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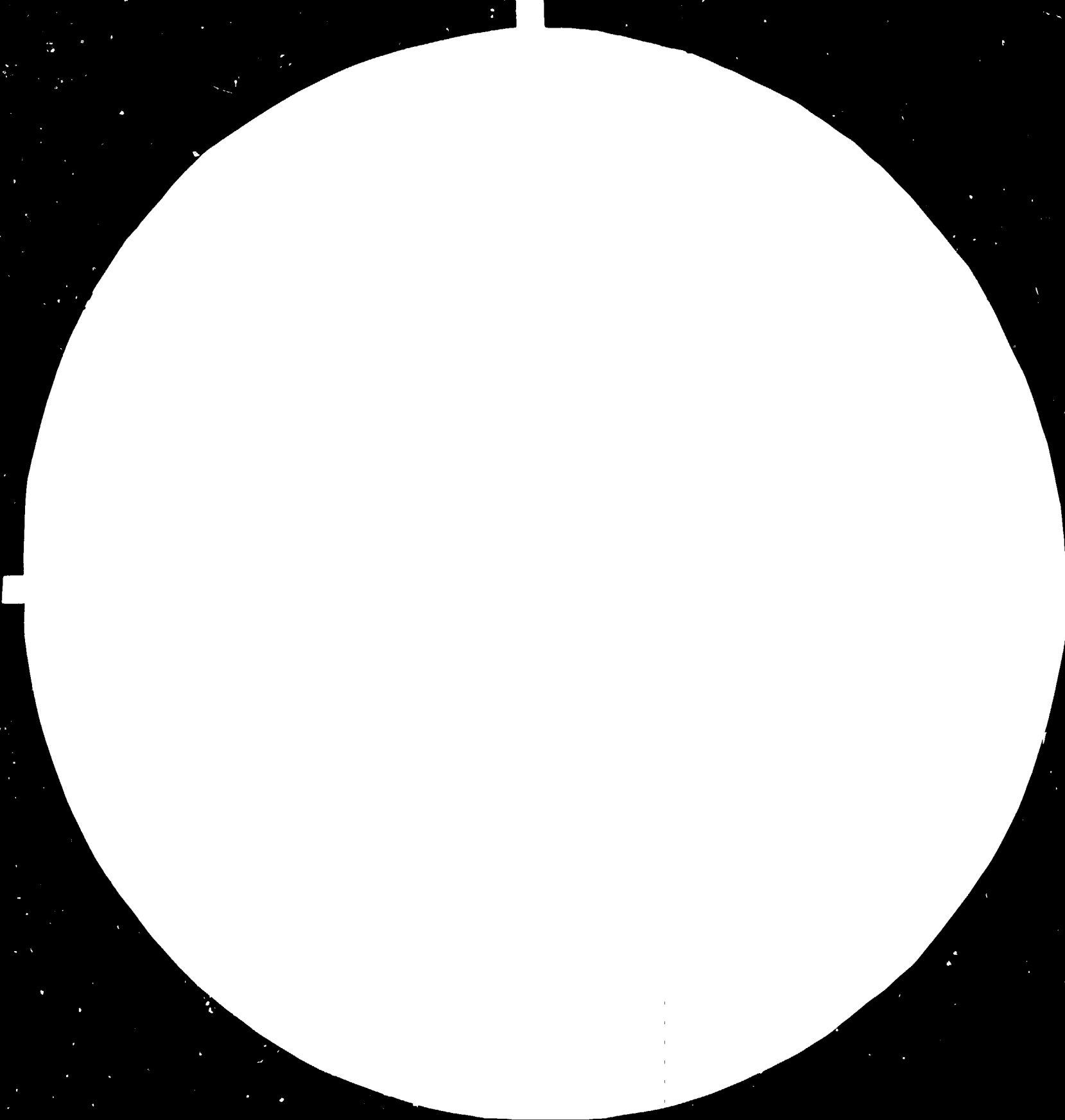

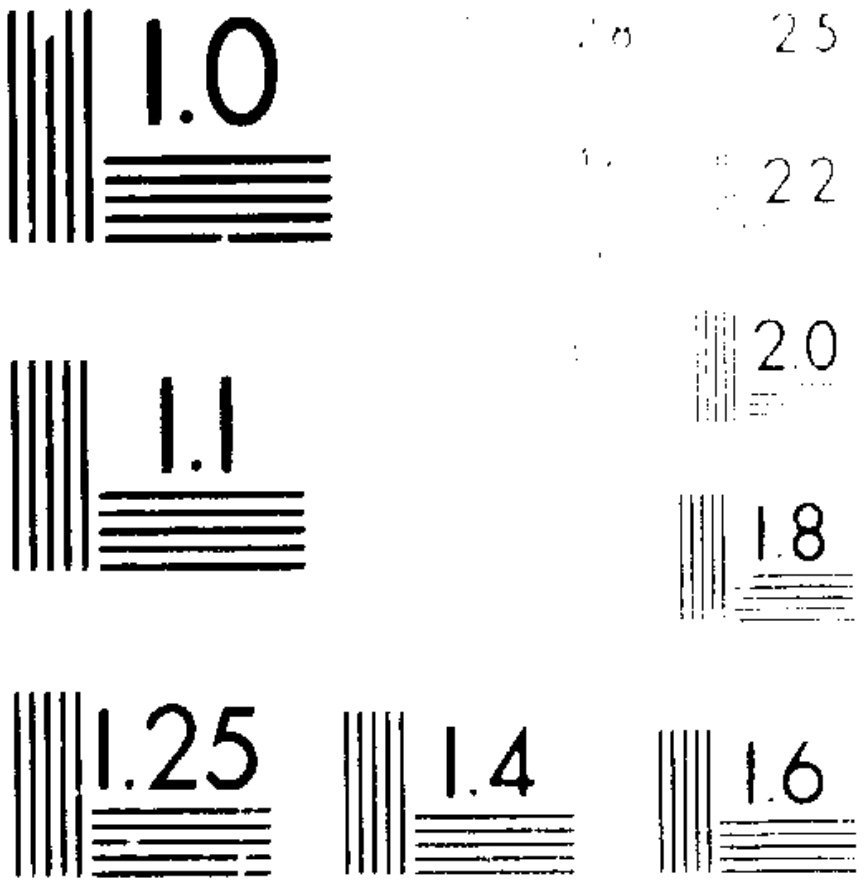
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CENTRAL TESTING LABORATORIES FOR

JUTE GOODS

UNIDO/TF/BGD

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 Programme.

Based on the work of G. F. Atkinson,
Adviser on quality control

United Nations Industrial Development Organization
Vienna

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Contents

Glossary

WIRA	Wool Industries Research Association.
LIRA	Lambeg Industrial Research Association.
IWS	International Wool Secretariat.
TNO	Organisation for Applied Research (Holland).
PERA	Production Engineering Research Association.
BJRI	Bangladesh Jute Research Institute.
BCSIR	Bangladesh Council for Scientific and Industrial Research.
Yarn count	The weight per unit length of yarns. In jute it is the weight, lb, of 14400 yd. It is thus a measure of the "thickness" of a yarn - the greater the count, the thicker is the yarn.
Secondary backing	A plain-weave jute cloth, usually 168 g/m^2, fixed to the back of tufted carpet by adhesive to give stability and weight and up-grade the appearance. Often up to 4 or 5 m wide.
B Twill bag	A heavy twill sack of about 1 kg in weight, usually.
BDSI	Bangladesh Standard Institute.
ISI	Indian Standards Institute.
BSI	British Standards Institute.
ASTM	American Society for Testing Materials.
PSI	Pakistan Standards Institute.
S.G.S.	Societe General Surveillance (inspection agency).
BJMC	Bangladesh Jute Mills Corporation.

INTRODUCTION

The project was approved on December 1981 and field work began in September 1982. The duration of the project was planned to be two years but this was extended by six months in 1983 to compensate for delays in implementation.

The final UNDP budget was $815,036 and the contribution from the BGD Government was $420,000 (in kind). The project number was DP/BGD/79/030/A/01/37.

A. Development objective

The primary objective was to improve the competitive position of the Bangladesh jute industry in world market by control of the quality of exported jute goods and so increase foreign exchange earnings.

B. Immediate objective

The immediate objective was to enable the Directorate of Inspection for Jute Goods to set up three central laboratories for testing finished jute goods. These would carry out physical and chemical tests on jute goods in order to ascertain whether the quality of the goods conform to buyers' specifications and then to issue Export Inspection Certificates after the necessary testing.

C. Background and justification

The annual production of jute goods in Bangladesh in recent years has been approx. 0.6m tonnes representing roughly one fifth of the world output. The average jute crop approaches 1 million tonnes each year of which about 60% is used to manufacture yarn, fabric, bags and some other miscellaneous items. The remaining 40% of the crop is exported as raw jute for manufacture elsewhere in the world.

Of the 600,000 tonnes or so which is manufactured in the country little is used on the home market, the remainder is exported worldwide. In Bangladesh exports of jute goods earn about 60% of the total export earnings of the country and, as such, play a vital role in the nation's economy. Jute, in many parts of the world, is facing competition from synthetic fibres (particularly polypropylene) in carpet backing and packaging. In addition jute bags must compete with bulk handling in the developed countries. The Bangladesh industry experienced further difficulties in 1984. Drought early in the season delayed and reduced sowings then in July-September the country was devasted by teasible floods. These factors led to a smaller crop than usual (approx. 720,000 tonnes) and prices escalated rapidly, increasing by a factor of about 2.5, creating financial problems for the mills in the country with some mills claiming to be losing US$ 200 per tonne. Unstable prices of jute encouraged end-users to consider alternative fibres and once a change has been made to a synthetic material it is rare for the end-user to return to jute even when its price falls to more normal levels.

