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ASSISTANCE IN TEXTILE TESTING AND QUALITY CONTROL

DP/NIR/75/023

NIGERIA

TERMINAL REPORT

Prepared for the Government of Nigeria by the
United Nations Industrial Development Organization,
executing agency for the
United Nations Development Programme

United Nations Industrial Development Organization

id.76-7138

United Nations Development Programme

ASSISTANCE IN TEXTILE TESTING AND QUALITY CONTROL

DP/NIR/75/023

NIGERIA

Project findings and recommendations

Prepared for the Government of Nigeria
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Gabor S. Asohner, textile testing
and quality oontrol expert

United Nations Industrial Development Organization
Vienna, 1976

Explanatory notes

A comma (,) is used to distinguish thousands and millions.

A full stop (.) is used to indicate decimals.

The monetary unit in Nigeria is the naira (N). During the period covered by the report, the value of the naira in relation to the United States dollar was $US 1 = N 0.62.

The following abbreviations are used in this report:

FIIR Federal Institute of Industrial Researoh

HT Heat treatment

ABSTRACT

The project "Assistance in textile testing and quality control" (DP/NIR/75/023) arose from a request by the Government of Nigeria to the United Nations Development Programme (UNDP) in June 1975 for an expert to assist in the installation and initial operation of textile testing and quality control equipment at the Federal Institute of Industrial Research (FIIR) of Nigeria. The request was approved in July 1975, with the United Nations Industrial Development Organization (UNIDO) designated as the executing agency, and FIIR as the counterpart agency. The three-month mission began on 1 September 1976, in conjunction with followship training periods of equal duration undertaken in Hungary by two FIIR staff members.

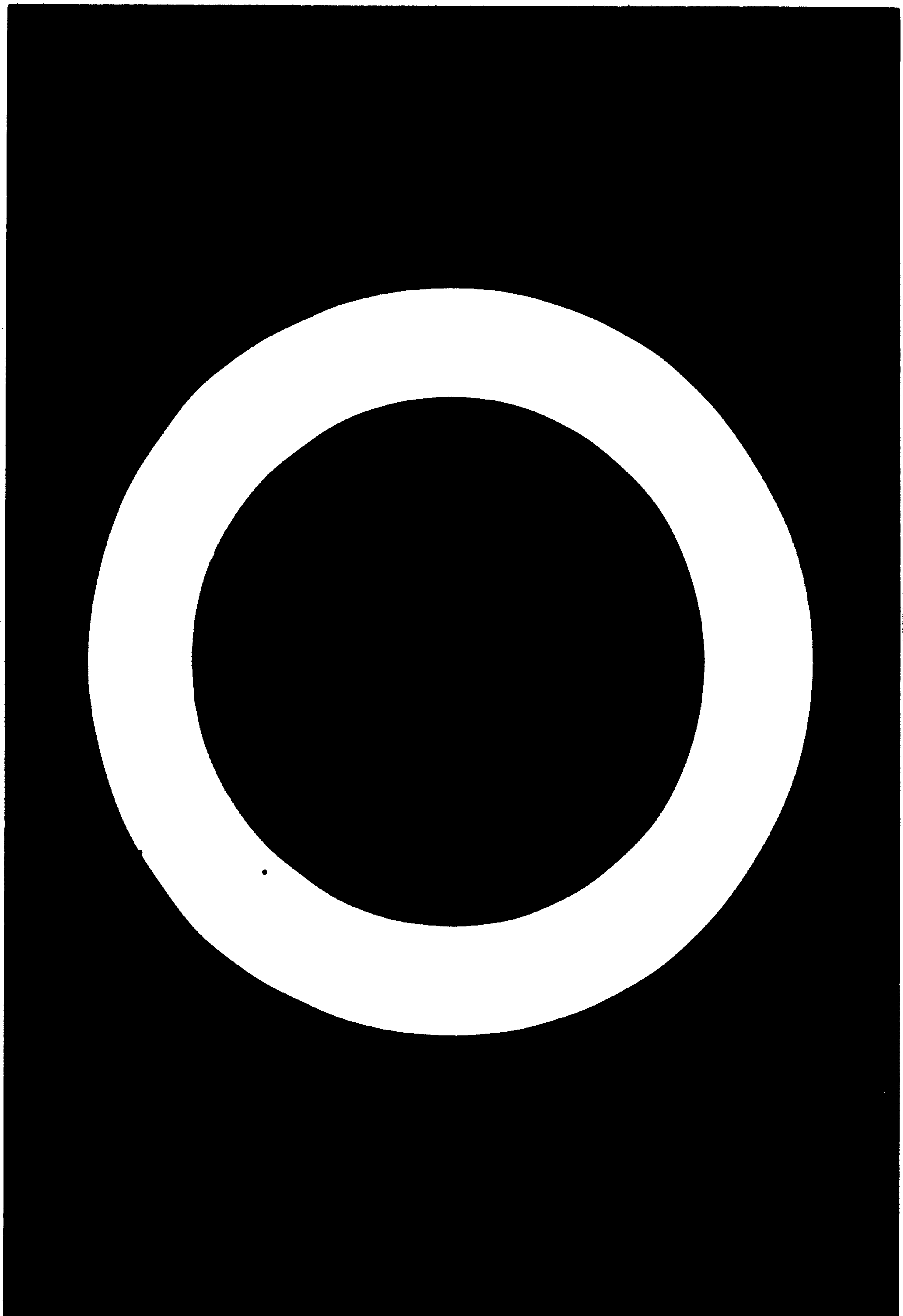
Foremost among the long-range objectives of the project was the provision of both the government and private industry with reliable technical services for the testing and quality control of textile materials and allied products. Its immediate objectives were to equip and put into operation an adequate textile testing and quality control laboratory, and to strengthen the capabilities of the staff of FIIR to provide the necessary services to Government and the private sector.

