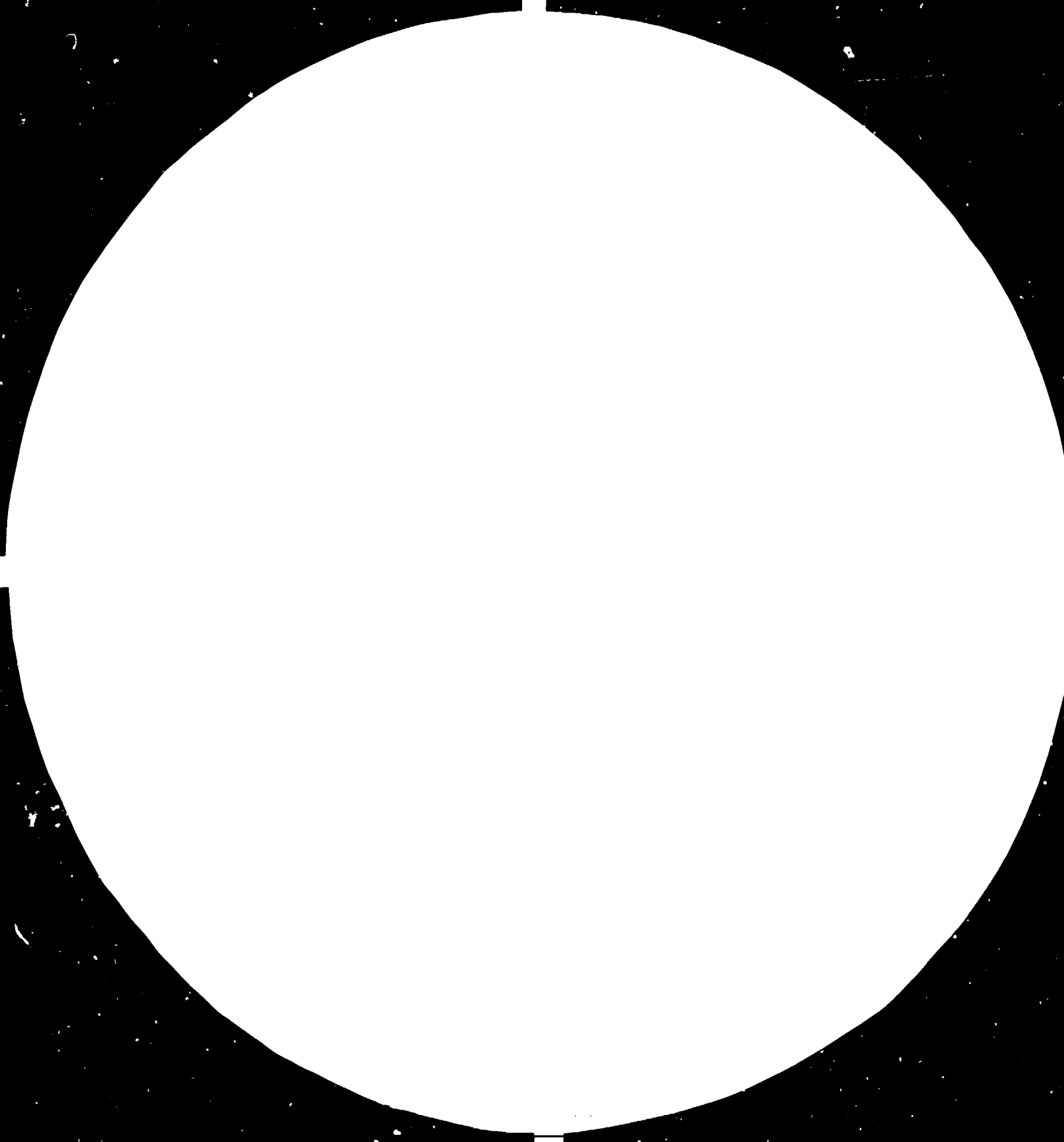
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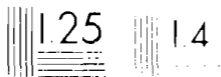
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TEXTILE INDUSTRY DEVELOPMENT PROGRAMME

DP/BGD/82/006

BANGLADESH

Terminal Report*

Prepared for the Government of Bangladesh
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Organization

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INTRODUCTION

This project was approved on 14 August 1978 and field work commenced in Feb. 1979. Following a Tripartite Meeting on 23 March 1981 the project was extended to October 1984. However, following a unilateral decision by External Resources Division, Government of Bangladesh, the project was terminated on 31 December 1983.

- Project Duration - Four(4) years, ten(10) months
- Final UNDP Budget - Approximately US \$ 3066000 assuming partial cancellations in 1984 budget

The project number of DP/BGD/73/049 was changed to DP/BGD/82/006 on 1 January 1982.

A. OBJECTIVES AND LOGIC OF PROJECT

a. DEVELOPMENT OBJECTIVE

The development objective to which this project was related, was to increase the domestic production of cotton textiles in Bangladesh and to reduce the reliance upon imports of cotton cloth. By increasing the quantity and reducing the production costs of cotton yarns, the project was also expected to contribute to an expansion of the handloom industry, thus increasing employment opportunities in rural areas.

b. IMMEDIATE OBJECTIVES

- i) To upgrade the levels of skill of selected BTMC managerial and supervisory staff and of skilled workers in a selected number of mills;
- ii) To establish central training and advisory services for BTMC mills;
- iii) To improve the quality of yarn and cloth produced by BTMC mills through the establishment of quality control and process control measures at all stages of production;
- iv) To improve machine productivity in BTMC mills through the establishment of suitable preventative maintenance systems and repair services;
- v) To rationalise existing facilities for the production of textile mills machinery and spare parts in Bangladesh;
- vi) To improve BTMC mill workshops and to upgrade the skills of workshop personnel;

Following requests from the International Development Association (World Bank), the Tripartite Meeting of March 1981 agreed to the following additional objective.

- vii) In connection with the Balancing, Modernisation and Rehabilitation Program of Bangladesh Textile Mills Corporation (BTMC), financed by the International Development Association (World Bank), experts in the fields of spinning, weaving and bleaching, dyeing and finishing will plan, execute and monitor in close cooperation with the BMR Project Implementation Cell the:-

- (a) preparation of bidding specifications for machinery, equipment and spares;
- (b) bid evaluation;
- (c) scheduling of erection and installation;
- (d) trial runs and final discharge of the erector/supplier;
- (e) follow-up and entry into commercial production; and
- (f) the general planning, execution and monitoring of specific projects.

It should be noted that the delayed start of the BMR Program, October 1982, meant that only (a) could be accomplished during the reduced life of the project.

c. LOGIC OF PROJECT

Bangladesh's per capita consumption of cloth at about 5 yards per person was considered to be one of the lowest in the world. The handloom weaving sector met approximately 2/3rds of total requirements for cloth in the country. Large-scale industrial production of spun yarn and textile fabrics was taking place in fifty-four(54) textile industry establishments in the public sector. Nine(9) other mills were under construction.

After Bangladesh's War of Independence in 1971/72, the large-scale textile mills were nationalised and put under the control of the Bangladesh Textile Industries Corporation(BTIC), later to become Bangladesh Textile Mills Corporation(BTMC). In view of the large and unsatisfied demand for cloth in the domestic economy and the need for the generation of employment in the rural areas, which would necessarily involve expansion of incomes and employment in the handloom weaving sector, it was considered that there was a great potential in particular for an increase in the supply of yarn for the use of handloom weavers. Development of the cotton textile industry in Bangladesh would, by increasing production of finished cloth in the textile mills themselves and in the handloom sector, provide a means for reduction in the amount of Bangladesh's large balance of payment deficit.

Following the exodus of most of the senior management in the textile industry at the start of the Independence War, Bangladeshi nationals had necessarily to be substituted for these managers, but their lack of experience had hindered the efforts of the industry to attain its pre-1971 levels of production and efficiency. However output of yarn per spindle/shift was 2.44 ozs. in 1975/76. In June 1976 only 52 percent of the installed spinning spindles were actually in operation.

Further constraints on efficient production in the textile industry had been the inadequacy of much of the machinery in the mills. Many of the mills contained machinery which was not operating because it was out-of-date and spare parts were no longer obtainable. Much of the remaining machinery was not maintained adequately because there was a lack of skilled operators to maintain the machinery and because spare parts were in short supply. Facilities for the local production of spare parts and components for textile mill machinery were poor. There was an acute shortage of trained staff at all levels in the industry, particularly at the levels of supervisory and middle management personnel as well as technical personnel responsible for maintenance and repair of machinery. Those responsible for the management of the industry had paid insufficient attention to training. Most workers and machine operators also came from an agricultural background and still had considerable ties with their village communities which caused disruption of production at certain times of the year.

Another constraint affecting the efficient operation of the industry was the weakness of the management information and control system, which resulted in considerable delay in the submission of mill performance data to the management and lack of standardisation in the information presented.

BTMC had embarked on an extensive program for the construction of new textile mills and the expansion of existing mills, concentrating mainly on the expansion of spinning facilities in order to increase the production of yarn. Twelve(12) projects, involving an addition of two hundred and seventy five thousand (275000) spindles and two hundred six looms, were provided for in the 1975/76 Annual Development Programme. Of these, nine(9) were expected to have been completed in 1977 and the remainder in 1978. Seven additional projects were being considered during the current financial year, involving an addition of one hundred thousand nine hundred and twelve(100912) spindles and three hundred ninety-four(394) looms.

In view of this planned expansion of capacity in the textile industry, the need for training became even more urgent. Existing training programs of BTMC only covered the training of surplus unskilled labourers before their re-assignment to new mills. BTMC recognised the need for the implementation of a coordinated program of practical in-service training at all levels, including machine operators and lower middle and senior management personnel. Such a program should necessarily concentrate on in-country training because of the numbers involved, but there would also be a need for a certain number of overseas fellowships in order that Bangladeshi's might acquire on-the-job training in certain fields

and at certain levels, for which in-country training facilities were not available.