In order to counteract the competition facing jute and to gain the trust of foreign buyers, the Ministry of Jute set up the Directorate of Inspection for Jute Goods in 1978. The chief function of the Directorate is to provide for mandatory preshipment inspection and certification of jute goods. By so doing, the Government will establish effective control over the quality of jute goods prior to shipment.

An outline of the staff structure is given in Annex - 2. It may be seen that the Directorate makes inspections in the mills as well as testing in the laboratory. The present project is concerned briefly with the latter but of course close cooperation between the two wings is essential.

UNDP has provided assistance to the jute industry since 1975 in the areas of production planning, quality control, maintenance and management information systems through project BGD/73/043 - Jute Industries Development. UNDP project BGD/75/043 - Jute Products and BGD/74/048 - Jute Seed Research gave assistance to the jute sector. Various other UN agencies such as World Bank, Overseas Development Agency (U.K.) and the Canadian Development Agency have contributed technical and other assistance to the industry.

D. Outputs

The planned outputs were :

1. Establishment of three central testing laboratories, one each in Dhaka, Khulna and Chittagong.

2. Pre-shipment inspection of all jute products ready for export to ascertain that the quality is in conformity with the buyer's specification.

3. Establishment of appropriate export standards for jute products.

4. Issuing Export Inspection Certificates for tested jute products.

5. Conducting further tests in cases of complaint or claims from buyers regarding specifications, quality, quantity, etc.

6. Establishment of a channel for technical communications between the testing laboratories and the industry.

E. Training

Five fellowships of 2-3 months duration were awarded to the Assistant Directors and engineers and a study tour of 6 weeks was undertaken by the Director. In addition, there was continuous on-the-job training in the installation and use of textile testing equipment. A course on testing was provided for the staff of the Directorate and quality control workshops for industry were conducted. The on-the-job training has been only partially successful sine the laboratories are not fully staffed yet. A manual of test methods to be used in the Directorate and the industry has been written in order to standardise the mill's and the Directorate's testing techniques. Another manual on process control is to be presented by the third quarter of 1985. A third manual illustrating cloth faults will be prepared by counterpart staff.

F. Equipment and buildings

The equipment was up to specification and, with few exceptions, arrived safely and was installed competently by the Directorate's engineers. There is no question that in a project of this type early fellowships in the supplier's premises are extremely valuable to overcome the inevitable small problems arise during installation and commissioning of equipment.

By the second half of the project the laboratory buildings were 99% complete though even yet a temporary power line must be replaced by a permenent one at Dhaka.

The equipment has been formally handed over to the Government of Bangladesh.

A sack-dro[illegible]ter (P.O. 15/4/01056) is awaited and will be received by the Director of the Directorate of Inspection for Jute Goods. Three yarn regularity meters are to be specially made at Napier College, Edinburgh, U.K. at a cost of approximately $30,000 (a provision for this was made in Budget Revision F). These are expected to be ready by the end of 1985.

G. Recommendations

To the Government of Bangladesh

1. Recruitment of a deputy director and junior staff should be undertaken as speedily as possible. This is now the major impediment to progress in this project.

2. Final work for the buildings i.e. provision of a permanent power line to Dhaka, should be begun immediately.

3. The adviser should return to BGD in the third quarter of 1985 to help to train the junior testing staff of the laboratory.

4. When training is complete the laboratories should be given a 6 - month period to overcome minor problems before certification begins.

5. Certification of one selected product should be programmed to begin in 1986.

6. A Deputy Director should be included in the staff of each laboratory to oversee the two wings of the Directorate.

7. For on-going support consideration should be given to short annual visits by an experienced jute technologist for a number of years. The Government must realise that quality certification is a major task on the scale envisaged. This would help to consolidate and sustain the success of the Directorate.

Recommendations to the Directorate of Inspection

1. In the short-term i.e.up to September 1985 or thereabouts, the Assistant Directors in charge of the laboratories should gain as much practical experience as possible by carrying out all the necessary tests themselves.

2. Cooperation with other organisations in related fields (BJRI, BDSI, BTL, SGS etc.) should be fostered but the prime need in this respect is for good relations with the industry.

Recommendations to UNDP/UNIDO

1. To provide support in the initial critical years of pre-shipment inspection and certification UNDP/UNIDO should provide the Directorate with the services of a jute technologist to consolidate their progress and recommend future activities.

CHAPTER - I

ACTIVITIES AND OUTPUTS

A. Laboratory buildings

The Bangladesh Government have constructed 3 identical buildings to house the Inspectorate's test laboratories in the main jute manufacturing regions. These are situated at Dhaka, the capital city, at Khulna, 145 km to the south west and Chittagong 220 km to the south east.

The buildings are two-storied with the testing laboratories occupying 290m^2 on the ground floor and offices for the field inspection staff on the upper floor. Each has sufficient ground for expansion and the design of the building allows for an additional floor to be built in the future.

International standards require testing to be carried on in areas climatically controlled to 65% r.h. at 20° or 27°C. Conditioning to these levels requires expensive equipment and the building should strictly be designed around the conditioned test laboratories. To achieve the best possible control the rooms should be windowless and well-insulated from the external ambient atmosphere. The design of the building was for conventional laboratory use and it may be found during that over the whole yearly cycle controlled conditions cannot be maintained. If this proves to be so, some re-construction may be necessary, even to the extent of bricking up the windows.

The buildings were scheduled to be ready by December 1982 but delays in construction prevented them being completed until June 1983. By that date building was finished and purpose-built furniture was installed by September. There followed further delays in the provision of water and electricity supplies and it was not until July 1984 that all services were available at all locations.

One location (Dhaka) still has only a temporary 220V and 440V electricity supply which is adequate at the moment but steps are in hand to provide a permanent link to the Bangladesh Power Development Board's lines.

B. Equipment

1. Delivery

Standard textile testing and general laboratory equipment was purchased at a cost of $440,000 from suppliers in Europe, America and Japan.[4]

Experience showed that the lead time in most cases was about six months even with air transportation. In the project document it was anticipated that this would only be two to three months.

All the items of equipment matched their specifications and, with a few minor exceptions, arrived safely. Breakages were mainly in glassware and resulted from insufficient packing chiefly by one American supplier.

Spare parts and extra glassware were purchased to provide the Directorate with sufficient back-up for the next few years. Solvents, acids and other chemicals are available locally.

2. Installation

As equipment arrived it was stored until the laboratory buildings were ready. The equipment was then delivered to each laboratory where the Assistant Director was assisted in checking and inspecting each items. This gave them confidence in handling what is, in some cases quite delicate electronic and glass items. Unfortunately there was a hiatus of several months between the receipt of the equipment at the laboratory equipment and the electrical connections being made.

Regretably much of the equipment had to be stored in packing cases during the rainy season and some items had become badly rusted, necessitating a considerable amount of work before they were back in working order.

Some trouble was experienced with the electronic weighing devices on the Goodbrand drying ovens and these have been sent back to the maker for repair. In general the other electronic instruments have been satisfactory, only requiring one or two fuses to be replaced. Those suppliers who had to replace parts did so promptly without cost to the project.

The installation of the equipment was greatly helped by the two instrument engineers who put the training they received on their fellowships with selected suppliers of the equipment for the project to good use. The installation of some items, e.g. the air-conditioning units, was quite demanding but the engineers performed well.

3. Calibration and maintenance of equipment

Calibration of textile testing equipment to ensure the accuracy of the test is necessary at regular intervals. To this end sets of standard weights have been provided for calibrating the important tensile testing machines and full instruction was given to the engineers and assistant directors with suggestions for maintaining objective evidence that calibration is done in a logical and timely manner.

The adviser found that the moisture meters which were in use in the industry were not being used correctly due to a mistaken understanding of the calibrated scale. The meters are calibrated in moisture regain while they were being used on the assumption that they measured moisture content. This overestimated of the measurement of moisture levels during processing by as much as 5%.

On the subject of maintenance and calibration mention should be made at this point, of an instrument repair and calibration service which the Directorate is now in a position to provide to the industry. The service is operated by the instrument engineers who acquired their expertise on their fellowships and training during the installation of the equipment for the laboratories. This service is being used by the industry and is expected to grow in the future. This will benefit the jute mills because it became apparent during the adviser's tour early in the project that much of the testing equipment in the mills was in poor shape.

C. Establishment of three laboratories

By providing buildings and equipment output (1) of the project "establishment of three testing laboratories at Dhaka, Khulna and Chittagong" can only be said to have been achieved only in part. Until the laboratories are fully staffed and operational they cannot be said to be "established".

1. Counterparts

One of the chief counterparts - the Deputy Director with overall responsibility for the testing laboratories - resigned from the Directorate in March 1984 at a time when his presence was essential. Regretably, this post is still vacant almost 12 months later. It is strongly recommended that the Government remedy this at the earliest opportunity.

The absence of the Deputy Director has had a detrimental effect upon the work of the project. The Assistant Directors (laboratory managers) are relatively inexperienced and require the support and guidance of the Deputy Director in the next few months. In a developed country a laboratory manager would be expected to have at least 15 years testing experience, 5 of which would have been in a supervisory capacity.