The main conclusions of the expert were the following:

(a) It was not possible to complete the installation of the equipment or to leave the laboratory fully operational because of the failure to deliver some instruments, the delay in the delivery of others, electrical supply problems, serious damage to some instruments during transport and the lack of essential spare parts for repairs, and oounterpart staff changes which interfered with training in the operation and maintenance of the equipment;

(b) The amount of equipment acquired is not enough to meet the needs of the rapidly-expanding Nigerian textile industry.

To enable the Nigerian textile industry to achieve and maintain proper quality oontrol standards, the purchase of additional equipment and further staff training are recommended.



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INTRODUCTION

Although Nigeria's industrial growth as a whole still falls short of the country's development objectives, considerable progress has been made in some sectors. The rapidly-expanding textile industry in particular is the strongest in the country, with a direct work force of 32,942[1/] and another 40,000 engaged in textile-related industries such as knitted goods, carpets etc. The relative strength of the textile industry becomes clear when it is noted that the next largest industrial sector in terms of total workforce is the saw-milling industry, which employs only about 10,000 workers.

To promote overall industrial development through the increased use of local raw materials and technologies and a corresponding reduction in imports, the Government of Nigeria established in 1955 the Federal Institute of Industrial Research (FIIR) within the framework of the Federal Ministry of Industries. FIIR is responsible for investigating the suitability of domestic raw materials for industrial use, and adopting and modifying technologies developed elsewhere to achieve the best results locally. It also gives technical assistance to industry, either government - or privately-owned, by providing laboratory facilities for product analysis, and by helping to find solutions to the technical, production, economic and statistical problems facing individual industries or firms. FIIR consists of six divisions covering the following broad specialized fields: food science and technology, material science and technology, industrial analysis, analytical chemistry, engineering and applied biology. It has carried out a considerable amount of research on basic foods, special foods, essential oils, fibres, clays, minerals, starches, wood and paper. The results of these studies have proven useful in the development of the industries concerned.