BTMC considered that the first step in increasing production of yarn would be to increase the extent of capacity utilisation in BTMC's spinning mills. In this connection, BTMC urgently needed to receive advice at the level of individual mills, of measures which could be taken to improve the utilisation and the performance of the spinning facilities. This should cover particularly measures to improve the maintenance of machinery and advice on the most suitable measures of production of spare parts. Also BTMC required UNDP assistance in implementing the recommendations of a prior study on the Corporation's spare parts requirements and possibilities for local production of spare parts.

A large part of Bangladesh's requirements of cloth was being met by imports. The weaving mills needed assistance in devising measures to increase efficiency and productivity, in order that they could increase output and lower costs in order to compete with imports. Additionally, an increase in the range of attractive fabrics being produced by expanding facilities for dyeing, printing and finishing was required. Advice and training was needed on the most appropriate techniques in these fields.

B. ACTIVITIES CARRIED OUT AND OUTPUTS PRODUCED

a. OUTPUTS TARGETED

1. Training Program

A training program for BTMC staff indicating the purposes of the training, the content and structure of the training program, the number, qualifications and methods of selection of staff for training, the methods of administering and staffing the program and the teaching facilities and methods to be used.

2. Training Implementation

The provision by in-service training and skill upgrading of about 450 skilled personnel and trained managerial staff by the end of the project, about one third of whom would be management and accounting staff. The exact numbers and levels of people to be trained would depend on the recommendations of the UNDP Training Centre Adviser concerning the design and duration of courses at the Centre.

3. Overseas Training

About 35 senior and middle level personnel in the Corporation and the textile mills with overseas on-the-job training in cotton classing, textile economics management, spinning, weaving, dyeing, finishing and maintenance.

4. Productivity

An increase in the productive efficiency of the Corporation's mills to about 3.5 czs. per spindle shift and a sustained increase in the availability of yarn to the handloom industry.

5. Quality and Process Control

Improved procedures for quality control and process control at all stages of production, from raw material preparation to finishing.

6. Maintenance

Improved procedures for preventive maintenance in the mills and for the allocation of spare parts amongst the mills.

7. Machinery and Spare Parts

Analysis and recommendations outlining the textile mill machinery and spare parts considered feasible for local production, the capital investment required and the likely annual market for each item.

8. Workshop Development

Improved mill workshops and provision for in-service training and skill upgrading programs.

9. BMR Program

The Provision of Technical Appraisal Reports for all factories in the Balancing, Modernisation and Rehabilitation Program.

b. ACTIVITIES SCHEDULED

1. Training Program

- i) Designation of 16 selected mills providing 40% of the Corporation's total output.
- ii) Analysis of levels and numbers of staff from selected mills and BTMC headquarters required to be trained at incountry training facilities.
- iii) Carry out inventory of existing physical facilities for training personnel of the textile industry, including principally the Textile Institute.
- iv) Design the physical facilities of the BTMC Training Centre, and prepare list of equipment requirements.
- v) Examine available equipment in the country and order additional training equipment needed to be installed at the Centre.
- vi) Evaluate courses available at the Textile Institute and prepare curricula for courses at the BTMC Training Centre.
- vii) Assist in the redesign of courses at the Textile Institute in line with the needs of BTMC.

2. Training Implementation

- i) Determination of selection procedures for those to be trained.
- ii) Implementation of incountry training program in BTMC Training Centre in cooperation with the Textile Institute.

3. Overseas Training

- i) Analysis of levels and numbers of staff from selected mills and BTMC headquarters for training overseas.
- ii) Determination of selection procedures for those to be trained.
- iii) Implementation of overseas training program.
- iv) On-the-job training programs by fellows, with the assistance of the UNDP advisers concerned, after their return from training overseas.

4. Productivity 5. Quality and Process Control, 6. Maintenance

1. Designation of 16 selected mills providing about 40% of the Corporation's total output.

- ii) Selection of 14 counterparts from BTMC for "productivity and maintenance advisory groups".
- iii) Initial survey by productivity and maintenance advisory teams of factors affecting production, and quality control in the mills.
- iv) Advise on measures to increase productivity and improve quality control in the mills. This would include:-
 - Establishment of suitable methods of preventive maintenance in the selected mills.
 - Advise on ways of improving machine productivity and output per person in spinning and weaving sections, including availability of sufficient stocks of suitable types of raw cotton, avoidance of machine shutdowns due to breakages in yarn, increases in operating speeds so that machines run according to design capacity, improvements in lighting and climate control, recommendations on minimum quality standards for each yarn count, on ways of improving machine utilisation in the weaving sections to achieve uniform quality, and advice on improvements in existing techniques of bleaching, dyeing and finishing and on the appropriate technology for new bleaching, dyeing and finishing facilities.
 - On-the-job training for mill managers and operative personnel in preventive maintenance systems and in spinning and weaving techniques.
 - Follow-up visits by productivity and maintenance advisory teams to the selected mills to assess results of advice given and training received.
 - Preparation of program of visits by productivity and maintenance and advisory teams to other mills in Bangladesh.

7. Machinery and Spare Parts

- i) Study reports and recommendations made by textile mill machinery consultant under the UNDP project BGD/75/002 "Linkage Studies in Engineering Industries".
- ii) Assessment of existing capabilities for the production of mill machinery and spare parts both within the textile industry and in factories outside the Textile Mills Corporation, including particularly engineering factories under the responsibility of the Bangladesh Steel and Engineering Corporation and the production facilities for Jute Mills spare parts under the Jute Mills Corporation.
- iii) Assessment of major items of machinery and spare parts which can be produced in Bangladesh.

- iv) Advise on the most economical and practical means of producing these items taking into account existing facilities.
- v) Implementation of recommendations.

8. Workshop Development

- i) Conduct a survey of the Engineering Industries Limited, the present Central Workshop of BTMC, recommended balancing of machinery requirements and other facilities, such as foundry, moulding, heat treatment and raw material usage.
- ii) Advise on modernisation of existing mill workshops and the establishment of workshops in mills where none exist at present.
- iii) Develop a tooling control system.
- iv) To increase the skill and technical know-how of workshop personnel by developing and upgrading of staff for all workshops.

Prepare basic engineering and workshop practice courses for part of the textile fitter training program at the BTMC Training Centre.

9. B.M.R. Program

- i) Analysing the condition of all machinery, determining spare parts and modernisation requirements.
- ii) Balancing of departmental outputs to achieve proposed calculated production.

c. OUTPUTS PRODUCED

1. Training Program

- i) Originally sixteen (16) mills were designated for project work (Appendix-I), both for training programs and operational assistance. This was increased by a further eighteen (18) mills for spinning training in April 1982, as there was insufficient higher level management personnel available in the sixteen (16) mills for some repeat courses.
- ii) An analysis of levels and numbers of staff from all mills requiring training or retraining, at in-country facilities is shown in Table 1 on next page.

TABLE - 1
Training Requirements¹

	Technologists/ Technicians	Supervisors/ Foremen, etc.	Jobbers/ Fitters	Operatives	Total
Spinning	1753	1594	1784	16750	21881
Weaving	515	570	863	2550	4498
Dyeing, Printing & Finishing	70	214	41	-	325
Total	<u>2338</u>	<u>2378</u>	<u>2688</u>	<u>19300</u>	<u>25704</u>

Discounting the number at operator level, a total of 7404 management and skilled personnel needed training facilities over the next five years. Accordingly a program of training for the BTMC Training Centre, to meet this demand, was drawn up.²

iii) An inventory of existing physical facilities for training personnel of the textile industry had disclosed that the only venue for textile technician/technologist training was the Dhaka College of Textile Technology. The training of craft level and junior management people, except for management subjects in general at the Management Development Centre, was non-existent and operative training was also at a low level and not industry oriented.

iv) The physical features of the BTMC Training Centre at Savar, were designed as three sections:-

Seven(7) workshops and laboratories covering 14,400 sq.ft. These included the Central Testing Laboratories of BTMC which they had decided to transfer and incorporate in the BTMC Training Centre;

Four(4) classrooms and two(2) common rooms, totalling 3375 sq.ft;

Hostel and administration areas totalling 28,300 sq.ft.:

Full details are shown in appendix-3

Machinery and equipment for the Training Centre was estimated to cost around US \$ 1,046,521. However, as the bulk of heavy processing machinery could be transferred from industry, a reduction in the cost of machinery of US \$ 671,900, at 1980 prices, was possible.

As a result, additional machinery and equipment was to be supplied by UNIDO as shown in Table 2.

1. Mr. J. Woelfenden's Report No. 1 "Manpower Needs in the BTMC"
2. Mr. J. Woelfenden's Report No. 2 "The BTMC Training Centre"

TABLE - 2

<u>Machinery & Equipment</u>	<u>Approx. Cost</u>
Testing and Quality Control Laboratory	US \$ 90,000
Spinning Workshop	26,650
Weaving Workshop	39,100
Erection Room	4,600
Bench Fitting & Machine shop	23,000
Chemical Laboratory	13,091
Dyeing Workshop	83,880
Fabric Testing Laboratory	14,300
Cotton Classing Room(Chittagong)	80,000
Total:	US \$ 374,621

Full details are given in appendix-4

v) Following examination of textile processing machinery available in the industry, a selection was made of representative pieces for transfer to the Training Centre. These are shown in appendix-5.