While recruitment of suitably qualified technical staff is not easy in Bangladesh a good Deputy Director is, in the adviser's opinion, vital to the success of the Directorate.

To give the new Deputy Director experience and career development, the project has provision for a 6-week study tour for him at testing establishments in Europe.

2. Chief counterparts

Although the Directorate has been in existence since 1980 it is only when a full-testing service and certification can begin will it have a real impact on the jute industry of Bangladesh. To achieve this, stability of the senior counterparts, especially the Director, should be ensure. The next 12-24 months will be critical for the Directorate and a stable management structure is essential to achieve success.

3. Junior staff

Governmental rules of procedure for recruitment are protracted and it is unlikely that the full complement of junior testing staff will be recruited before the last quarter of 1985. The adviser had hoped to supervise their training but this proved impossible and will require a return visit of 6-8 weeks to fulfil this obligation as soon as all the junior staff are on site.

4. Assistant Directors current activities

Until all the staff are available, the Assistant Directors are carrying out a limited amount of testing for the jute mills of Bangladesh. This is being done on an ad hoc basis but will, nevertheless, keep the facilities offered by the Directorate before the mills. It also gives the Assistant Directors experience of dealing with routine enquiries from the mills. It is strongly recommended that the Directorate should encourage the mills to make more use of the test facilities available.

D. Training

1. Laboratory training

While the equipment was being installed the Assistant Directors and the engineers were given instruction on the following subjects :

- the importance of cleanliness and tidy work habits
- safety in handling chemicals
- principles behind each test
- use of the equipment

A more formal course of training was given to the Assistant Directors by the adviser and consultant in 1984. As the course proceeded it confirmed that the Assistant Directors, through no fault of their own, lack testing experience. During this training course the emphasis was placed on the practicalities of testing with use being made of job-breakdown. It was repeatedly emphasised that the Assistant Directors should consolidate their new-found knowledge by carrying out as much testing as they could over the next few months. A testing regimen was proposed but this was not followed. The Directorate can only award Export Inspection Certificates with confidence if it has technically-competent staff.

2. Fellowships

Fellowships were undertaken by the Assistant Directors in European testing and educational establishments. The overall design of these was satisfactory in achieving the object of giving the men further training in textile testing. Understandably in a 3-month fellowship embracing locations some parts of their course were more valuable than others.

There was, however, a more serious defect in regard to timing. It would, in the adviser's view, been more useful to the Assistant Directors if they had had some months of testing in their own laboratory environment

before the fellowships then they could have regarded their fellowships as more positive sources of technical education. Unfortunately the timing of the whole project precluded this Two instrument engineers were awarded fellowships in the maintenance of textile testing instruments in the premises of selected suppliers of equipment. These proved most beneficial as will be explained later.

3. Study tour

The Director underwent a study tour in Europe, America and Egypt to visit testing and certifying bodies. The object was to give the Director exposure to various systems of administration and certification.

A more limited study tour is scheduled for the Deputy Director when he is recruited.

4. Workshops on in-process quality control

During the adviser's tour in 1982/83 it became clear that further training in quality control for the manufacturing process would be of benefit to the people engaged in mill quality control departments. To provide some assistance a series of workshops were conducted by the adviser and the consultant during the latter's first mission to Bangladesh in 1983.

The workshops were well attended and later the proceedings were published and distributed throughout the industry.

5. Seminar on sampling and specifications

During the consultant's second mission in 1984, a one-day seminar for the Assistant Directors (laboratory and field) and Examiners on the special problems associated with taking representitive samples from a population were discussed and draft sampling schemes for secondary backing and B Twill bags were examined.

6. Training manuals

A manual of test methods for jute yarns, fabrics and bags has been provided. This was prepared as a result of the realisation that wide discrepancies existed in the test methods used in different mills, moreover there were several instances of equipment being used in the wrong manner. Since a necessary part of any certification laboratory is a reference book of official tests and as such required to be written in any case, it was thought that wide-spread dissimination of the manual throughout the industry would go a long way to overcome differences in testing techniques in the mills. The manual comprises some 47 test methods for physical and chemical tests on jute yarns, fabrics, bags and carpets.

Another manual to be ready by late 1985, will cover quality control methods for the processes of jute spinning and weaving. The rationale for this was to try, by means of a practically-based book, to plug the gaps in the knowledge of the quality controllers in the industry which were manifest at the in-process quality control workshops held in July 1983 and to introduce common systems for making process checks. It is planned to distribute 500 copies in the industry.

E. Export Certification

Without the full testing facilities of the three laboratories it was impossible to make real progress for this output.

It is recommended that no certificates be issued for 6 months after testing has begun. It is vital to give the laboratories time to settle down and to overcome the many day-to-day difficulties which arise in the early life of a young organisation. For the future credibility of the Directorate sound, steady progress, taking one product at a time for certification is desirable.

The Government of Bangladesh has prepared an Ordinance for certification and preshipment inspection whereby certification is mandatory and no goods will be permitted to leave the country until the Directorate has completed their tests. In the Ordinance there are procedures for re-inspections and arbitration if goods have been debarred from export.

The Directorate has a full set of Standards (BDSI, ISI, BSI, ASTM, PSI) and as the opportunity has arisen the Assistant Directors have been shown how to use these. It is only through frequent use that the interpretation of standards and specifications becomes familiar and unfortunately until volume testing is in progress this part of the Assistant Director's duties cannot be fully implemented.

A technical report "Guidelines for a Code of Practice for Export-Worthiness Certification" was written by the adviser.

F. Sampling and Testing Procedures

1. Sampling

The seminar mentioned earlier was held for the Assistant Directors and the Examiners of the Directorate. Draft sampling schemes for secondary carpet backing and jute bags were put forward. Instruction has also been given in sampling yarns.

2. Testing procedures

By exposure-training and a short course, instruction has been given on how to conduct the necessary tests for certification. Prolonged "hands-on" experience is now needed by the Assistant Directors.

The Directorate, assisted by the adviser has prepared a manual of tests methods for the jute industry. In the jute mills standard test methods were not being followed making it impossible to compare the result of one mill with another or, more importantly, a mill's results with those of their customers. To remedy this the manual was prepared and it will

form the standard tests to be used in the Directorate's laboratories and it is hoped, throughout the industry. It is based on the methods of traceable standards from BDSI, PSI, ISI, ASTM and BSI.

To facilitate testing in the laboratories a series of test forms have been designed.

G. Establishment of export standards

The only activity related to this output has been the provision of a technical report "Guidlines for preparing specifications". The adviser has given the Director of the Directorate informal suggestions on how this output might be realised.

The standards and specifications which will be used in the Directorate - national, customer's or self-composed - must verify clearly the product's conformity with the relevant parts of the standard in such a manner that the manufacturer and the buyer are satisfied. In this way, the Directorate can claim, legitimately, to minimise the risk to the customer, thus upholding the reputation of the Bangladesh industry. It was observed by the adviser and the consultant that, while the majority of mills in the country were producing goods in conformity with standards a few mills were not and it is these very mills which impair the reputation of the remainder.

Mandatory preshipment inspection is the essential part of the whole project but, without abandoning their professional integrity and impartiality the Directorate should render all the practical assistance it can to the industry in its vital exporting role.

H. Testing in relation to complaints

This aspect could not be implemented because of the lack of testing facilities. It is one facet of the Directorate's work where extra care is required since the opinions expressed by the authoritative Bangladesh body in relation to jute goods' quality may be quoted in a court of law.

I. Channels of communication with industry

When the adviser was visiting the mills early in the project there was, in some mills, a feeling of suspicion about the Directorate. Some saw it as yet another beaurocratic hurdle others as a "policeman". Fortunately this attitude seems to have disappeared and relations now are good.

Three activities have led to this :

- the week-by-week visits from the field inspectors have gradually built up mutual trust and co-operation

- the quality control workshops conducted by the Directorate with the help of the international staff

- as the laboratories have become ready and mill managers have seen the facilities for testing which can be put at their disposal they have come to appreciate the practical help the Directorate can give.

In late 1984, the Directorate held six 1-day meetings with the industry to try to identify shortcomings, if any, in the Directorate's relations with the industry. These were well attended and clearly showed that the attitude had changed and that now the industry saw the Directorate as having a positive, rather than a negative, role.

CHAPTER - II

ACHIEVEMENT OF IMMEDIATE OBJECTIVES

A. To carry out physical and chemical tests on jute goods to ascertain their quality in relation to specification.

1. The air-conditioned laboratories have been fully equiped to make on the physical and chemical tests on jute goods which are specified in national and international standards.

2. The Director has undertaken a study tour to see systems of administration, testing and certification to broaden his outlook on testing etc.

3. The Assistant Directors have by means of exposure training, courses and fellowships have gained a knowledge of the tests required for process control in jute manufacture and testing of jute goods.

4. Instrument engineers, through exposure training and fellowships, have a knowledge of maintenance and calibration of jute testing equipment.

5. The laboratories are carrying out limited testing for the industry.

6. Full use of the laboratories must await the recruitment of all the staff needed for volume testing.

7. It is estimated that volume testing may begin in January 1986.

Thus it may be concluded that this immediate objective has been only partially reached. The infrastructure has been made available but the delay in staffing has not permitted the laboratories to come on stream.

B. To issue export certificates after the necessary tests have been done.

In the absence of working laboratories it has been impossible to reach this objective. If volume testing can begin in January 1986 as it is hoped then in July 1986 the Directorate should be in a position to begin certification prior to export.