In 1971 the Government of Nigeria expressed its desire for UNIDO assistance to strengthen FIIR, mainly through the provision of textile testing and quality control equipment. The FIIR laboratories, financed by government funds, are generally well equipped. Perhaps the only exception was the textile testing laboratory. A project was therefore developed to provide the necessary equipment, financed from the Hungary Voluntary Contribution Fund. It was subsequently suggested that an international expert should be provided to install the equipment at the FIIR laboratories and to train the staff in its operation and maintenance, and that two FIIR staff members should receive fellowship training in Hungary. One of the staff members, a textile chemist, would study the use of the equipment, the evaluation and interpretation of

1/ Figures drawn from the Digest of Statistics, Federal Office of Statistics, Volume 23, October 1974.

test results, and quality control generally, while the other, an instrument officer, would concentrate on repair and maintenance. To this end, the Government of Nigeria submitted in June 1975 a request for UNDP assistance, which was approved in July 1975, with the United Nations Industrial Development Organization (UNIDO) designated as the executing agency, and FIIR as the counterpart agency. The project budget involved contributions by UNDP and the Government of Nigeria of, respectively, $US 13,500 and N 8,940. In addition, the cost of the equipment, $US 53,700, was covered by the Hungarian Voluntary Contribution Fund. The three-month project "Assistance in textile testing and quality control" (DP/NIR/75/023) began on 1 September 1976, and largely coincided with the fellowship training periods of equal duration undertaken in Hungary by two FIIR staff members.

The long-range objectives of the project were the following:

(a) Providing both government and private industry with reliable technical services for the testing and quality control of textile materials and allied products, and with research facilities suited to the needs of the rapidly-growing textile industry;

(b) Strengthening the capabilities of the staff of FIIR to provide the necessary services to government and the private sector;

(c) Promoting the establishment of suitable national quality control standards and certification procedures.

The expert also had the following specific tasks to perform:

(a) Helping to unpack and assemble the equipment received;

(b) Reporting and correcting damage, and, if not reparable, initiating the necessary steps for the return and replacement of the equipment;

(c) Putting the equipment into operation and carrying out tests to ensure that it is in proper working order;

(d) Training the FIIR staff in the operation, use and maintenance of the equipment.

I. PROJECT ACTIVITIES

The immediate tasks of the expert were twofold: to assist in the unpacking and installation of the textile testing equipment listed below, and to provide staff training in its operation and maintenance.

Equipment	Model
1. Fibre-bundle tensile strenght tester	FM 20
2. Automatic yarn tensile strength tester	FY 17
3. Abrasion tester for yarns and sewing threads	FY 10
4. Yarn evenness tester	FY 26
5. Flexometer for testing the flexibility and crease recovery of fabrics	FF 20
6. Tensile strength tester	FF 24
7. Laboratory washing scourotester	FE 09
8. Laboratory dyeing apparatus	FE 05
9. Selecter	FM 13
10. Pick out force tester for carpet yarns	FC 04
11. Trico dim test	FD 22
12. Momcolor	
13. Photocolorimeter spectromom	402
14. Microscope	

The equipment was to be delivered by air, one consignment arriving by air cargo direct from Budapest. Another consignment, which contained an instrument too large and heavy to be handled by aircraft landing in Hungary, had to be conveyed by road to Vienna, and from there by air to Lagos. Items 4, 7, 9, 10, 11 and 13 had arrived by 1 October 1976, and a second consignment consisting of items 1, 2 and 6 arrived on 29 October 1976, together with an unordered water permeability tester, model FF 13/a. The remaining instruments were due to arrive in late November.

A work programme was drawn up for guidance in unpacking, installation, maintenance and training. It was fully discussed and explained in briefings conducted by the expert for all the counterpart staff members. With regard to unpacking, a report was to be prepared on parcels or instruments found damaged upon arrival. During installation, the electrical and mechanical operation of the equipment had to be checked, and any damage or defects repared, where possible. In particular, since a three-phase current is needed, the electrical loads imposed by single-phase equipment should be calculated so that the load on the three-phase line can be balanced among the phases. About ten outlets would be needed for the equipment. The accuracy of the units would have to be checked and tests would be carried out on the various sample fabrics, yarns, fibres and bundles. Staff would be trained in the functioning, operation, utilization and maintenance of the equipment, in the application of quality control and testing standards, and in the evaluation of test results. Finally, a report was to be prepared containing proposals for further action by FIIR and the government.