All equipment was ordered and has been, or is, being delivered, except for \$ 91,196 worth which was scheduled for 1984 budget. These items are shown in appendix-6.

vi) Following evaluation of the courses available at the College of Textile Technology, it was realised that even when fully staffed, (only 46% of lecturing staff and 74% of instructor/demonstrator staff were in post at the time of the survey), the College fell a long way short of meeting the needs of BTMC in the provision of sufficient numbers of well educated and trained personnel to fill junior management vacancies.³

Accordingly, curricula for forty-five(45) course subjects were drawn-up, which would be developed by the individual training advisers. These are shown in appendix-7.⁴

vii) Assistance was given to the College of Textile Technology in amending existing syllabus and recommendations to cut out irrelevant course material or readjustment of time spent on certain subjects. A number of other detailed recommendations were made.⁵

3. Mr. J. Woelfenden's Report No. 3 "The College of Textile Technology"

4. Mr. J. Woelfenden's Report No. 2 "The BTMC Training Centre"

5. Mr. J. Woelfenden op. cit.

2. Training Implementation

- i) The courses were devised with the object of teaching factory and management personnel the necessary technical skills; technological knowledge; quality aspects; control procedures and; in general, how to run the section or department; including a high practical content. It was decided that the first presentation of any particular course would be to Masters(Managers) responsible for that particular department. Second presentation would be for Assistant Masters and Shifts-in-Charge, then Supervisor level and so on down the management level to Foremen, Jobbers, Fitters and craft-level employees. When numbers permitted, "mixed" groups would not be trained together so as not to undermine the status of senior personnel.
- ii) Courses were prepared by the three training advisers in English, to be translated into Bengali by the counterparts.

Two hundred and eighty-eight(288) courses were presented: 161 for management personnel and; 127 for skilled workers; resulting in the equivalent of 1250 trained managerial staff and skilled personnel as shown in Table 3.

TABLE - 3

Personnel Trained

	Total	Spinning	Weaving	Dyeing, Printing & Finishing
<u>Management</u>				
No. of courses presented	161	80	50	31
Total number of man-days	30254	17234	3757	9263
Total number attended	2732	1790	464	478
No. days for full series of regular courses	-	50	51	109
Equivalent number trained in full series of courses	504	345	74	85
<u>Skilled Workers</u>				
No. of courses presented	127	35	25	67
Total number of man-days	17593	9417	2077	6088
Total number attended	3361	1629	216	1516
No. days for full series of regular courses	-	23	29	23
Equivalent number trained in full series of courses	746	409	72	265
<u>All Personnel</u>				
Equivalent number trained	1250	754	146	350

Details of courses presented and numbers trained are shown in appendix-8. First courses were given in English by the adviser with the counterparts assisting. The next one or two courses were given by the counterparts in English and Bengali as appropriate with, this time, the adviser assisting. All regular training courses were being given solely by the counterparts prior to the project's termination.

As the College of Textile Technology was not in a position to run the courses for BTMC personnel, counterpart staff were transferred from BTMC factories to the Textile Industry Development Centre (TIDC) to be trained by the advisers as teachers at the BTMC Training Centre. A Principal of the Centre and three counterparts to each adviser, were appointed. Adequate man-months were made available to train them to a high standard, capable of replacing the training advisers. Details of their services are shown in Table 4.

TABLE - 4
Training Counterparts

Counterpart	Joined	Adviser concluded work assignment or counterpart left	Service
a. Training Centre			
<u>Principal</u>			
M. Ahmad	Mar. 80	Oct. 82	2 Yrs. 8 mths.
M. Mahmood	Dec. 82	Feb. 83	3 mths.
A.K.M.M. Hussain	Mar. 83	Nov. 83	9 mths.
Md.A.A. Mahmood	Dec. 83	Dec. 83	1 mth.
b. Spinning Department			
N. Ahmed	Feb. 80	Dec. 83	3 Yrs. 11 mths.
M. Rahman	Nov. 79	Dec. 83	4 " 2 "
S. Islam	Feb. 81	Dec. 83	2 " 10 "
c. Weaving Department			
G.R. Chowdhury	Jan. 80	Feb. 83	3 Yrs. 2 mths.
N. Jahangir	Jan. 80	Feb. 83	3 " 2 "
M. Rahimuddin	Jun. 81	Feb. 83	1 Yr. 9 "
d. Dyeing, Printing and Finishing			
A.K.M.S. Huda	Oct. 79	Mar. 83	3 Yrs. 6 mths.
A. Taher	Dec. 79	Nov. 82	3 Yrs.
Tofazzal Hussain	July 81	Dec. 81	6 mths.
A.K. Roy	Feb. 82	Mar. 83	1 Yr. 2 mths.

It should be noted that although Mr. Md. A.M. Mahmood, present Principal, has only one month's service, he had been on the "Operations" side of TIDC since April 1981 and had assisted training staff on a number of occasions.

In addition to courses six(6) seminars were held to acquaint management personnel with specific major problems. A total of 317 persons attended these seminars. Details are shown in appendix-9.

3. Overseas Training

- i) Consultants of the Royal Textile Mills, Nijverdal - Ten Cate N.V., The Netherlands, had analysed the levels and numbers of staff in selected mills and BTMC headquarters and agreed to provide training overseas for thirty-six(36) personnel in the technologies, economics and statistics related to the cotton textile industry.
- ii) All persons selected held a textile qualification, usually Diploma of the Bangladesh College of Textile Technology, and could speak, read and write English at an acceptable standard, although special classes in English were required for the final group. At least five years BTMC services was recommended, although again, for the final group this requirement was relaxed. The level of management position was usually that of Manager (Spinning Master, Weaving Master or Dyeing Master). As sufficient persons could not be found for the final group, Assistant Manager and Shift-in-Charge levels were permitted. Selection was made after interviews by senior members of BTMC and UNIDO team advisers. Six(6) fellowships were awarded to other personnel to improve their performance in a specific job.
- iii) The participants for Ten-Cate, were divided into three groups and spent five months each in the mills of the Royal Textile Mills and their associates and at the Polytechnical College "DeMaere" in Enschede. The composition and fellowship dates of each of the three groups are shown in Table 5.

TABLE - 5
Fellowship Groups - Ten Cate

<u>Dates</u>	<u>Total</u>	<u>Spinners</u>	<u>Weavers</u>	<u>Dyers & Finishers</u>
1. Dec.79-Apr.80	14	10	2	2
2. Dec.80-Apr.81	10	4	3	3
3. Dec.81-Apr.82	<u>10</u>	<u>5</u>	<u>3</u>	<u>2</u>
	<u>34</u>	<u>19</u>	<u>8</u>	<u>7</u>

Other fellowships were provided for training overseas as shown in Table 6.

TABLE - 6
Other Fellowships

<u>Subject</u>	<u>Place</u>	<u>Dates</u>	<u>Duration</u>
1. Statistics & textile physical/chemical testing.	Egypt	Apr.82 - Sept.82	6-months
2. Statistics & textile physical testing	Egypt	Apr.82 - Sept.82	6-months
3. Statistics & textile physical testing	Egypt	Apr.82 - June 82	3-months
4. Spinning technology	U.K.	Sept.82- Mar. 83	6-months
5. Weaving technology	U.K.	Sept.82- Mar. 83	6-months
6. Dyeing, printing and finishing technology	U.K.	Sept.83- Mar. 84	6-months

Full details of all fellowships are to be found in the 6-monthly Project Progress Reports.

iv) Following return of each group of fellows from The Netherlands attempts were made by the advisers to set-up an on-the-job training programs to be conducted by the individual Fellow for his subordinates. No success was achieved.

4. Productivity, 5. Quality and Process Control 6. Maintenance

i) The sixteen(16) mills designated for the training program were also used for the "Operations" program and are shown in appendix-1.

ii) Eleven counterparts were transferred from BTMC factories to the Textile Industry Development Centre for the four "Operations" advisers, with the objective of them replacing the advisers in the long term (approximately three years time). Details of their services are shown in Table 7.

TABLE - 7

<u>Operations Counterparts</u>			
Counterpart	Joined	Adviser concluded work assignment or counterpart left	Service
a. <u>Spinning-I</u>			
Md.A.M.Mahmood	April 81	Nov.83	2 Yrs. 8 mths.
T.K.Biswas	Sept. 81	Apr.82	8 mths.
J. K. Kundu	Feb. 82	Dec.83	1 Yr. 10 mths.
A.Hashem	Dec. 82	Dec.83	1 Yr. 1 mth.
b. <u>Spinning-II</u>			
E.Heque	Dec. 81	Dec.83	2 Yrs.1 mth.
M.Jamaluddin	Dec. 81	Dec.83	2 Yrs.1 mth.
N.Mohammad	Dec. 81	Dec.83	2 Yrs.1 mth.
c. <u>Weaving</u>			
S.B.Das Gupta	Dec. 79	Dec.80	1 Yr. 1 mth.
S.C.Paul	Mar. 80	Sep.83	3 Yrs.7 mths.
A.B.M.Heque	May 80	Sep.83	3 Yrs.5 mths.
A.B.M.Jalaluddin Khan	Sept. 81	Sep.83	2 Yrs.1 mth.
d. <u>Finishing</u>			
Kazi S. Iqbal	Dec. 79	Jan.80	2 mths.
A.N.Rashid Khan	Dec. 79	Jan.83	3 Yrs. 2 mths.
A.Awal	May 81	Jan.83	1 Yr. 9 mths.

iii) Initial surveys were carried out by each operations adviser and his counterparts.

Sixteen(16) spinning mills, sixteen(16) weaving factories and seventeen(17) dyeing, printing and finishing units were surveyed with special attention being given to:-

- a) condition of machinery and equipment
- b) processing methods
- c) production balance
- d) material quality standards
- e) maintenance schedules and degree of implementation
- f) in-plant training facilities

Many reasons for the low level of production and inadequate quality control were identified. Major reasons being, among others; the lack of appreciation by Managers, both technical and non-technical, of the problems; the shortage of practical textile technicians, managerial and maintenance; the resultant run-down in machinery standards - incorrect machine settings, worn parts;

shortage of spare parts and essential auxillary items; poor work practices and factory discipline and; the very wide range of counts being spun in relation to the average count the mill was set-up to spin, putting the various departments out of balance and so under-utilising men and machinery.