CHAPTER - III

UTILISATION OF RESULTS

A. The Central Testing Laboratories

Since the three laboratories became operational, albeit on a small scale, late in 1984 growing use has been made of the test facilities on offer to the jute mills. Because of personnel constraints the concrete results, in terms of test reports, must inevitably be small for the new few months until a full staff is available.

The imposition of mandatory requirements for preshipment inspection by the Government will, in itself, ensure that in the future the laboratories of the Directorate will be fully used. However, it is unlikely that all jute products will be subject to the Ordinance for preshipment inspection and the extent of voluntary use of the facilities for those products will depend to a large extent on the reputation the Directorate can build up in its initial years of operation.

The successful development of the Directorate depends upon its staff acquiring a good image in the industry. The staff must clearly be seen as helpful, knowledgeable technologists who can assist the industry to reach the quality standards needed for certification. If a disciplinariam mentality develops no mill will use the facilities of the laboratory on a voluntary, self-help basis and the Directorate will be left with the duty of certification as its only justification.

Through a study tour and five fellowships and exposure training a cadre of senior managerial technologists has been provided. On their shoulders rests the extent to which the project will be used.

B. Industry-wide repair and calibration service

The Directorate, through its two instrument engineers, has provided a useful service to the industry. It now offers a complete service, repair and calibration facilities for all types of testing equipment used in the mills for quality measurement. In 1982 it was found that many of the testing instruments in the mills were being used incorrectly, particularly the important tensile test machines. This, coupled with serious malfunction and erroneous calibration, has been corrected by this service in several mills.

The Directorate is ideally placed to run short courses on testing for mill quality controllers either in-house or at one of the laboratories. As such it could play an important part in raising quality awareness throughout the country's jute industry.

CHAPTER - IV

CONCLUSIONS

1. The project as a whole

The time allocated to the project was 2 years. This was too short a time in which to achieve all the objectives listed. Certification is not an easy task and in a developed country with a fully developed infrastructure and equipment suppliers on hand it would have taken longer than 2 years to complete the programme. The scope of the project was very wide, embracing not only testing and certification, but development of standards and arbitrating in quality disputes between buyer and seller. For a young organisation the emphasis required to be on fewer outputs until the early steps in certification were taken.

2. The laboratories

The laboratories are generously equipped to cover all the normal testing requirements for jute. To cater for all foreseeable demands on testing it was not easy to strike a balance between expenditure on some items of equipment and the contribution these will make to the successful development of the testing laboratories. This lead to a degree of over-equipment in some instances. Future events however may prove such items to be of great value.

The buildings are spacious and well-sited. The chief testing laboratory requires to be climatically controlled to meet international requirements for textile testing. Temperature and humidity controllers have been installed but have not been run throughout the range of seasons. Some modification to the building may be needed if adequate control cannot be achieved with them. If a similar testing facility is built in the future in Bangladesh, the building should be designed so that the controlled - atmosphere room and the conditioning plant are integrated in the design early in the planning stage.

3. Counterparts

The provision and maintenance of the full complement of counterparts was one of the essential factors for the successful conclusion of the project. It was a disappointment that a key counterpart, the Deputy Director in charge of the laboratories was absent during the last year of the project.

4. Fellowships

It is thought that it would be more productive if the fellowships for the Assistant Directors had been awarded later in the project. By that time the fellows would have had longer exposure to the adviser's program of training and to practical work in their own environment. In this way steps could have been taken in the design of their fellowships to remedy any weaknesses which had emerged. Undoubtedly the fellows benefited from their tour but they have had little opportunity to use their new-found knowledge or pass it on to their subordinates.

The fellowships awarded to the two instrument engineers have already proved most useful not only to the Directorate of Inspection but to the industry.

5. Staffing

Recruitment of junior staff has been slow and cognisance of this possibility should have been taken. This is doubly unfortunate since the laboratories are ready for use and the Assistant Director should be requiring experience of managing their laboratories, building reporting systems and developing managerial skills.

6. Training

The methods of on-the-job training coupled with two short courses have provided the Assistant Directors with a basic knowledge of all the tests which are necessary to ensure that the quality of jute goods matches the customer's specification.

A return visit by the adviser is considered essential in order to assist the Assistant Directors to train their junior staff. A period of 6-8 weeks should suffice.

In the industry as a whole there is a need for instruction and training in quality matters. All the mills have, it is true, quality control departments but not all are effective. The quality control workshops highlighted some of these short-comings and the manuals on process control and testing should help in this regard. The Directorate should become a focal point for quality matters in the jute industry in Bangladesh.

7. Laboratory administration

Each regional office has a field inspection and a laboratory testing wing. Certification will require close co-operation between the two because either may, legitimately, refuse a certificate as a result of their observations. One can foresee a possible source of conflict here when each wing is controlled by men of equal rank. Because of this, and the great importance attached to the granting of Certificate of Export-worthiness, the adviser concludes that each regional office warrants a Deputy Director to take overall charge of the field and laboratory inspections.

The provision of such a Deputy would add to the status of each laboratory and strengthen the position of the Assistant Directors in the field and in the laboratory as well by giving one head in overall charge of the Directorate's activities in each zone.

Annex - 1

Senior Counterpart Staff Of The Directorate
Of Inspection For Jute Goods

1. **Mr. M. S. H. Khan, Director.**

   Overall responsibility for the work of the Directorate; its 7 zonal offices, 3 testing laboratories and its staff of

2. Mr. S. M. Huque, Deputy Director.

   Responsible for all operations of the testing laboratories.

3. Mr. T. K. Biswas, Assistant Director.

   Responsible for all testing in the Chittagong laboratory.

4. Mr. A. Rauf, Assistant Director.

   Responsible for all testing in the Dhaka laboratory.

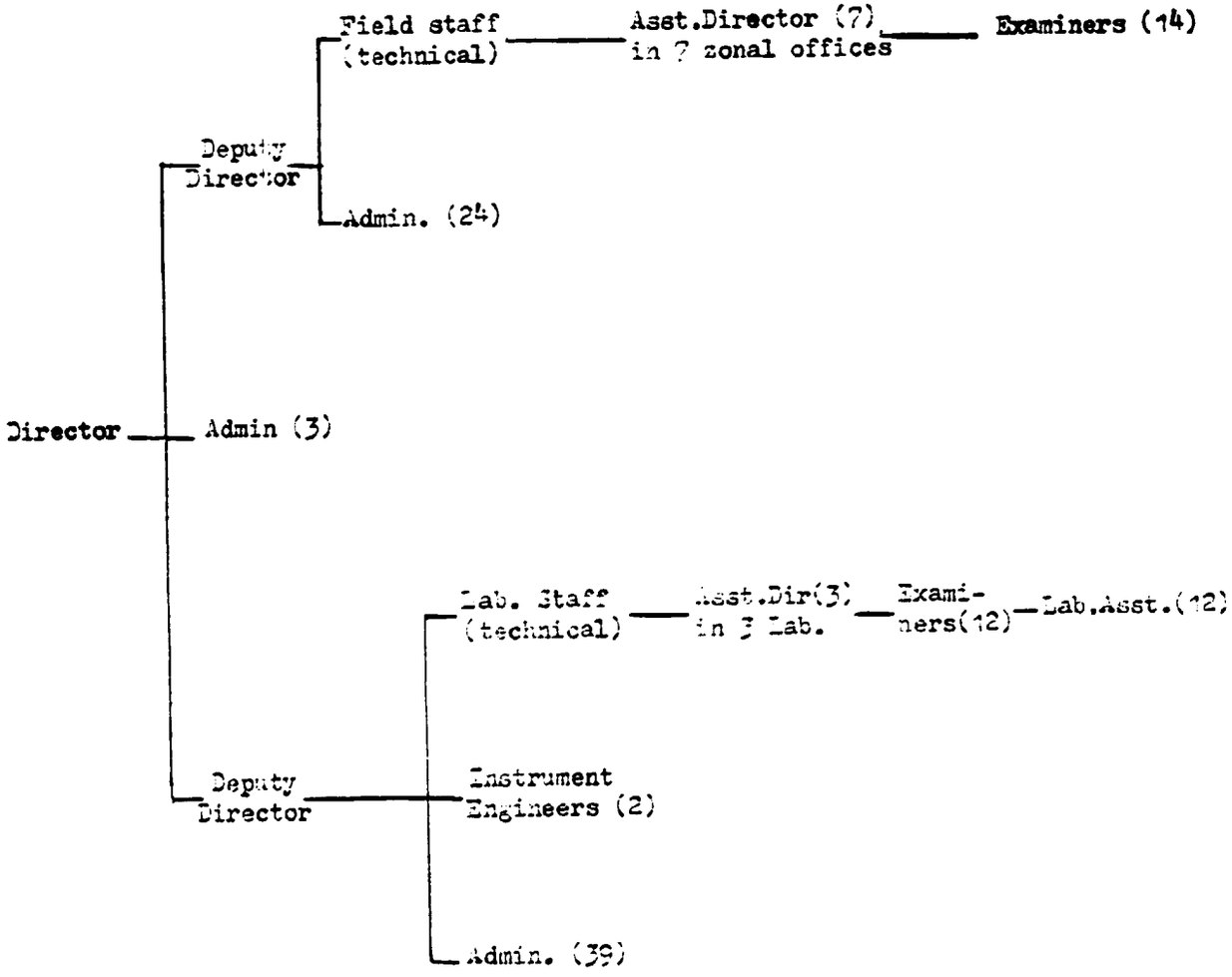
5. Mr. K. M. S. Islam, Assistant Director.