Unpacking

The parcels containing items 4,7,9,10,11 and 13 included in the above equipment list were not badly damaged. However, despite the careful packing of the instruments, some of them had suffered serious damage, not all of which could be repaired because the necessary parts were not available. For example, the knob for the air quantity control levels of the selecter was broken, and a new one is needed. Other instruments, such as No.11, failed to run because of electrical defects which were only discovered during installation. Replacement parts have been ordered. On the other hand, instrument No. 5, which did not arrive together with the rest of the consignment, was found to be in good condition after its subsequent discovery at Ikeja Airport. With regard to operation manuals, for some of the instruments either no manuals or an insufficient number was sent, although three copies in English were ordered for each instrument. Requests for copies of the unsupplied manuals had to be made.

Another consignment consisted of items 1,2,6 and a water permeability tester which had not been ordered, and which was therefore kept unopened pending a UNDP decision as to what should be done with it. The parcel surfaces had not been seriously damaged, except for that of instrument No.1, although even in this case the damage was only slight. With regard to the equipment, instrument No.2 was in good condition, but substantial damage had occurred to the rest of the equipment despite the careful packing. For example, upon unpacking instrument No.1, the following observations were made:

(a) The backplate of the machine was broken off and the heads of the screws holding the plate were shorn off. Six new fixing screws were needed;

(b) The plate covering the bottom of the upper drawhead was broken off, and the heads of the screws holding the plate were shorn off. Two new screws were needed;

(c) The screw fixing the left side holder of the strength scale to the body of the machine was shorn off and the scale was bent. A new screw was needed. The screw fixing the force scale to the holder was also shorn off and a hole had to be drilled to remove the broken part of the screw. During drilling the thread in the holder was damaged. A long screw together with a nut was therefore needed to remount the scale;

(d) The connector between the sliding weight and the nut on the threaded spindle was broken. A new connector was needed;

With regard to instrument No. 6, the following findings were made:

(a) The fastening of the pendulum shaft during transport was loose and shaft moved freely;

(b) The plastic cord adaptor was broken and a new one was needed;

(c) Chain No. 4 was broken and the nut of the screw holding the connector of the pendulum shaft and the damper cylinder together was lost. Replacements were needed for both the chain and the nut.

Installation

The equipment was to be installed in one of the laboratories of the Institute. The size of the room seemed to be appropriate, however to achieve good and safe working conditions several recommendations were made relating to the following matters: alteration of the laboratory where the equipment was to be installed; modification of the furniture so as to be able to carry the equipment in safe conditions; fulfilment of safety regulations (for instance by obtaining fire extinguishers, providing suitable emergency exists, etc.).

The location of each apparatus has been determined, and there are plans to acquire new tables for holding the instruments and for storing accessories.

As mentioned above, it was discovered during installation that some electrical parts had been damaged, and, owing to the lack of replacement parts, in particular sophisticated parts such as transistors, diodes etc., could not be repaired. The necessary parts were requested from the producing firms, but had not arrived by the end of the expert's mission. Moreover, owing to the danger of contamination of the equipment by the high dust content of the air, covers for all the apparatuses have been requested.

Installation was delayed by the lack of a few essential tools, in particular a 16-20 cm-long screwdriver thin enough to cope with small screws, and two pairs of pliers, one strong and wide and the other rather slim. Various types of necessary oils, specifically sewing machine, fine motor, silicon and superfatted oils, were not available. Nor was it possible to obtain certain metric screws which were needed. Requests were made for the above-mentioned tools and oils, although they had yet arrived when the expert completed his mission.

It was found that the fluctuation of the main voltage was higher than that specified in the manuals provided with the equipment. All the equipment contains more or less sensitive electronic and electric parts. Therefore the permitted fluctuation of the line voltage is a maximum of ± 10 %. Above these limits the electrical parts can be seriously damaged and will not function. The fluctuation of the line voltage will always lead to uncertainty in the results, which means that different results will be obtained for the same sample when repeating the test. This makes it impossible to set the instrument properly. Moreover, operating equipment in such conditions would weaken any subsequent legal claim which might arise on grounds of malfunctioning.