Additional factors reducing output and quality were head-office responsibilities such as purchase of raw cotton; many mills ran completely out of cotton; counts and quality were changed frequently; grades supplied were not always suitable for the counts planned and management would try to spin higher counts than the cotton was suited for, resulting in very high end breakage rates at ring spinning and considerably overloaded operatives. Power-cuts and excessive absenteeism, were a further cause of lost production.

iv) Advice on measures to increase productivity and improve quality may be summarised as follows:-

a) Spinning Operations Advisers

Consultancy work was carried out in 45 spinning mills over the three years assignment period. On the basis of available resources recommendations were made to achieve short term and longer term improvements. The improvements the advisers attempted to implement met with varying degrees of success.

- 1) Production balance based on acceptable technological standards
- 2) Maintenance schedules
- 3) Waste reduction
- 4) Larger mixings, based on microneaire and Pressley results, with controlled addition of waste.
- 5) Lubrication specifications and supplies.
- 6) Technological improvements which can be subdivided into:-

Blowroom

A reduction in C.V% in scutcher laps and also to effect improvements in cleaning efficiencies by identifying problems and correcting.

Insistence on a lap weighing tolerance being observed with adequate distribution about the mean.

Carding

Nep counting as a basis for setting, stripping and grinding of cards.

Gauge settings and production rates.

Sliver weight standards and standardisation of pinions between cards.

Recommendations on wire specifications and maintenance procedures.

Drawing

Improved setting standards
Roller buffing schedules
Setting of coiler assemblies
Stop motion effectiveness
Sliver testing procedures and establishment of acceptable sliver weights
Evaluation of locally produced drawing frame cots

Lap Former

Stop motion effectiveness

Comber

Improved settings
Recommendations for the replacement of top combs, cylindered needling, detaching rollers etc. where necessary.

Simplex Machines(Speed Frame)

Setting of drafting systems and overall maintenance through roller buffing, apron replacement and top roller weighing checks.
Rationalisation of twist levels related to ring frame break draft.
Changes to settings and pinions to effect improvements in bobbin build.

Ring Frame

Improved settings and draft distribution
Implementation of maintenance and roller buffing schedules
Bobbin build and traveller selection
Development of improved spindle tapes incorporating nylon or polyester

Winding

Clearers and yarn devices
Correction to package build
Knitting, including provision of mechanical knotters where possible

Reeling

Measured length

7) At the request of the Chairman of the BTMC the advisers undertook direct responsibility for the implementation of their technical and production recommendations in five designated mills over a three-months period. The production and quality achievements in these mills over the period were very impressive.

- 8) Polyester/Cotton spinning was successfully pioneered in three different spinning units and advice given on further processing.
- 9) An investigative report into the possible diversification of a worsted spinning plant.
- 10) Report on the alternative methods of yarn production and their applicability to the BTMC.
- 11) Analytical report on the causes of low production within the BTMC.
- 12) Detailed survey of five "sick" mills and recommendations for improvements.
- 13) Advice on the specification of testing equipment for Chittagong Zonal testing laboratories.
- 14) Advice on the spinning equipment needed for the Training Centre, Savar.

b) Weaving Operations Advisers

- 1) Problems common to most of the mills visited were pointed out with recommendations made for their correction.
- 2) Arrangements were made with local spares manufacturers to produce essential spares in an attempt to restart idle preparation and weaving machinery.
- 3) Trials were carried out with these parts and modifications suggested where necessary, based on a performance evaluation.
- 4) A weaving mill was selected as a pilot unit to implement recommendations for preparatory processing-warping, sizing, pirn winding and drawing-in and the automatic pirn change mechanisms on 120 looms put into working order. This resulted in a production increase of the order of 20%.
- 5) Survey of two specialised weaving units to determine possibility of diversifications.
- 6) In-plant training for loom turners and weavers in eleven weaving units.
- 7) Recommendations given for the reorganisation of the preparation department in seven weaving mills.
- 8) Sizing trials with Polyester/Cotton successfully carried out in two mills.
- 9) Recommendations given to local manufacturers to improve the quality of locally manufactured healds and shuttles.
- 10) General recommendations given for suitable lubricant and lubrication schedules.

- 11) Inaugurated cloth inspection and quality control procedures in three weaving units.
- 12) Visited several Hand Loom areas and made recommendations for yarn sizing.
- 13) Arranged local manufacture of wood accessories from Bangladesh timber, with encouraging results.
- 14) Assistance given to BCSIR in setting-up a preparation and weaving research unit.

c) Dyeing, Printing and Finishing Operations Adviser

- 1) A reporting system was established for the monthly collection of the following data from the finishing units -
 - Monthly production report
 - Monthly quality report
 - Monthly consumption of chemicals & dyestuffs related to production
- 2) Preliminary survey of the present production capacity against potential capacity. Some machinery for balancing and modernisation was suggested in this context.
- 3) Efforts were made to use old stocks of dyes and a central follow-up data system was established to evaluate monthly production quantities and quality.
- 4) Specifications were given for processing materials, and advice on requisitions for dyestuffs and chemicals for one year's usage, was given to the BTMC tender committee.
- 5) Details were given for balancing and modernisation of existing finishing units and machinery required for doubling output and improving work methods.
- 6) Defects in processing methods were located and consultancy services were provided on a continuous basis.
- 7) Improvements were effected in Dyeing & Finishing resulting in:
 - : an increase in absorbency of prepared fabric during desizing and boiling stages.
 - : better utilisation of padded naphtolated ground by printing and then developing by padding techniques.
 - : development of selected designs and printing and duplex prints.
 - : utilisation of idle mercerising capacity.
 - : introduction of pad-jig dyeing techniques and utilisation of idle

pad-hot flue and washing machine capacity.
: revised desizing recipes.
: economics in the use of dyes and chemicals.
: general reintroduction of idle capacity.

- 8) Successful trials were undertaken to produce "burnt-out" prints and carrier dyeing of cotton/polyester blends.
- 9) The facilities within BTMC were studied for the dyeing and printing of cotton/polyester and suggestions made for future production. Trials on the dyeing of cotton polyester fabrics were conducted in Olympia Textile Mills and in the laboratories of the Jute Research Institute.
- 10) A study was prepared, to facilitate expansion in the field of Hand Screen Printing; into methods of preparation and; the design of screens and printing tables.
- 11) Prepared specification for the local manufacture of a printed fabric steamer.
- 12) Introduction of pad-steam dyeing techniques using cotton vat colours; dyeing and water repellency of umbrella fabrics; finishing of export poplin; production of cheese cloth and; revision of dyeing recipes.
- 13) Assessment of the potential usage of idle yarn dyeing capacity by the Handloom Board.
- 14) Preparation of specifications and analytical acid tests for chemicals and dyestuffs. Proposals made for in-plant testing during desizing, scouring and bleaching operations.
- 15) Advised on the specification of equipment needed in the chemical and dyeing laboratories and workshop for the Savar Training Centre.
- v) While the Operations Counterparts were involved in the above activities, factory personnel at all levels received on the spot training so that they themselves could apply the knowledge to other machines and processes. A continuous follow-up of recommendations given and assistance in their continued implementation, with the co-operation of management, applied at all times.

7. Machinery and Spare Parts

- i) The textile machinery aspects of the report prepared by Project EGD/75/002, "Linkage Studies in Engineering Industries", was developed further and in considerable detail by the Textile Mill Machinery and Spare Parts Adviser assisted by two counterparts whose service is shown in Table 8.

TABLE - 8

Machinery & Spare Parts Counterparts

Counterpart	Joined	Adviser concluded work assignment	Service
Abdul Hye	Jan.80	Sept.80	9 months
Rafiqul Alam Mazumdar	Jan.80	Sept.80	9 months

- ii) The practicalities of producing spare parts and later, machinery, were examined in sixteen (16) BTMC factory workshops, six (6) major engineering enterprises and a number of private engineering workshops. The capacity of the Bangladesh Jute Mills Corporation's workshops was totally inadequate for them to consider supplying the textile industry with spare parts or to manufacture textile machinery.
- iii) It was calculated that approximately 4,996,600 spare parts were consumed by BTMC mills in a year, of which 72% were imported. The US Dollar values being \$ 8,089,300 imported and \$ 1,904,000 manufactured locally. To provide for expansion and replacement of old machinery, it was considered that 200 ring spinning frames, 160 reeling machines and 150 other units could be manufactured locally each year, provided adequate capacity was available.
- iv) Recommendations were made to modernise and expand BTMC workshops and create new ones where none existed, into: mini; medium, composite; specialised and; central, according to the size of the factory. Also the present Engineering Industries Limited, central workshop of BTMC, should be upgraded and developed as a modern workshop. It was also suggested that the more sophisticated spare parts could also be supplied by the major engineering enterprises, while production of textile machinery should be the province of the Bangladesh Machine Tools Factory.
- v) Under the Balancing, Modernisation and Rehabilitation Program to be financed by World Bank, proposals were drawn-up for modernisation of twenty-one (21) BTMC workshops and the Central Workshop for the manufacture of spare parts. Production of reeling frames has started at BMTF and experiments have commenced in ring-frame assembly.

8. Workshop Development

- i) The initial survey of the Engineering Industries Ltd., Central Workshop of BTMC revealed many deficiencies: layout of machinery was poor in that machines which create heavy vibrations were set next to lathes; machine tools were often 40-50 years old, with consequent loss of precision; lighting was totally inadequate for fine work; electric wiring was dangerous;

exposed connections; floors uneven and full of holes and leaky roofs; worker skill was of a low level and preventive maintenance schemes non-existent. Similar surveys in twenty-five(25) factory workshops also revealed, in addition, that machine operators could not read blueprints or use calipers and micrometers. Cleanliness and housekeeping was poor.