   Responsible for all testing in the Khulna laboratory.

Note Mr. S. M. Huque, Deputy Director left the Directorate in March 1984 to take up another appointment. From that time to the end of the project the post was vacant.

Annex - 2

DIRECTORATE OF INSPECTION FOR JUTE GOODS
STAFF STRUCTURE

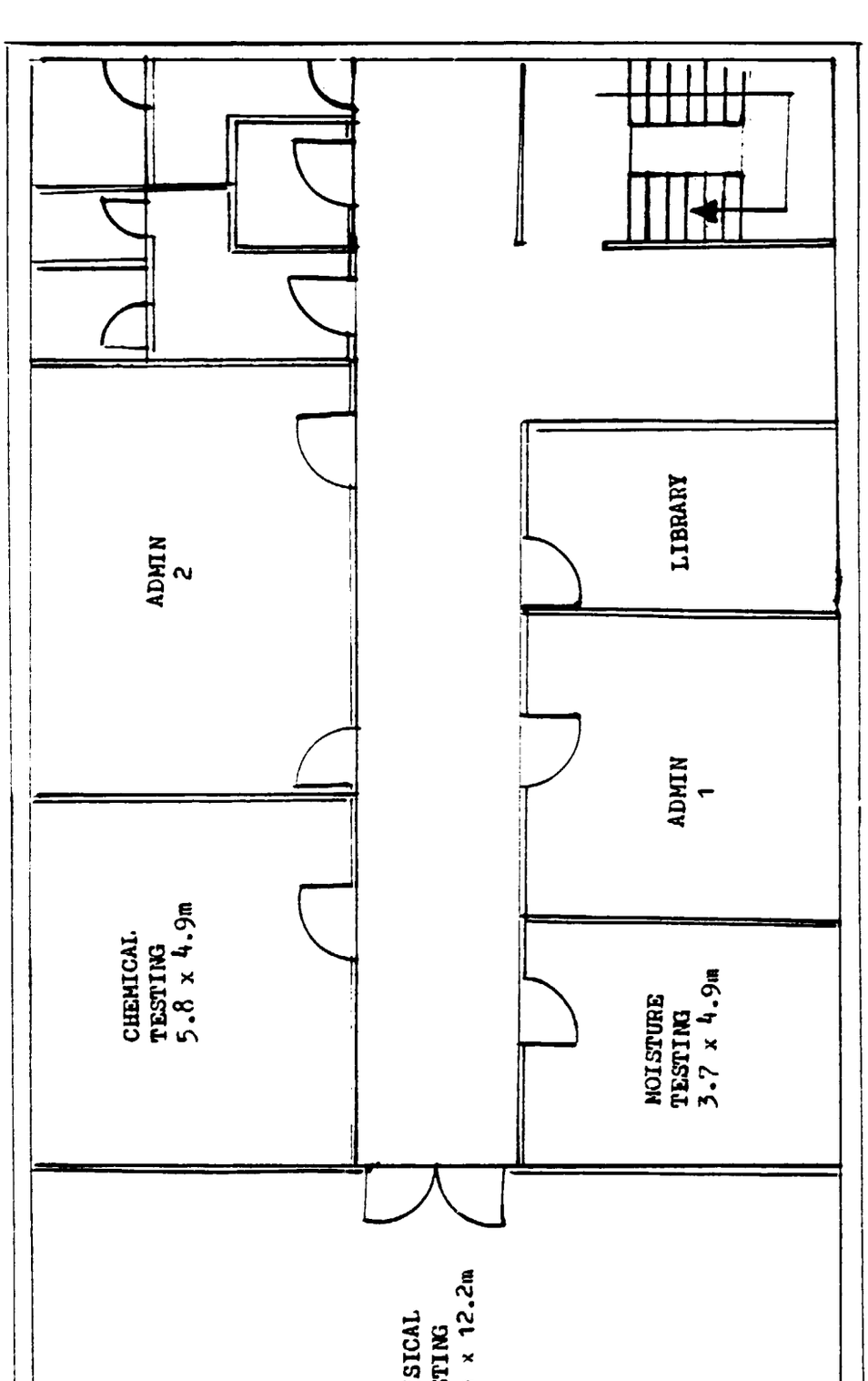


Below the level of Deputy Director :

Technical Staff	50
Admin.	66
	116

Annex - 3

Sketch of laboratory floor plan



Annex - 4

Equipment

Each Laboratory was equipped with the following major items. Additionally, all necessary glass-ware and small laboratory items were supplied.

Description of items	US Dollars
Jute moisture meter, Type JFM I "Aquaboy"	712
Binocular laboratory microscope	816
Crockmeter - Model 255	540
Wira carpet abrasion machine	2821
Wira carpet thickness gauge	1251
Wrap reel	1096
Yarn examining machine	939
Moisture tester Model No.97A	1174
Light fastness tester	2164
Counter scale	780
Viscometer, Redwood No.1	867
Wira rapid oil extractor	1080
Instron Tensile tester Model 1026	14636
Cannon Plain paper copier NP-120	775
PH meter	195
Balance analytical	846
Salinity meter	447
Overhead projector	277
Water still	806
Soxhlet extraction assembly	360
Flash point apparatus	182
Moisture testing oven Model FDA	3928
Standard Model yarn strength tester Model 19E	3192
Model No.8 Twist tester	1383
Goodbrand Model D4 Cloth strength tester	6575
Goodbrand Model P.14 Hand operated bursting strength tester	1623
Shirley Hairiness meter	7083
Yarn friction recorder	3281
Muffle Furnace	500

Description of items	US Dollars
Centrifuge	1278
Air permeability tester	5503
Crimp tester	1102
Wira Dynamic loading machine	3274
Tuft withdrawal tensometer	1323
Balance top pan	1523
Tachometer	158
Dessicating cabinet	216
Thermohygrograph 24 hour	345
Hotplate	235
Ballistic tester	1911
Precision balance	112

Annex - 5

Training Courses

1. Testing Jute Goods

As a supplement to the on-the-job training in the installation and operation of the equipment for the three Assistant Directors (laboratory managers) a more formal course on testing of jute goods was conducted by the consultant and the adviser in 1984, Phase One from 23 July to 07 August Phase Two from 11 August to 16 August.

The curriculum was designed to show the basic principle of each test and its use as a means of assessing the quality of jute goods. The course members were given ample time for hands-on experience. Although the Assistant Directors had a theoretical knowledge of most of the tests they had limited practical experience and they lacked the manual dexterities need to conduct many of the tests. This has been no fault of theirs but is a result of their previous work-experience.

The topics covered were :

Bursting test on cloth

Air permeability of cloth

Size measurement of sacks/bags

Carpet analysis

Carpet abrasion tests

Carpet thickness tests

Dynamic loading test on carpets

Measurement of pile height and weight

Tuft withdrawal force from carpets

Light fastness testing

Rub fastness tests (wet and dry)

Moisture tests -

- Drying oven
- Rapid moisture tests
- Dean and Stark method
- Use of moisture meters

Oil content tests -

- Soxhlet extraction
- WIRA Rapid Oil Method

Stability of emulsions -

- Cylinder method
- Centrifuge method

Oil viscosity (Redwood)

Salinity of water

Measurement of pH

The training sessions were comparitively short but sufficient information was given to the participants to enable them to carry out the majority of routine tests which are needed. They require now, consolidation of their new-found knowledge. This they can only gain through testing jute goods themselves in their own laboratories. A suggested work-programme for this was drawn up by the adviser.

The subjects covered were :

Yarn count from bobbins, cops, spools, fabric

Degree of twist in yarn

Strength and extensibility of yarn

Friction of yarn against steel

Crimp of yarn in cloth

Strength of fabrics -

Strip

Grab

Seam

Measuring threads/inch in cloth

Tear strength of cloth

Mass per unit area of cloth

2. Sampling of jute goods

An in-house seminar was held on 25 August 1984 on "Sampling Jute Goods" for the Assistant Directors (laboratory and field) and the field Inspectors. It was led by the adviser and the consultant.

It was apparent that some difficulty was being experienced in how to draw samples for testing so as to arrive at a result in which the sample could be fairly said to be representitive of the population from which it had been removed.

The one-day seminar comprised a lecture session followed by questions and discussions on the following topics :

1. General statistical theory of sampling variable products. Sampling schemes in Standards and Specifications.

2. Yarn sampling, spools and cops. Numbers required and degrees of accuracy.

3. Sampling secondary backing.

4. Sampling B Twill bags.

3. Workshops on in-process quality control

Two-day workshops were held in the laboratory areas (Dhaka, Chittagong and Khulna) for jute mill managers and quality control staff. They were held in August and September 1983 during the first visit by the consultant and were attended by some 600 people in total.

During the adviser's initial tour of the industry in October 1982 to March 1983 several anomalies were discovered in the quality control laboratories and it was thought that a suitable quality control workshop would be of some help to the mills. Not only might it give some instruction but, it was hoped, it would act as a catalyst and perhaps bring about a fresh mental attitude to quality in the mills.

Ten sessions were presented over the course of two days leaving ample time for discussions and questions.

1. Inaugural session
2. Process control in spinning and winding
3. Quality control on the mill-floor in spinning and winding
4. Laboratory tests of yarns in process
5. Laboratory management (1)
6. Inaugural session
7. In-process quality control in dressing, beaming and weaving
8. Laboratory management (2)
9. Shop-floor control in dressing, beaming and weaving
10. Laboratory tests-fabrics.