To make possible the safe operation of the equipment, it was therefore recommended that a stabilizer of about 20 kW, or at the very least 12 kW, should be acquired. In mid-October the network for the three-phase current supply was ready, but because of the lack of the stabilizer the instruments could not be operated. A suitable stabilizer was not acquired and installed until the last week of the expert's mission.

Test samples

A list was made of the different textile materials which are necessary for running the equipment in. This list included fibre samples from bales and cleaned lints, yarn samples of different fineness, and plain and tufted fabric or carpet samples.

The Nigerian Textile Mills, Ikeja, was visited to obtain the samples, which were provided in due time.

Local management and counterpart staff

Local management actively participated in the implementation of the project and there was very good co-operation between the expert and the senior staff members requested to assist in the installation work. The trained staff of the Institute will play a major role in ensuring the long-term success of the project. Their assistance was prompt and effective, especially in altering the layout of the laboratory to make it suitable for the equipment and during the installation work. Staff training was carried out in conjunction with the installation of the equipment.

In mid-October the staff member appointed to work with the expert to learn the running and maintenance of the equipment was assigned to the food branch. That made necessary the appointment of another staff member and the teaching and training of him from the very beginning.

Follow-up mission and training

In October 1976 both FIIR and the Government of Nigeria expressed their desire for an extension of the expert's mission in Nigeria. This was considered necessary for the following reasons:

(a) One part of the equipment had not yet arrived, and a letter of the Hungarian exporting firm, Metrimpex, indicated that the deliveries would be completed in November 1976;

(b) The implementation of the project was delayed by the lack of certain oils, tools, a proper stabilizer, and replacement parts for damaged equipment.

However, the Government subsequently decided to request a return mission of the expert for 3 full months to complete the project.

During the return mission, a seminar is to be held on the operation and maintenance of the equipment, the sampling and testing of textile materials and the evaluation of results. Their are also plans to hold a workshop during which the use of the instruments can be discussed with representatives of the textile mills and demonstrations of their operation can be given.

II. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

1. Despite the careful packing of the equipment, a number of instruments were seriously damaged in transport and could not be repaired owing to the lack of some essential replacement parts in Nigeria.