- ii) Machinery and tooling requirements for all sizes of factory workshops were drawn-up and maintenance requirements detailed. Reconditioning requirements of existing machinery and equipment were listed so that reasonable quantities of an acceptable quality of spare parts for the factories own use could be made, after implementation of the recommendations.
- iii) Developing tooling control systems proved difficult as none of the workshops was equipped with the right tools and the few existing tools were usually worn out.
- iv) A very wide range of tools and equipment costing around \$ 24,170 was ordered by UNIDO for delivery when the workshops at the BTMC Training Centre at Savar would be ready. Although fitting out of the workshops were not completed by the end of the project(December 1983) the equipment was scheduled to arrive in February 1984.
- v) A comprehensive workshop manual was compiled to be used in retraining the workshop operators, utilising the above equipment. Two counterparts have been trained to conduct this training. BTMC had difficulty in releasing the second counterpart for the adviser, with the consequent loss of training time. Their service is shown in Table 9.

TABLE - 9

Counterpart	Joined	Adviser concluded training assignment	Service
M. Nazrul Islam	Apr.82	Feb.84	1 Yr. 11 months.
H.S. Hossain	Sep.83	Feb.84	6 months.

9. Balancing, Modernisation and Rehabilitation(BMR) Program

Fifty-two(52) Feasibility Studies in the spinning, weaving and dyeing, printing and finishing units of BTMC mills and in the private sector were conducted in which the condition of all machinery was analysed. Spare parts, replacements and additional machinery requirements to bring the output levels up to the optimum were determined and the balance of departmental production levels were calculated. In addition, proposals were made for re-equipping of twenty-one(21) factory workshops and the Central Engineering factory of BTMC.

This was considered as part of the consultancy training of the operations counterparts.

C. ACHIEVEMENT OF IMMEDIATE OBJECTIVES

1. Upgrading the Levels of Skill

- i) A target of 450 skilled personnel and trained managerial staff by the end of the project was the target set in the project document. This was comfortably exceeded in that 746 skilled operators and 504 managerial personnel completed a full series of courses in their field, a total of 1250 persons, thus exceeding the target by 178%. For example the spinning management personnel would have attended a course on a) opening and cleaning, b) carding and drawing, c) simplex, d) ring spinning, e) coaming and f) production control. Skilled operators in the Finishing Sector would have covered the series of courses in a) preparation for dyeing, (b) dyeing, c) printing and d) finishing.
- ii) In addition, at the request of the Chairman, BTMC further specialised courses were prepared and have started.
 - (a) a course for Spinning Operative Instructors
 - (b) two courses of 12-months duration each in textile technology for forty-four(44) Higher School Certificate science graduates. This consists of 20 days class-room work alternating with 30 days in-factory practical work, for one year. Two assistant spinning masters were transferred from factories to assist the Spinning Training Adviser in this program, however, after 4-months of operation the Adviser has left the program on completion of his assignment and one of the counterparts left shortly after. A similar program prepared for training fifty(50) Secondary School Certificate science students has not started yet.
- iii) Further training continues to be given by the Spinning and Weaving Training Counterparts, although no courses have been presented by the two Training Counterparts of Dyeing, Printing and Finishing since the Adviser completed his assignment in March, 1983.
- iv) While thirty-five(35) fellowships were tenable at Ten-Cate only thirty-four(34) were filled. Special classes in English were required for the third group and ten(10) qualified for eleven(11) vacancies. The follow-up program of the fellows should have resulted in them running classes for their subordinates to pass on their newly acquired knowledge.

This part of their program was a failure, in that none of them undertook this teaching. Reasons given included:

- a) factory management did not permit them time off from the normal duties to run classes.
- b) they had not been trained to teach or prepare courses.
- c) their Ten-Cate training was for a sophisticated European textile industry, quite different from their local problems.
- d) the training program of TIDC superceded their program.

The other fellowships upto 1983 were successfully completed except one for the Head of Weaving Operations TIDC which was cancelled by the Government at a late stage in the arrangements. Fellowships in the 1984 program have not been arranged. They should have been of six months duration each:

Principal of Training Centre

Head of Operations

Two Senior Counterparts of Spinning Operations departments.

2a. Establishment of Central Training Services

- i) Building of BTMC Training Centre at Savar commenced early in 1980 and the buildings were completed towards the end of 1983, some 2½ years behind schedule. While a power supply is available, no machinery or equipment is connected. Gas, water and drainage facilities in the laboratories have not yet been provided. Of the twenty-two(22) machines approved for transfer from the factories only five(5) have been delivered. Forty-nine(49) items of equipment supplied by UNIDO over the past three and a half years(3½) were transferred and stored in the Centre in December 1983. Nineteen(19) items are on their way from suppliers. Equipment for the chemical laboratories was to have been supplied locally in 1984, when the laboratories were ready for use. Also three(3) items were scheduled for purchase from local sources in 1984 when the workshops were operational. Tools and gauges were to be supplied during 1984 following the machinery transfer from the BTMC mills. Four(4) items have not been supplied as no offers have been received from suppliers.
- ii) All the forty-five(45) course subjects shown in appendix-7 were incorporated in the training course program, with the exception of the three(3) subjects:

Inorganic and Physical Chemistry

Physics

Organic Chemistry

These were scheduled for preparation by the Dyeing, Printing and Finishing Counterparts.

2b. Establishment of Advisory Services

- i) The counterparts working with the Operations Advisers were to form the advisory services personnel attached to the Operations Directorate of BTMC. It was considered that to develop them up to consultant level required a minimum of three years training (this was one of the reasons for the projects extension to October 1984). This length of training was achieved with two(2) of the Weaving Operations Counterparts and one(1) of the Dyeing, Printing and Finishing Counterparts, but with none of the six(6) Spinning Operations Counterparts, as their advisers' assignments were terminated prematurely. On average, the training of the Spinning Operations Counterparts was almost two(2) years.
- ii) While it was considered that the provision of three(3) counterparts for each adviser would cover normal manpower wastage, the denationalisation of about 40% of BTMC mills in 1983 created a private sector prepared to pay high for experienced capable technologists. Naturally, technologists with specialised training from expatriates, i.e. TIDC counterparts, were approached. The Head of TIDC and all the counterparts of the Dyeing, Printing and Finishing Operations department left for better paid jobs in the private sector. It is expected that more counterparts will consider leaving.

3. Improvement of Quality

Many of the activities and recommendations enumerated in section-B, sub-section C, "Outputs Produced, paragraphs 4,5,6, items iv-a,b and c, were directed towards improvement of yarn and fabric also. There is very little quality control equipment installed in the mills, resulting in inadequate frequency and variety of testing. A standardised system of quality control and testing was established for all spinning mill departments. Special tests taken before and after recommendations were implemented invariably showed considerable quality improvement in all aspects. While methods of control at each stage of processing were established, it was sometimes found on follow-up visits, that supervision had allowed these procedures to lapse. As the quality control staff in the mills has a low status, usually being mere recorders of data, there is no independent follow-up of quality deficiencies noted. In general, however, as a result of the training programs and action by the TIDC operations personnel, an improved awareness of quality can be seen.

4. Improvement of Productivity

- i) In a similar manner to the quality aspect, recommendations also led to increased output, but improvements with their necessary discipline were not always continued.

The degree of both quality and productivity implementation and continuity varied from mill to mill, often depending on the degree of interest taken by top management. Best results were obtained from the spinning sector. It is significant that during the three months period when the three spinning advisers were directly responsible for implementing their recommendations in five mills, production increases up to 30% were achieved.

- ii) While the output in BTMC mills has been nowhere near the 3.5 oz. per spindle/shift set in the project document, (an impractical improvement of 45% output per running spindle as shown in Mr. B. Jackson's final report), the production did increase by 7%. However many of the advisers' recommendations led to idle spindles being put back into production again, consequently production based on the number of spindles available (installed), showed an improvement of 19%.
- iii) While in many cases maintenance schemes were started or improved, it is not considered that the optimum benefit could be attained due to the very poor condition of the factory workshops.

5. Local Production of Machinery and Spare Parts

While production of textile mill machinery of various kinds has started at the Bangladesh Machine Tools Factory, much development work remains to be done. Without much of the factory workshops' equipment and machines being replaced and, in the case of the Central Workshop, considerable expansion undertaken, little improvement in the quantity and quality of spare parts has been possible. This is an expensive and long-term project.

6. Improved BTMC Factory Workshops

As noted above very little improvements can be made without replacement of machinery and equipment. However, while no training courses in "Workshop Practice" have been held for up-grading the skills of workshop operatives, course material and trained counterparts are available. With the expected arrival of the UNIDO workshop equipment and tools, provided the Training Centre Workshop is furnished, an early start to training is expected.

7. Balancing, Modernisation and Rehabilitation Program

- i) Eighty-five (85) Feasibility Studies should have been compiled. Seventy-four (74) were completed leaving eleven (11) to be undertaken by the Operations Counterparts on their own. The premature departure of the advisers has delayed the completion of this phase of the World Bank's schedule for the private sector.
- ii) Combined with this, delays in the program of BTMC's Implementation Cell has meant that the remainder of their schedule i.e. bid evaluation; trial runs;

follow-up and entry into commercial production etc. cannot be undertaken with the adviser's assistance.

D. UTILISATION OF PROJECT RESULTS

1. Upgrading the Level of Skills

- i) An adequate number of training counterparts have been developed over the advisers' tenure, the average length of service being almost three(3) years, with five counterparts having well over this duration. Having already trained 1250 persons in their full series of regular courses, the counterparts teaching experience is considerable. Regular consultations with the Operations Directorate ensure that the future training program meets the requirements of B.T.M.C. management.
- ii) Although three(3) courses remain to be written by the Dyeing, Printing and Finishing Counterparts and their teaching program restarted, it is expected that when the Senior Counterpart returns from fellowships in June 1984 that this will be undertaken.
- iii) While seven(7) mechanical instructors should have been appointed to install the BTMC machinery transferred from the factories and to run, maintain and instruct course participants in its usage, we assume, that as the factory personnel are erecting the five machines transferred to date, the appointment of the mechanical instructors will take place at a later date.