The question and answer sessions which followed each paper were lively. Their content showed to the adviser and the consultant that many of the men engaged in quality work need further training and development. The type of question being asked was indicative of a strong desire for knowledge and expertise. Some did not appreciate that free, open discussion with their colleagues would benefit not only themselves but others also.

For the adviser and the consultant the experience was rewarding.

4. Statistics

Following the recommendation of the consultant in his final mission report, a short seminar on statistics was held for the senior staff.

The subjects covered were :

Common statistical parameters (range, S.D. CV etc.)
Frequency distributions.
Gaussian and Poisson distributions.
Specification tolerances.

Annex - 6

Fellowships

In accordance with the project document (activity no.8) three fellowships were awarded to the three Assistant Directors who are in charge of the laboratories. The object was to broaden their experience in textile testing with particular reference to jute. To this end visits to major testing facilities in Europe were organised for them from 05 August 1983 to 27 November 1983.

The Fellows were trained at the following locations :
MIRA, Headingly, Leeds, U.K.
College of Technology, Bell Street, Dundee, U.K.
IWS, Ilkley, Yorkshire, U.K.
James Mackie and Sons Ltd., Albert Foundry, Belfast, U.K.
LIRA, Lisburn, N. Ireland, U.K.
TNO, Delft, Holland.

Since the testing laboratories were to be equipped with expensive machines which required regular and careful maintenance in order to provide accurate, reliable test results, a good standard of skilled maintenance is a prerequisite. This was foreseen when the project was structured and to comply with (activity no.8), fellowships were arranged from 15 July 1983 to 17 September 1983 for two instrument engineers -

Mr. S.C. Sarkar and Mr. A. Azam

The Fellows were given thorough training at :
Instron Limited, High Wycombe, U.K.
Goodbrand-Jeffreys Ltd., Rochdale, U.K.
PERA, Melton Mowbray, U.K.
MIRA, Leeds, U.K.
Shirley Institute, Manchester, U.K.

Annex - 7

Study Tour

A 6-week study tour was arranged for the Director, Directorate of Inspection for Jute Goods. The object was to visit testing facilities to study their organisational systems and inspect equipment.

The itinery was :

Bradford Conditioning House, Bradford, U.K.

Carpet and Rug Institute, Dalton, U.S.A.

Dundee College of Technology, Dundee, U.K.

Directorate of Stores and Clothing, Ministry of Defence Testing Laboratory, Didcot, U.K.

Georgia Institute of Technology, Georgia, U.S.A.

Jute Carpet Backing Council, Dalton, U.S.A.

Napier College, Edinburgh, U.K.

Quality Control Services, London, U.K.

Shirley Institute, Manchester, U.K.

Scottish College of Textiles, Galashiels, U.K.

TNO, Delft, Holland.

Textile Quality Control and Development, Alexandria, Egypt.

WIRA, Leeds, U.K.

The period covered was from 6 April 1984 to 9 May 1984.

Annex - 9

Progress Reports

In accordance with UNIDO requirements the following progress reports were submitted by the due dates :

1.	Six month project progress report	October 1982 - March 1983
2.	Six month project progress report	April 1983 - September 1983
3.	Six month project progress report	October 1983 - March 1984
4.	Six month project progress report	April 1984 - September 1984
5.	Project evaluation report	October 1982 - September 1983
6.	Project evaluation report	October 1983 - September 1984

Two Tripartite Review Meetings were held, the first in November 1983 and the second in October 1984. Minutes of these are available.

Annex - 9

Technical Reports

During the project the following reports were presented to the Government of Bangladesh :

1. A Review of Quality Control in the Bangladesh Jute Industry.

   Based on the work of R.R. Atkinson, Project Adviser.

   This report was written following the adviser's tour of the Bangladesh Jute Mills in 1982 and 1983. It gives an overview of the methods used to measure and control quality, pointing out deficiencies and suggesting ways to overcome these. It highlights the need for training in quality control among quality control staff and line management.

2. Guidelines for Preparing Specifications.

   Based on the work of R.R. Atkinson, Project Adviser.

   As the Directorate of Inspection is a certifying body it will make regular use of standards and specifications from such bodies as BDSI, ISI, BSI, ASTM and others. Cases will arise where no published standard exists and then the Directorate will have to compile its own standards. The Guidelines were written to assist in this matter.

   Chapter headings are -

   Specifications
   Collecting data
   Analysing data
   Preparing the draft standard
   Publication of the draft for comment
   The Final Specification

3. Guidelines for a Code of Practice for Export Worthiness Certification of Jute Goods.

Based on the work of R.R. Atkinson, Project Adviser.

This guide was written to assist the Directorate of Inspection for Jute Goods to introduce certification in a logical, planned manner. It tried to encourage the Directorate to look and plan ahead to the day when certification becomes mandatory for exporting certain jute products. The topics covered were certification schemes, product audits, sampling and surveillance, assessment of control schemes, self-certification, testing routines, reporting, the responsibilities of manufactures and the responsibilities of the Directorate, legal aspects of certification.

4. Setting-up of Quality Control Measures and Establishment of Testing Laboratories.

Based on the work of Mr. E.J. Gordon.

This is the report on the Consultant's first mission in 1983.

The report includes an account of the Consultant's visits to selected jute mills to see the quality control facilities, recommendations for classifying cloth faults, procedures for classifying jute goods in terms of quality and finally discussions on standard test methods. The annexures include the papers presented by the consultant to the In-process Quality Control Workshops held for the industry.

5. Setting-up of Quality Control Measures and the Establishment of Testing Laboratories.

Based on the work of Mr. E.J. Gordon.

This is the report of the consultant's second mission in 1984. The report gives ten recommendations for running the testing laboratories covering such items as staffing, training, care of instruments, transport, statistics. A full statement of the training session for the assistant directors is given along with test methods for yarns, fabrics and carpets covering the tensile, weight and constructional analyses commonly specified for jute goods.

6. Manual of Standard Test Methods.

Based on the work of R.R. Atkinson, Project Adviser.

This is the authorative source for all the test methods to be used in the laboratories of the Directorate of Inspection for Jute Goods. The methods are all based on traceable national standards taken, with modification if necessary, from BDSI, ISI, ASTM, BSI, PSI. The Manual has been given wide-spread distribution in the industry and it is intended that all mills will adopt these Standard Test Methods. This will make a uniform approach to testing possible all over the country.

7. Manual of In-process quality control.

The will be prepared by the adviser and be ready for distribution to the industry by the end of 1985.

8. Manual of cloth faults.

This will be prepared by the Director and his staff and will show faults which will be of sufficient severity to fail preshipment inspection. The manual will be ready by late 1985.

Annex - 10

Company visits

During the life of the project and visits to frequent communication with the industry and related enterprises was considered imperative. The following organisations were visited, the number of visits being given in parenthesis.

1. Jute mills

Ashraf Jute Mills Limited	(1)
Allied Jute Mills Limited	(1)
Alijan Jute Mills Limited	(1)
Alhaj Jute Mills Limited	(1)
A. K. Khan Jute Mills Limited	(1)
Amin Jute Mills Limited	(2)
Anowara Jute Mills Limited	(1)
Ajax Jute Mills Limited	(1)
Afil Jute Mills Limited	(1)
Abdul Maleque Jute Mills Limited	(2)
Ahmed Jutex Limited	(3)
Adamjee Jute Mills Limited	(4)
A.R.A. Jute Mills Limited	(2)
Ahad Jute Mills Limited	(1)
Baghdad-Dhaka Carpet Factory	(1)
Bangladesh Jute Mills Limited	(1)
Co-operative Jute Mills Limited	(1)
Chittagong Jute Manufacturing Company Limited	(1)
Crescent Jute Mills Limited	(2)
Carpeting Jute Mills Limited	(2)
Daulatpur Jute Mills Limited	(1)
Dhaka Jute Mills Limited	(1)

Eastern Jute Mills Limited	(1)
Fauzi Chatkal Limited	(1)
Furat-Karnafuli Carpet Factory	(1)
Faridpur Jute Fibres	(2)
Gawsia Jute Mills Limited	(1)
Gul-Ahmed Jute Mills Limited	(1)
Hafiz Jute Mills Limited	(1)
Hossain Jute Mills Limited	(1)
Islam Jute Mills Limited	(2)
Islam Khan Jute Mills Limited	(3)
Janata Jute Mills Limited	(1)
Jessore Jute Mills Limited	(2)
Jute Yarn Spinners Limited	(1)
Jute Spinners Limited	(1)
Karim Jute Mills Limited	(2)
Kohinoor Jute Mills Limited	(1)
Karnafuli Jute Mills Limited	(3)
Kwality Jute Yarn Spinners Limited	(3)
Latif Bawany Jute Mills Limited	(2)
Mashriqui Jute Mills Limited	(2)
Munawar Jute Mills Limited	(1)
Mymensingh Jute Mills Limited	(1)
M. Rahman Jute Mills Limited	(1)
M. M. Jute Mills Limited	(1)
Mohsen Jute Mills Limited	(1)
Mutual Yarn Spinners Limited	(1)