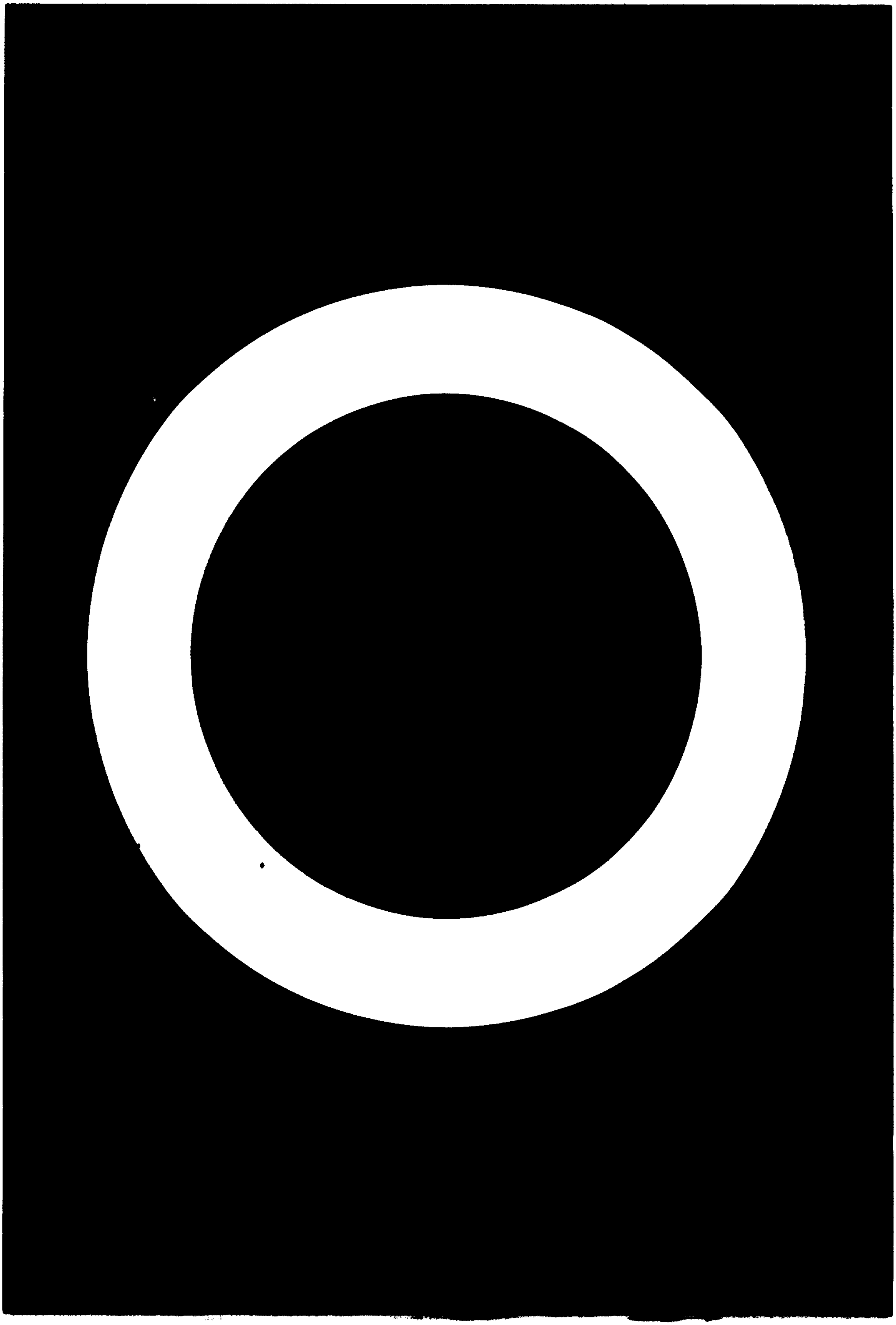
2. The installation of the equipment could not be completed because of the failure to deliver three instruments, the delay in the delivery of the other equipment, the lack of any decision about the water permeability tester, the lack of a three-phase current supply and a stabilizer, serious damage to some instruments during transport and the lack of essential spare parts for repairs, and the replacement of the counterpart staff member being trained to operate and maintain the equipment by another staff member who had to be trained from scratch.

3. It would have been possible to complete the staff training and the installation and running-in of the equipment if the expert's mission had been extended by approximately three months.

4. The amount of equipment acquired is not enough to meet the needs of the rapidly-expanding Nigerian textile industry. This means that upon the completion of the project the industry as a whole will still not be able to ensure proper quality control of its products.

B. Recommendation

To enable the Nigerian textile industry to maintain the proper quality control standards, additional equipment and staff training are required. A detailed description of the recommended equipment and proposals concerning staff training and a follow-up mission are set forth in annex I.



Annex I

ADDITIONAL EQUIPMENT[a] NEEDS AND FOLLOW-UP ACTION

The equipment involved in the present project is only part of the basic equipment necessary for textile testing and quality control.

Considering the local textile industry as a whole, research, testing and quality control should focus primarily on cotton and synthetic textile goods. Table 1 shows the figures for the domestic production of cotton and synthetic textiles.

Table 1. Domestic textile production

Product	Year 1972	Year 1973	Year 1974
		(1,000 m^2)	
Shirting	34,882	78,463	65,038
Prints	118,699	148,730	149,683
Drills	14,875	12,572	9,259
Bafts	21,800	51,775	54,102
Synthetic fabrics	5,564	9,616	22,251
		(tons)	
Knitted fabrics	1,399	1,274	2,410

Source: Economic Indicators, Vol.11, Nos. 4,5 and 6. (Lagos, Federal Office of Statistics, June 1975).

Whereas the jute and silk industry do not play a major role in Nigerian textile production, the wool and carpet industry is expected to develop. There must be at least one institution in the country which can cope technically with the rapid development of the textile industry. This institution has to be equipped properly to perform the studies and quality control analyses which may be required in the next five to ten years, and to carry out the arbitrage work necessary for the government and private firms. Its is clear that the institution best suited for that purpose is FIIR.