2a. Establishment of Central Training Services

- i) It is disappointing that the equipment provided by UNIDO is not being used. By now the entire Central Testing department of BTMC should have been transferred to Savar; all equipment connected to electric and water supplies and; a wider testing service being provided to BTMC factories. In addition, course participants should have been able to receive training on the equipment.
- ii) The Cotton Classing Room in Chittagong has not yet been completed and no testing equipment has been installed in temporary premises as we suggested, consequently a program of testing sample bales from incoming shipments cannot be started.
- iii) As noted earlier, little remains to be prepared of the complete regular training course subjects. While a number of additional subjects have also been covered, it is not envisaged that no further development will take place. As time permits the Counterparts will develop more advanced aspects of subjects now being taught, based on their experience of the level of achievement being attained by BTMC personnel.

2b. Establishment of Advisory Services

- i) It is unfortunate that the Spinning Operations Counterparts could not have received the further ten months training, agreed to at the Tripartite Meeting in 1981, to develop them to a higher level. Also the cancellation of the weaving fellowship for late 1983 and loss of spinning fellowships for late 1984 will have an adverse effect on these individuals all round development. However, in general, they have considerably improved their technical competence and investigative techniques while working with the advisers. BTMC Operations Directorate is using them as intended, that is, in analysing reasons for poor industrial performance, proposing solutions and assisting management in carrying out the recommendations.
- ii) Some loss of these counterparts to the private sector, with their higher rates of pay, is inevitable, all the Dyeing, Printing and Finishing Operations counterparts having already gone.

3. Improvement of Quality

- i) With the provision of the UNIDO testing and quality control equipment to the BTMC Training Centre at Savar, if installed, all course participants could be given a better appreciation of the quality aspects relevant to their subject. The training of three Q.C. staff overseas through UNIDO fellowship provides additional specialists for this purpose also. The provision of certain specialised equipment should now enable individual faulty machine components to be identified by suitable trained personnel.
- ii) Installation of the fibre testing equipment and bale inventory computer in a Cotton Classing Room in Chittagong should enable BTMC to categorise the majority of its imported bales prior to delivery to the mills. This will enable the mills to put down the optimum mix, thus giving a higher quality throughout subsequent processing.

4. Improvement of Productivity

- i) Use of the Operations Counterparts by BTMC, will in itself raise the level of productivity. However the degree of implementation of productivity improvements may be expected to vary widely, depending on the backing the counterparts get from mill management and BTMC head office personnel in implementation and follow-up.
- ii) The greater technical and supervisory knowledge acquired through course attendance at the BTMC Training Centre will also lead to a gradual improvement in output levels.

5. Local Production of Machinery and Spare Parts

Production of textile mill machinery has commenced in the Bangladesh Machine Tools Factory and is expected to slowly increase in numbers and variety of machines in the years ahead. While contacts were made with local suppliers, their products evaluated and the results passed on to BTMC, it remains for BTMC to continue this process and to make definite recommendations to their factories when improved suppliers are found.

6. Improved BTMC Factory Workshop

i) Little priority appears to have been given in the past to improving workshop facilities. With the information provided by the Adviser, BTMC now knows exactly the machinery requirements for each factory workshop and its Central Workshop. Facilities will also be available shortly at BTMC Training Centre, Savar and also trained counterparts, to retrain present staff and new entrants in workshop practices, to improve the skills required for repairs and production of better quality of spare parts.

7. Balancing, Modernisation and Rehabilitation Program

Following training from the advisers, the counterparts have continued independently analysing the condition of additional factories and producing Feasibility Studies of a level acceptable to the World Bank. This also provides BTMC with additional staff who can plan extensions of existing factories and new factory developments.

E. FINDINGS

1. Counterparts

The provision and maintenance of an adequate number of counterparts of a suitable calibre, is essential for successful replacement of the advisers on schedule. While one or sometimes two were usually provided soon after the adviser joined, it was often around a year before the third counterpart in the team was provided. In the case of the Workshop Engineering Adviser his second counterpart was appointed only six months before the adviser's assignment terminated. Similarly, replacements for counterparts who resigned could take-up to nine months. The reasons for this was the difficulties created for BTMC Operations Directorate who had to find replacements for them in the factories from which they would be withdrawn. Only three counterparts were returned to BTMC as not being suitable calibre for the post.

While the terms and conditions of service of the counterparts are outside the scope of the project's terms of reference, it should be mentioned that all the advisers were concerned about the possible effects on the counterparts work. When transferred to TIDC the counterparts lost a number of fringe benefits available to them in the factory (loss of bonus was one). Being outside the mainstream of operations it was difficult to promote them to fill a vacancy within the factories. Only four out of twenty-four were promoted over a four years period BTMC's rules and regulations also prohibited any special payments or allowances to them. It says much for the character of the counterparts that for the good of BTMC and their own individual development, they have accepted these constraints yet performed so successfully.

2. BTMC Training Centre

Late completion of the Training Centre at Savar, created a number of difficulties in the project's plan of work. During the Tripartite Meeting in March, 1981 it was stated that the Centre would be ready by May of that year. Work still remains to be completed. The resultant delay necessitated other temporary locations being used for classroom work; delivery of equipment rescheduled; UNIDO advisers not being available to assist in installing equipment during the running-in period and; postponement of the transfer of the Central Testing Laboratories. Similarly, the delay in building the Cotton Classing Room in Chittagong has meant that the advisers have not been able to set up the equipment there and develop an integrated system of bale control.

3. Course Attendance

While it is unreasonable to expect 100% attendance on courses by management and supervisory personnel, attendance could have been better. Although both General Managers and Departmental Managers of factories were usually advised well in advance of course dates and requested to send one or two specific individuals or a substitute, a few courses had to be cancelled through insufficient attendance. Percentage of attendance for management personnel was a) Spinning-80%, b) Weaving 65% c) Dyeing, Printing and Finishing 75%.

4. Operator Training

Although training was given to the more skilled personnel and a Management Development Centre is available in Dhaka for management personnel, a distinct gap was noticed in the training of machine operators. No formal training scheme using instructors trained in teaching methods exists. While this type

of program was outside the terms of reference of the project, it would have considerably improved product quality and output. However a comprehensive scheme was prepared by the Spinning Training Adviser, but not taken up by the BTMC.

5. Fellowships

It is considered that fellowships should be awarded to senior counterpart staff at, or near, the end of the adviser's assignment. This ensures that they have the maximum exposure to the advisers program for their development and that weaknesses are identified and an appropriate fellowship tailored to rectify these weaknesses and develop the counterpart for more advanced requirements of his post at a later date.

While the fellowships undertaken at Ten-Gate undoubtedly enabled the participants to improve their technical knowledge and obtain an idea of how a textile industry should be managed, something of a more intermediate level dealing with less sophisticated operating factories and their problems, would also have been advantageous. While the fellows themselves benefitted from these fellowships and their work performance improved, very little has been passed on by them to subordinates. This aspect does not appear to be a practical expectation.

6. Implementation of Recommendations

This varied considerably from mill to mill, depending, we feel, on the level of support from top management. While some welcomed the Operations Advisers and counterparts as extra help to improve the factories' performance, a few, while paying "lip service" to the idea, were slow to take effective action. Without support from top management lower levels of management did not always see the need for implementing changes with the resultant extra work for themselves. Often too, the question of labour control was a deterrent to change.

7. Factory Workshops

Much needs to be done in raising the standard of personnel, machinery and equipment of factory workshops. BTMC has considerable difficulty in obtaining qualified engineers in competition with the private sector.

Advantage can be taken of the BMR program, financed through World Bank, to purchase new machinery and equipment and thus solve part of the problems.

F. RECOMMENDATIONS

1. Counterparts

Retention of present counterpart staff is essential for the continuation of both the training program and operation advisory services. Their specialist knowledge should be recognised by adequate rewards, whether financial, promotional or fringe benefits, otherwise many will request a return to factory work or be lost to the private sector. Rapid replacement should be made whenever a counterpart leaves the training centre or operations program, in order to pass on as much as possible of the Adviser's training.

2. BTMC Training Centre

A determined effort should be made to completely finish the outstanding interior work at the Training Centre; aircondition the physical testing laboratory; instal the UNIDO equipment; transfer entirely the Central Testing Laboratory and personnel and; provide the necessary housing facilities for them and the training and clerical staff. Also the outstanding machinery due to be supplied by BTMC factories should be transferred quickly and the mechanical staff to run and maintain them, hired.

3. Cotton Classing Room, Chittagong

This also needs to be completed; airconditioned; equipment set-up and; staff provide on a three-shift basis.

4. Course Attendance

In conjunction with Operations Directorate a course program at least three months ahead should always be available, together with the names of designated participants. Managements should have agreed to their attendance and made arrangements to cover for their absence.

5. Operative Training

To improve quality, so essential for export goods, each spinning and weaving unit should have its own small school run by its own trained instructor, usually a literate mechanic or operator. Higher level personnel are needed to coordinate the training programs among the various mills. Retraining of present personnel might be the first stage, followed by the development of a trained reserve pool of workers (badli system). A plan for this was submitted to BTMC in 1980, while detailed spinning and weaving operative training courses were prepared in 1983.

6. Implementation of Operational Recommendations

While the operations counterparts as a group are quite competent in analysing problems and recommending courses of action, their rank in general, within BTMC being fairly low is not conducive to recommendations being readily accepted by higher graded management. Only if a dynamic, high level manager heads up this group within Operations Directorate and follows-up constantly their implementation will recommendations be adopted.

7. Factory Workshop

While it is not expected that BTMC can overcome its shortage of engineers and provide one for every workshop, they should concentrate on upgrading their present staff and training additional and replacement personnel. Persons responsible for recruitment should form a close relationship with the many training institutes teaching workshop skills, a number of which give two or three years of training to young men and then try to place them in industry.

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We are especially grateful to the Counterparts, who have contributed so much to the attainment of the Project's objectives, for their hard work and dedication. Also the management and staff of the many factories we have been privileged to work with, we thank them for their co-operation.