N. Askari Jute Mills Limited	(1)
Nabarun Jute Mills Limited	(2)
Nishat Jute Mills Limited	(1)
National Jute Mills Limited	(1)
Noapar Jute Mills Limited	(1)
New Dhaka Industries Limited	(3)
Pubali Jute Mills Limited	(1)
Platinum Jubilee Jute Mills Limited	(2)
Peoples Jute Mills Limited	(1)
Purbachal Jute Mills Limited	(1)
R. R. Jute Mills Limited	(1)
Sattar Jute Mills Limited	(2)
Star Alkaid Jute Mills Limited	(1)
SKM Jute Mills Limited	(1)
Sultana Jute Mills Limited	(1)
Star Jute Mills Limited	(3)
Sonali Jute Mills Limited	(2)
Specialised Jute Yarn and Twine	(2)
Sonali Ash Limited	(3)
Saleh Carpets	(2)
Shine Pukur Jute Mills Limited	(3)
Sagor Jute Spinners Limited	(1)
Taj Jute Mills Limited	(1)
Transocean Fibres Limited	(1)
UMC Jute Mills Limited	(2)
Usha Jute Spinners Limited	(2)

2. Associated organisations

B J R I	(10)
Bangladesh Jute Spinners Association	(1)
Bangladesh Jute Manufacturers Association	(1)
Bangladesh Jute Mills Corporation (Head Office)	(4)
B J M C Central Laboratory	(1)
Central Test Laboratories	(1)
College of Textile Technology and Engineering	(3)
Juton Project, B C S I R	(1)
Ministry of Jute and Textiles	(8)
S. G. S.	(2)

Annex - 11

Testing facilities available in the testing laboratories of the Directorate

1. Yarn tests

Count
Twist
Strength
Extension at break
Friction on steel
Hairiness
Visual appearance
Regularity*

2. Fabric tests

Weight
Construction
Strength
Extension at break
Air porosity
Bursting strength
Crimp
Cloth brightness

3. Bag/sack tests

Weight
Dimensions
Construction
Seam strength
Sack drop strength*

4. Carpet tests

Weight
Construction
Abrasion
Pile height
Tuft withdrawal
Dynamic loading
Pile compression
Fastness to light
Fastness to rubbing

5. Chemical tests

Moisture regain
Oil content
Viscosity
Flashpoint
Emulsion stability
pH
Salinity
Ash content
Density
Starch content
UV illumination

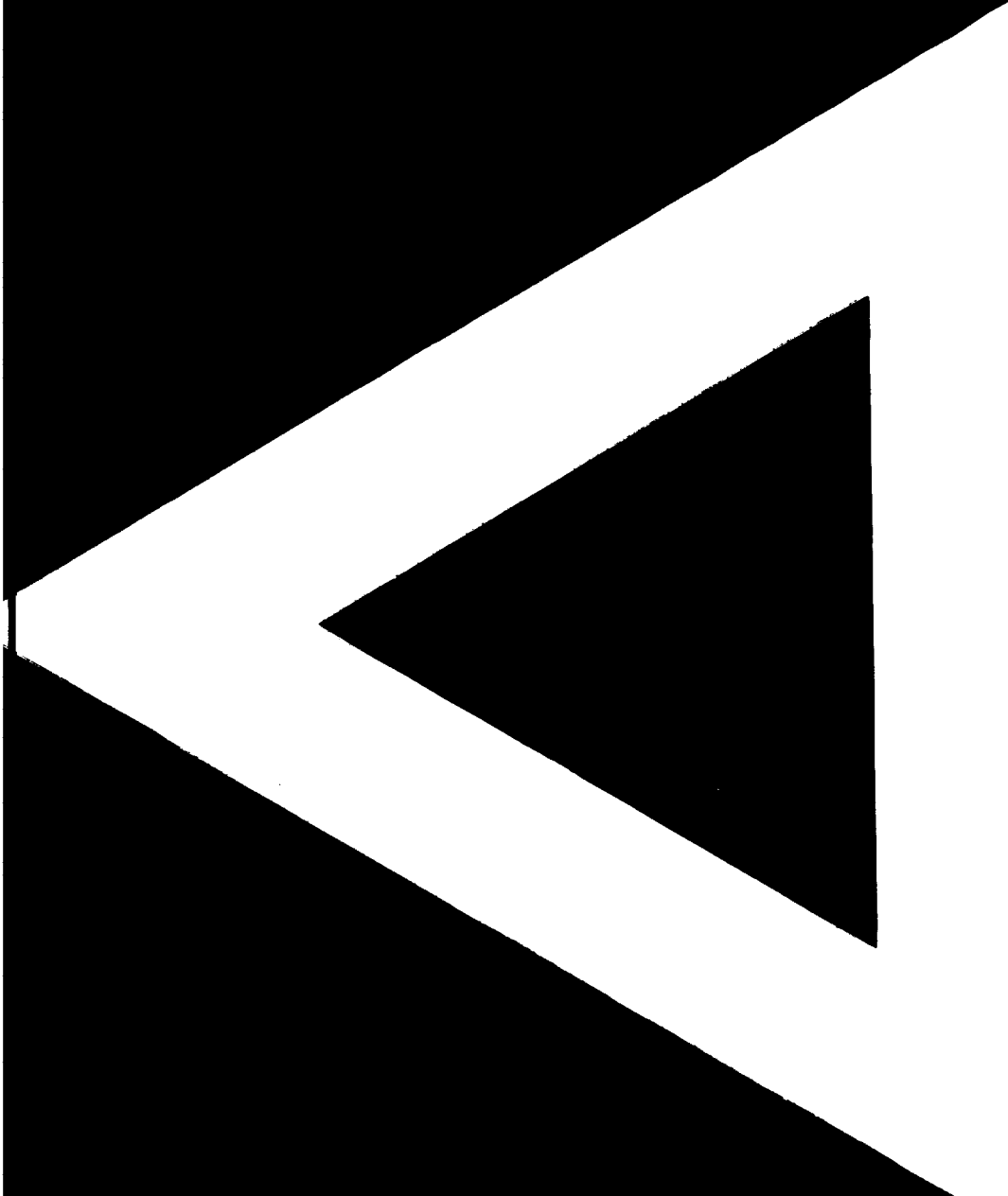
6. Microscopical tests

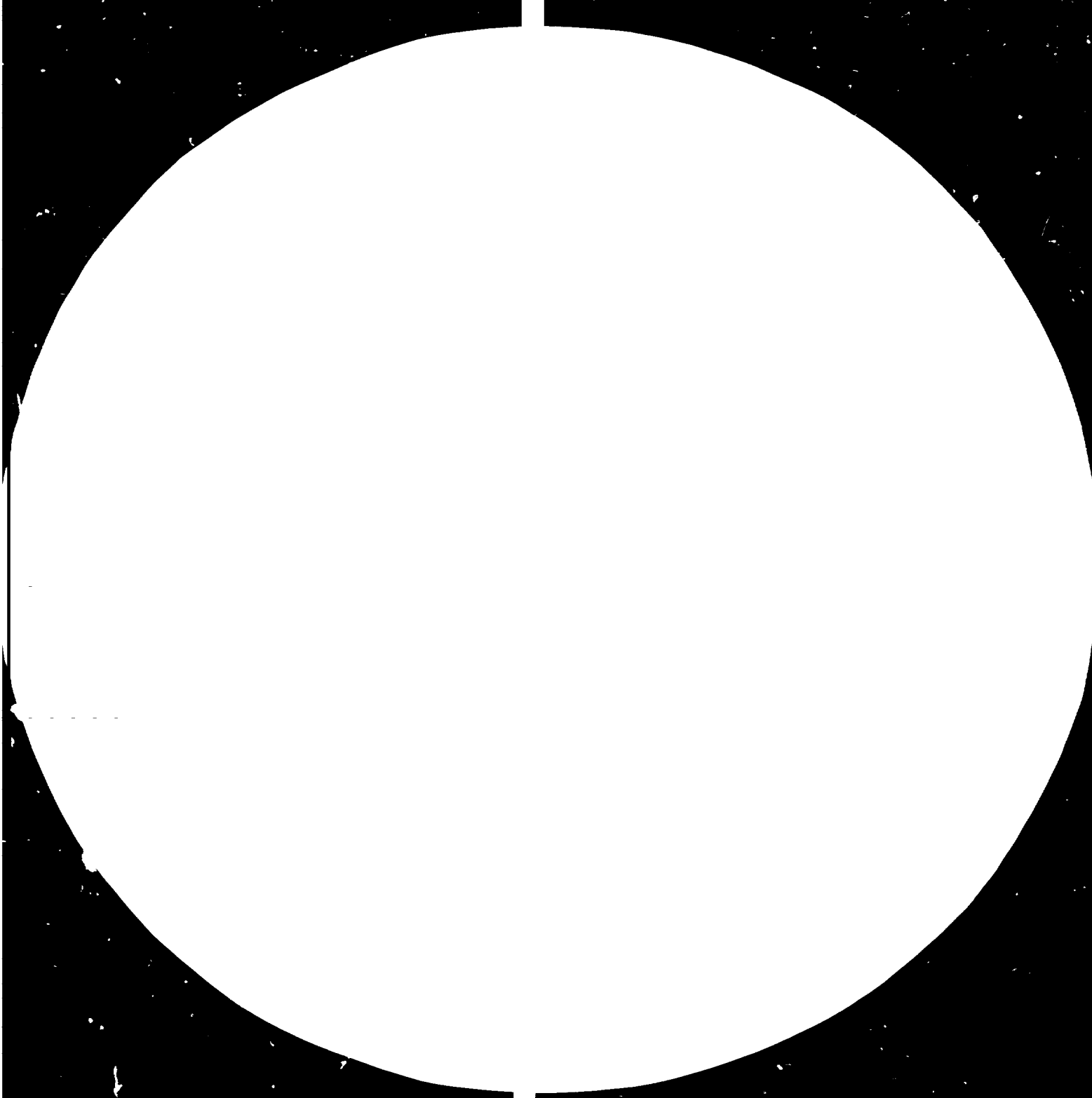
Fibre identification
Fibre damage

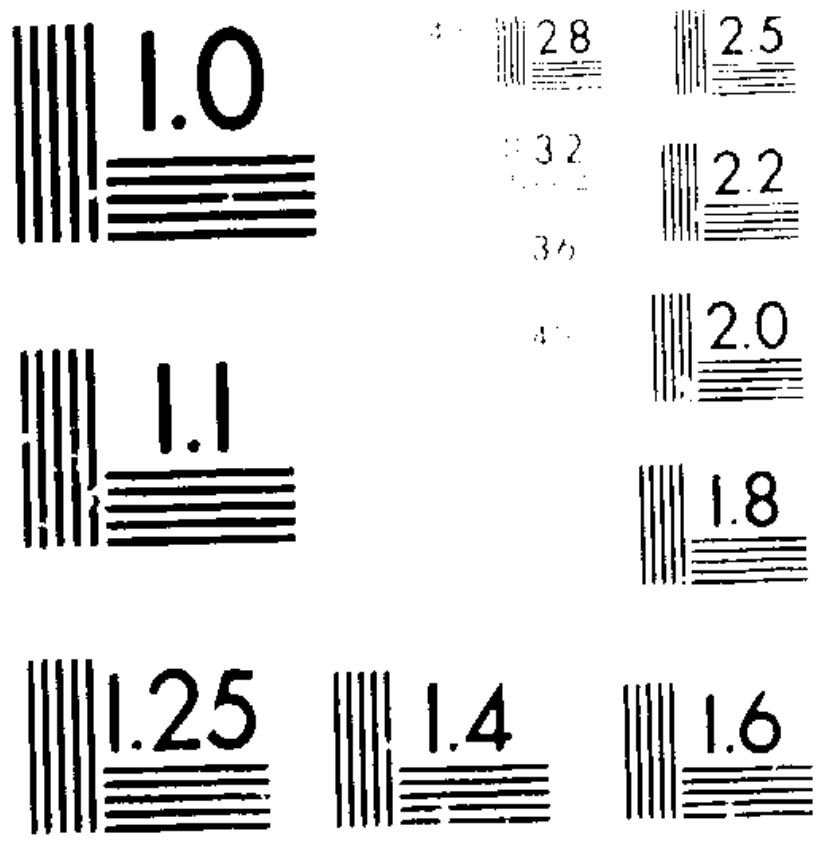
7. Climatic condition

Relative humidity
Temperature

* These tests await the arrival of equipment.







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DP/ID/SER.B/501/Add.1
24 November 1986
ENGLISH

CENTRAL TESTING LABORATORIES FOR JUTE GOODS

DP/BGD/79/030

BANGLADESH

Terminal report

Addendum*

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

Based on the work of R. R. Atkinson,
adviser on quality control

Backstopping officer: A. Eräneva, Agro-based Industries Branch

United Nations Industrial Development Organization
Vienna

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V.86-62386

ABSTRACT

The Directorate of Inspection for Jute and Jute Goods (DIJJG) provides a quality inspection service for jute fibre and jute products being exported. The project "Central Testing Laboratories for Jute Goods" (BGD/75/030) was undertaken at the request of the Ministry of Jute in order that testing facilities could be provided to allow certification of the quality standard of jute goods, The project was approved in October, 1981 and field work began in September 1982.

The objective was to set up three regional laboratories which, when fully operational, would assess the quality of jute products being exported. If such quality was in conformity with specifications and standards a certificate of Export-Worthiness would be granted and the goods could then be shipped.

This report, which is a supplement to the Terminal Report of 25 April 1985, DP/IR/SER.B/501, gives an account of the last mission of the Chief Technical Adviser prior to termination of the project.

A. Objective and Justification for the Mission

The objective of this mission was to assist the Directorate of Inspection for Jute and Jute Goods by giving training to 12 Examiners and 12 Laboratory Assistants. This training was to cover the physical and chemical testing of jute goods during a 6-week course of theoretical and practical instruction. The need for this course was foreseen and was one of the recommendations given the in Terminal Report, DP/IR/SER.B/501.

B. Detail of the Mission

The Adviser arrived in Bangladesh on 16 September 1985 only to find no staff were available for training despite assurances by the Directorate that staff would be ready when the Adviser came. Difficulties had arisen because of restrictions imposed by the Government on recruitment, coupled with procedural problems over the qualifications and age of the candidates for the posts of Examiners.

During the life of this project the necessary recruitment of staff has been a continuous problem arising from mandatory recruitment restrictions coupled with a lack of pre-planning. By Summer 1984, most of the testing instruments had been installed in the laboratories and some limited testing could have begun if staff had been available. As it was, a forecast was made in spring 1985 that the staff would be available by September of that year. Even now, in late 1986, the full complement of staff is not on site.

It is extremely distressing to see three extremely well-equiped laboratories unable to function properly and progress towards export-worthiness certification being delayed still further. In the interim period, the credibility of the Directorate is being eroded.

UNIDO has fulfilled its side of the agreement which was signed in 1981 by providing all the necessary textile testing equipment, two advisers to help to install and commission it, five training fellowships and an overseas study tour. All these inputs were supplied in accordance with the agreement. On the Government's side there were delays in the construction of the laboratories; these may be understood against the backdrop of the general difficulties encountered in Bangladesh. However, failure to supply staff in sufficient quantity and at the right time is even more disappointing and leads one to question whether Government and the industry are whole-hearted in their support for certification before exporting.

.../...

By 4 October the Director was able to provide 12 Junior Laboratory Assistants for their "hands-on" course in testing. This was gratifying to an extent but the time of the adviser would have been more fruitfully spent had the more senior Examiners been present. Be that as it may, the course (see Annex 1) was conducted successfully. For various reasons only 10 trainees completed the course.

Towards the end of October the Assistant Directors (Field) were given a brief refresher course for 1 week on general aspects of certification. The opportunity was taken to deal with some problems which had arisen since the adviser left the country in April 1985.

C. Conclusions

In relation to this mission the conclusions are few but fundamental. It is a serious impedement to development projects when Government regulations prevent certain essential inputs being provided on schedule. When an agreement is signed, the three parties, UNDP, the Government and the executing agency are bound, in good faith, to supply the inputs which are needed to make a project a success. Circumstances may change after the signing but these should not have a retrospective effect on the project. This may be the simplistic view of a technologist but in a straight forward project such as this one, it is hard to see why progress is impeded by the non-appointment of such a few men.

In the Terminal Report of 25 April, it was concluded that the time-scale for this project was too short. In the light of the past six weeks, this is even more true. Given the prevailing conditions, one is led to the conclusion that any serious certification work is very unlikely before the end of the decade.

D. Recommendations

Some of there recommendations are repeated from the earlier Terminal Report.

1. To the Government and Industry

(a) If it is at all possible, recruitment for the post of Deputy Director and all other staff should be taken up immediately.

(b) The future role of certification prior to export requires to be re-examined and greater emphasis placed upon it.

(c) Industry should avail itself of this excellent testing facility which can play a positive role by giving the mills an objective independent assessment of the quality of their products.

.../...

2. To the Directorate of Inspection

(a) A work-plan should be prepared using realistic estimates of timing. It is suggested that the following may be considered:

1987 Further training and work-experience for the staff;

1988 Development of all the necessary infrastructure for certification;

1989 Trial runs for certification of not more than 3 products;

1990 Implement Certification;

1991 Onwards. Gradually expand the number of products which require certification.

(b) The good relationship with the industry which exists now should be strengthened further by means of workshops, mill visits and other ways.

3. To UNIDO/UNDP

It seems likely that the laboratories will need further support especially when the Directorate reaches the stage of implementing certification. If this is so, then a period of pre-project activity would be recommended so that the difficulties caused by under estimation of the time-scale, which have been a feature of this project, may be avoided.

LABORATORY ASSISTANTS' COURSE

Directorate of Inspection for Jute and Jute Goods

Object: The Object of the course is to give newcomers to the industry an appreciation of the natureof jute fibre and how it is converted into yarn and fabric; the course then goes on to instruct the members in the common physical and chemical tests encountered in assessing the quality of jute products.

Method: Short lectures are used coupled with visits to baling stations and spinning and weaving mills are used for the first part of the course , followed by more detailed lectures and ample 'hands-on' experience in testing.

Duration: 13 days.

Curriculum:

1. The importance of jute to Bnagldesh; role of the Directorate of Inspection; importance of quality standards; Directorate's Testing Manual.
2. Safety hazards in the laboratory; protection of the eyes; handling chemicals; fire precautions.
3. Record keeping; neatness and accuarcy ; filing.
4. Familiarisation with balances, themometers, gauges, etc.; metric to imperial conversions and vice versa.
5. Count measurement and calculations; twist, twist angle and twist factor; yarn strength and quality ratio.
7. Fabric weight; construction;ends and picks; crimp; yarn count from cloth.
8. Cloth strength, strip and grab methods; sack dimension
9. Oil extraction, Soxhlet and WIRA methods.
10. Mean, standard deviation and coefficient of variation