To those people who, in their various roles, have provided the necessary supporting services : secretarial staff; drivers and; all the many persons in UNDP, we express our appreciation of your assistance.

And finally, we should like to thank the Government and people of Bangladesh who have been such kindly hosts to the expatriate personnel. We shall retain happy memories of our stay in Bangladesh.

<u>DESIGNATED MILLS</u>	<u>INSTALLED SPINDLES</u>	<u>INSTALLED LOOMS</u>
1. Dhaka Cotten Mills Ltd. Postagela, Dhaka - 4	14200	206
2. Lurmi Narayan Cotten Mills Ltd. Godnyle, Narayanganj.	15172	310
3. Dhakeswari Cotten Mills No.1 Godnyle, Narayanganj.	12096	510
4. Dhakeswari Cotten Mills No.2 Godnyle, Narayanganj.	17840	420
5. Mohini Mills Ltd., Kushtia.	17068	537
6. Adarsha Cotten Spg. & Wvg. Mills Ltd. Lakhankhola, Chittagong.	-	145
7. National Cotten Mills Ltd., Malisher, Chittagong.	13012	218
8. Chittaranjan Cotten Mills Ltd., Godnyle, Narayanganj.	19804	395
9. Ibrahim Cotten Mills Ltd., Mithazari Road, Chittagong.	12400	176
10. Pahartali Textile & Hosiery Mills, Pahartali, Chittagong.	30400	476
11. Kohineer Spinning Mills, Nayarhat, Savar, Dhaka.	25056	-
12. Zeenat Textile Mills Ltd., Tengi, Dhaka.	24694	430
13. Mualin Cotten Mills Ltd., Kaliganj, Dhaka.		
14. Olympia Textile Mills Ltd., Tengi, Dhaka.	45400	496
15. Ahmed Bawany Textile Mills Ltd., Demra, Dhaka.	39416	334
16. Gawsia Textile Spg. Mills Ltd., Murapara, Dhaka.	23920	212

APPENDIX - 2

<u>ADDITIONAL DESIGNATED MILLS</u>		<u>INSTALLED SPINDLES</u>		<u>INSTALLED LOOMS</u>
1. Al-haj Textile Mills	.....	27200	.....	176
2. Amin Textile Mills	.....	18400	.....	-
3. Asiatic Cotton Mills	.....	26608	.....	207
4. Chand Textile Mills	.....	29800	.....	205
5. Chittagong Textile Mills	.....	37200	.....	558
6. Calico Cotton Mills	.....	12480	.....	-
7. Chisty Textile Mills	.....	15120	.....	-
8. Gealunde Textile Mills	.....	12528	.....	-
9. Malina Textile Mills	.....	12400	.....	172
10. Ibrahim Textile Mills	.....	12400	.....	170
11. Khulna Textile Mills	.....	12448	.....	97
12. Meghna Textile Mills	.....	15120	.....	176
13. Mainamati Textile Mills	.....	12400	.....	-
14. Olympia Textile Mills	.....	32736	.....	364
15. Pahartali Textile Mills	.....	30400	.....	476
16. Quaderia Textile Mills	.....	15200	.....	-
17. Serajganj Textile Mills	.....	12400	.....	-
18. Sharmia Textile Mills	.....	12400	.....	176

BTMC TRAINING CENTRE - SAVAR

		<u>FLOOR AREA</u>
Total enclosed area	=	243207 sq.ft.
Total floor space of buildings and passage ways, etc.	=	53725 sq.ft.
Area available for future extensions	=	17900 sq.ft.

A. ADMINISTRATIVE BLOCKa. GROUND FLOOR

1.	Office	=	400	sq.ft.
2.	Toilet	=	50	"
3.	Store	=	100	"
4.	Principal	=	400	"
5.	Toilet	=	50	"
6.	Vice Principal	=	400	"
7.	Lobby	=	600	"
8.	Teachers Room	=	600	"
9.	Toilet	=	180	"
10.	Store	=	120	"
11...	Corridor	=	800	"
12.	Stair	=	150	"
				<hr/>
				3850 sq.ft.
				<hr/>

b. FIRST FLOOR

1.	Conference	=	1,800	sq.ft.
2.	Verandah	=	200	"
3.	Library	=	900	"
4.	Toilet	=	50	"
5.	Store	=	200	"
6.	Toilet	=	50	"
7.	Corridor	=	150	"
				<hr/>
				3,350 sq.ft.
				<hr/>

B. CLASS ROOM BLOCK

GROUND FLOOR

1. Common Room	=	475	Sft.
2. Class Room	=	500	"
3. Class Room	=	500	"
4. Lecture Hall	=	1000	"
5. Toilet	=	300	"
6. Corridor	=	1100	"
7. Stair	=	150	"
		<hr/>	
		4025	Sft.
		<hr/>	

C. WORK SHOP BLOCK

GROUND FLOOR

1. Spinning Workshop	=	2400	Sft.
2. Weaving Workshop	=	2000	"
3. Erection Room	=	2400	"
4. Toilet	=	200	"
5. Store	=	200	"
6. Stair	=	200	"
7. Bench Fitting & Machine Shop	=	1600	"
8. Testing and Fabric Analysis plus BTMC Textile Laboratory	=	2800	"
9. Toilet	=	200	"
10. Boiler Room	=	450	"
11. Dying, Printing & Finishing Workshop plus BTMC, Dying Trial Laboratory	=	1600	"
12. Textile Chemistry Laboratory plus BTMC, Dying Trial Laboratory	=	1600	"
13. Corridor	=	3900	"
		<hr/>	
		19500	Sft.
14. Connecting Corridor		1850	"

D. HOSTEL

1. Double - Bedded Rooms, 5 Floors	=	13200	Sft.
2. Dining and Kitchen Area	=	2800	"
3. Common Room	=	900	"
4. Corridor	=	4200	"
		<hr/>	
		21100	Sft.
		<hr/>	

Equipment to be supplied by UNIDO

a) Cotton Classing Room - Chittagong

Drying oven
2 Portable Moisture Meters
Comb sorter
Microscope
Micronaire air-flow tester
Fibre bundle tensile tester (Pressley)
Trash Analyser
Fibregraph (digital)
Balance (fine)
Balance (precision)
Miscellaneous

b) Central Testing & Quality Control Laboratory
(Additional to existing equipment)

Drying Oven
Wrap reels
Fabric sample template & Balance
Twist Tester
Evenness tester
Single thread tester manual
Balance - Yarn
Balance Fine
Wrapping block
Microscope
Small - sample scale and balance
Ballistic strength tester
Crimp tester
Moisture meters (portable)
2 Sling hygrometers
Counting glasses
Line gratings
Abrasion tester
Pilling tester
Grease recovery
Hydrostatic-head tester

Grey scales
Lauderometer
Ph Meter
Miscellaneous

c) Training Centre - Savar

Spinning Workshop

Lap Former
Reeling
Tools, gauges, etc.

Weaving Workshop

2-Head Firm Winder
Sectional Warper/W. Creel
Drawing Frames
Tools, gauges, etc.

Erection Room

2 Head Firm Winder

Bench Fitting & Machine Shop

Benches for Fitting work
Vices
Students' Lathes
Bench Drills
Bench Grinder
Hacksaw machine
Metal rack
Tools, gauges, etc.

Chemical Laboratory

Chemical Benches
Lab Distiller
Mixer
Chemical Balance

Colour Matching cabinet
Viscometer
Crockmeter
Stainless steel ware
Ph. meter
Other miscellaneous items

Dyeing Workshop

Steam Boiler
Lab. Auto MT/MP
Lab. Hank Dyeing Machine
Lab. Winch Dyeing machine
Lab. MT/MP Package Dyeing machine
Lab. Centrifuge
Heating/Drying Oven
Lab. Universal Dyeing m/c.
Lab. two colour printing m/c.
Water Softener
Lab. Steamer
Lab. Padder

d) BTMC Laboratory - Savar

Wash Wheel
Flameproof Tester
Hot Press
Fading Tester
Analytical Balance
Other small items
Minor items of equipment

BTMC Textile Machinery and Equipment
to be transferred from Mills to Train-
ing Centre, Savar, Dhaka.

<u>a. Chittaranjan</u>	<u>Quantity</u>
1. Finisher Scutcher, Toyoda, 1951	1
<u>b. Olympia</u>	
1. Carding Machine, flexible wire, Ishekawa, 1963	1
2. Carding Machine, metallic wire, Ishekawa, 1963	1
3. Carding Machine, 10" can size, OKK-1954	1
4. Draw Frames, OKK 1954 Model	2
5. Simplex Machine, Pendulum drafting, OKK-1954	1
6. Sliver Lap Machine, OKK 1954	1
7. Ribbon Lap Machine, OKK 1954	1
8. Combers, Howa	2
9. Twisting Frame, OKK 1954	1
10. Cone Winder, Universal	1
(a) 90 cans, 16"x 42" size	
(b) 50 cans, 10" x 36" size	
(c) 40 simplex bobbins	
(d) 100 doubler ring tubes	
(e) 26 comber cans 12" x 36" size	
(f) 40 cone centres (Paper/Plastic cons)	
<u>c. Zeenat</u>	
1. Roving Frame, Ingstadt, 1954, together with 40 bobbins.	1
<u>d. Ahmed Bawany</u>	
1. Platts 1955 Model Ring Frames with Sussan Drafting System.	2
2. Automatic Tappet Looms, Sakamoto, complete with pirn changing mechanism and mechanisms for weaving drill, twills and sateens.	2
3. Dobby Mechanisms, 16 shaft.	4
<u>e. Bangladesh</u>	
1. Builder Motion for Speed Frame	1
2. Automatic Tappet Looms, Toyoda, complete with warp stop motion and pirn changing mechanism	2
<u>f. National</u>	
1. Non-Automatic Looms, Henry Livesey, Loose reed and over pick...	2

EQUIPMENT SCHEDULE FOR 1984 BUDGET
(NOT ORDERED)

Reeling machine	3,800
Spinning workshop, tools and guazes	14,100
Weaving workshop, tools and guazes	12,900
Pirn winders	9,200
Sectional warper	21,000
Drawing-in frames	600
Stainless steel-ware	5,170 ↓
Chemical laboratory glassware, etc.	6,066 ↓
Laboratory two-colour printing m/c.	18,360
	<hr/>
	91,196
	<hr/>

COURSE SUBJECTS FOR B.T.M.C. TRAINING CENTRE

Textile subject	(SWD)	1	Effective Supervision
	(S)	2	Blending, Opening & Cleaning
	(S)	3	Carding
	(S)	4	Drawing and Roving
	(S)	5	Combing
	(S)	6	Spinning and Twisting
	(SW)	7	Winding and Reeling
	(S)	8	Spinning Calculations
	(SWD)	9	Raw Materials
	(SW)	10	Mathematics
	(S)	11	Textile Science
	(SW)	12	Textile Mechanics
	(SW)	13	Textile Statistics
	(S)	14	Textile Testing (Fibres & Yarn)
	(S)	15	General Textiles for Spinning Personnel
	(S)	16	Weaving Knowledge for Spinning Personnel
	(S)	17	Advanced Spinning Knowledge
	(W)	18	Yarn Preparation for weaving
	(W)	19	Weaving
	(W)	20	Fabric Structures (Woven)
	(W)	21	Weaving Calculations
	(W)	22	Textile Testing (Yarn/Fabrics)
	(W)	23	Fabric Analysis
	(W)	24	General Textiles for Weaving Personnel
	(W)	25	Fabric Structures and Analysis
	(W)	26	Advanced Weaving Knowledge
	(D)	27	Inorganic and Physical Chemistry
	(D)	28	Physics
	(D)	29	Chemistry Organic
	(D)	30	Textile Bleaching
	(D)	31	Textile Dyeing
	(D)	32	Textile Printing
	(D)	33	Textile Finishing
	(D)	34	Inorganic and Physical Chemistry

Textile subject	(D)	35	Organic Chemistry
	(D)	36	Chemical Textile Testing
	(D)	37	Textile Chemistry
	(D)	38	Advanced Textile Dyeing
	(D)	39	Advanced Textile Printing
	(D)	40	Advanced Textile Finishing
	(D)	41	Colour Physics and Chemistry of Dyes
	(M)	42	Basic Engineering Knowledge
	(M)	43	Engineering Workshop Practice
	(M)	44	Engineering Drawing
	(M)	45	Science and Calculations

Note : S = subject for spinning personnel
W = " " weaving "
D = " " dyeing, printing and finishing personnel
M = " " mechanical "

TRAINING COURSE PRESENTATION

<u>Course</u>	<u>No. of times held</u>	<u>Attendance</u>			<u>May-days</u>
		<u>Called</u>	<u>Attended</u>	<u>%</u>	
1. <u>SPINNING</u>					
- <u>Management</u>					
a. Opening & cleaning	20	633	521	82	5210
b. Carding & drawing	16	536	474	88	4740
c. Simplex	18	431	283	66	2830
d. Ring spinning	16	396	326	82	3260
e. Combing	1	20	11	55	110
f. Health & safety	2	44	19	43	57
g. Production control	1	20	13	65	65
h. Factory management for Chief Executives	4	98	89	91	890
i. Textile technology for Labour leaders	2	54	54	100	162
	<u>80</u>	<u>2232</u>	<u>1790</u>	<u>80</u>	<u>17,324</u>
- <u>Skilled Workers</u>					
a. Opening & cleaning	7		416		2496
b. Carding & drawing	9		428		2996
c. Simplex	7		393		1965
d. Ring spinning	12		392		1960
	<u>35</u>		<u>1629</u>		<u>9417</u>
Total:-	<u>115</u>		<u>3419</u>	<u>89</u>	<u>26741</u>

2. WEAVING

- Management

a. Pirn winding & warping	9	93	79	85	395
b. Pirn winding, warping & sizing	5	85	55	65	536
c. Sizing	5	85	64	76	256
d. Fabric defects, cloth inspection, process control, shuttles & their maintenance	8	131	77	59	522
e. Loom maintenance and settings.	7	33	31	94	165
f. Fabric structure	7	115	81	70	1122
g. Jacquards & calculations	6	113	49	43	335
h. Fabric structure- Jacquards	3	59	28	48	426
	<u>50</u>	<u>714</u>	<u>464</u>	<u>65</u>	<u>3757</u>

- Skilled Workers

a. Sakamoto automatic looms weft motions	12	132	103	78	1194
b. Sakamoto automatic looms-primary motions	4	44	36	82	405
c. Loom maintenance & settings	9	103	77	75	478
	<u>25</u>	<u>279</u>	<u>216</u>	<u>77</u>	<u>2077</u>
TOTAL:-	<u>75</u>	<u>993</u>	<u>680</u>	<u>68</u>	<u>5834</u>

3. DYEING, PRINTING & FINISHING

- Management

a. Bleaching & Mercerisation	8	130	121	93	2268
b. Dyeing Technology (I)	6	130	104	80	2201
c. " " (II)	5	108	74	69	1539
d. Printing Technology(I)	5	108	85	79	1660
e. " " (II)	5	108	74	69	1395
f. Finishing Technology	2	54	20	37	200

31	638	478	75	9263
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- Skilled Workers

a. Preparation for Dyeing	31	-	457	2742
b. Dyeing	23	-	377	2262
c. Printing	6	-	97	549
d. Finishing	7	-	107	535

67	1541	1038	67	6088
	<u>weighted average</u>			

TOTAL:-	98	2179	1516	70	15351
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Grand Total

Management	161	3584	2732	76	30254
Skilled Worker	127	3449	2383	84	17593
TOTAL:-	288	7033	5615	80	47847

APPENDIX - 9

S E M I N A R S

<u>Subject</u>	<u>Duration</u>	<u>Date</u>	<u>No. of Participants attended</u>
1. Potentialities and prospects of the local textile finishing industry.	1 day	Nov. '79	38
2. Weaving-Preliminary survey of 16 selected mills in BTMC	1 day	Jun. '80	100
3. Spinning training program - General Managers	1 day	Jul. '80	10
4. Difficulties in dyeing and finishing mills	1 day	May. '81	34
5. Cotton/Polyester processing	2 days	Nov. '81	115
6. Spinning - Role of labour leaders	1 day	Dec. '81	20
		TOTAL:-	<u>317</u>

UNIDO Personnel in Project

<u>Post No.</u>	<u>Post Description</u>	<u>Name & Nationality</u>	<u>Arrival</u>	<u>Departed</u>	<u>Service</u>
02	Training Centre Adviser	J. Woolfenden, UK	Nov.'79	Apr.'80	6 months
03	Chief Technical Adviser	C. Holstead, UK	Sep.'79	Feb.'84	4 yrs.6 mths.
04	Spinning Adviser(Trg)	R. Flaherty, UK	Feb.'80	Feb.'84	4 yrs.
05	Spinning Adviser	B. Jackson, UK	Apr.'80	Mar.'84	3 yrs.
06	Spinning Adviser	R. Ashton, UK	Aug.'81	Feb.'84	2 yrs.7 mths.
07	Weaving Adviser(Trg)	D. Jayawardana, Sri Lanka	Mar.'80	Mar.'83	3 yrs.
08	Weaving Adviser	J. Redmond, UK.	Oct.'79	Sept'83	4 yrs.
09	Bleaching, Dyeing & Finishing Adviser(Trg)	W. M. Walid, USA	Aug.'79	Mar.'83	3 yrs.3 mths.
10.	Bleaching, Dyeing & Finishing Adviser	A.S.A. Hassan, Egypt.	Feb.'79	Jan.'83	4 yrs.
11.	Textile Mill Machinery and Spare Parts Adviser	A. Kolozymski, Poland.	Oct.'79	Sep.'80	1 yr.
12.	Workshop Engineering Adviser	G.F.van Lantvliet, The Netherlands	Dec.'81	Feb.'84	2 yrs.2 mths.

APPENDIX-11LOCALLY RECRUITED PERSONNEL

<u>Sl.No.</u>	<u>Name of Staff members</u>	<u>Designation</u>	<u>Date of Joining</u>	<u>Date Departed</u>	<u>Total Service</u>
1.	J. C. BARMAN	Senior Secretary	01.12.1979	30.9.1981	1 Yr. 10 months
2.	M. IMDADUL HAQUE	Senior Secretary	10.11.1981	29.2.1984	2 Yrs. 4 months
3.	MOHAMMAD NISAR	Clerk/Typist	16.07.1979	29.2.1984	4 Yrs. 8 months
4.	M. LUTFOR RAHMAN	Clerk/Typist	01.01.1980	30.4.1980	4 Months
5.	MD. HESHAMUDDIN	Clerk/Typist	01.07.1980	29.2.1984	3 Yrs. 8 months
6.	SK. KARAM HUSSAIN	Driver	01.07.1979	29.2.1984	4 Yrs. 8 months
7.	ABDUR RAHIM	Driver	01.09.1979	30.11.1983	4 Yrs. 3 months
8.	HEMAYETUDDIN KHAN	Driver	01.11.1979	29.2.1984	4 Yrs. 4 months
9.	SHAHID MIAH	Driver	01.12.1979	30.11.1983	4 Yrs.
10.	IDRIS MIAH	Driver	01.12.1979	31.12.1983	4 Yrs. 1 month
11.	MD. MUJIBUL HAQUE	Driver	11.11.1981	31.12.1983	2 Yrs. 2 months
12.	MD. NAWSHER ALI	Driver	26.02.1980	06.2.1983	2 Yrs. 10 months
13.	MD. KHALILUR RAHMAN	Driver	16.01.1980	30.11.1982	2 Yrs. 11 months