A description of the equipment required to enable FIIR to perform its role is given below, together with explanations of why the equipment is needed. The equipment could be acquired either within the framework of UNIDO projects

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a/ Manufacturers'names, catalogue numbers and model designations given in this annex are for reference only. Equipment for which a model designation alone is given is supplied by Metrimpex (Hungary). Other equipment models equal in function, quality and performance to those listed could also be used.

or through government financing or by a combination of the two. Suggestions of suitable equipment models are given for guidance in case the recommendation is accepted.

General purpose equipment

Atmosphere control cabinet

FIIR has no apparatus for producing the standard testing atmosphere. A cabinet is also needed for the preparation and conditioning of samples. When the Institute has an apparatus for producing the standard testing atmosphere. A cabinet is also needed for the preparation and conditioning of samples. When the Institute has an apparatus for producing the standard testing atmosphere in the laboratories, the cabinet can be used for preconditioning, which has to be carried out before testing textile materials, and for the ageing of textiles.

An automatically-controlled cabinet equipped with a relative-humidity changing device and a heating and cooling device is recommended. The chambers made by the Brabender firm (Federal Republic of Germany or the United States of America) are suitable.

Atmosphere control device for textile testing

Most natural textile materials are hygroscopic, and man-made fibres are rather sensitive to the high temperature. Equipment is therefore needed which will provide the laboratory test area with the standard temperate atmosphere. A suitable unit can be supplied by Metrimpex (Hungary).

Hygrometer and thermometer with recording device

To control the standard temperate atmosphere, hygrometers and thermometers are needed. For this purpose a simple Assman hygrometer is suitable, but a unit is recommended which will continuously record the measuring data for further checking. This unit can be obtained from Metrimpex (Hungary), although it is not included in the present Metrimpex catalogue.

Computer

The Institute has a programmable calculating machine which is suitable for administration and business purposes, but not for scientific work. A small table computer with a working language which is not to difficult to learn by qualified staff members is recommended.

There are two moderately-priced mini-computers which seem suitable: the Hewlett Packard 9830 (United States of America), with a capacity of 32 kbyte, and the Wang 2000 series (United States of America).

The Hewlett Packard 9830 is the best for the purpose of the Institute for the following reasons:

(a) It works on basic computer language, which is one of the easiest to learn;

(b) Hewlett Packard has developed all the necessary peripheries to extend the capacity of the computer with a background memory to the capacity of a middle-size computer (e.g., discs and magnetic tapes were developed in addition to the punch tapes, and the storing capacity of one disc is about 4 Mbyte);

(c) It is one of the most versatile multi-purpose table calculators;

(d) It takes up only a small area, and, together with all the peripheral equipment, only costs from $US 45,000 to $US 50,000.

The Hewlett Packard 9830 has to be ordered together with read-only memory, extra cassette reader, X-Y plotter, teletype ASR 38 (for typing and handling punch tapes), thermoprinter etc.

In case this recommendation is accepted the list of necessary units has to be further completed and additional cost calculations must be made. The expert is prepared to complete the list and cost calculations if requested to do so.

Equipment for testing fibres and raw materials

Fibre-fineness measuring device

The airflow instrument makes possible a quick air-permeability test to obtain an estimate of cotton fibre fineness. Model FM-06/A would be suitable for this purpose.

Shearing Apparatus

When preparing fibre bundles it is often necessary to cut them to a given length. With this unit the fibres can be preloaded during the cutting process. Model FM-14 would meet this need.

Instrument for testing the nepping tendency

For testing the nepping tendency of cotton fibres a Nepcard is needed. This together with the selecter which the Institute already has, will make possible the easy assessment of the quality of cotton fibres to be carded. Model FM-11 could perform this function.

Equipment for measuring fibre length and length distribution

A fully automatic unit, such as the Autosampler Fibrograph, is recommended. This instrument can be used to measure the length and length distribution of cotton and synthetic fibres of any staple length. Model FM-22 would be suitable.

Fibre tensile tester

The tensile properties of the individual textile fibres and fibre bundle will not usually give identical results. The tensile strength and elongation of the fibre are of a great importance. A model FM-21 tester is available for this purpose.

Shrinkage tester

During the heat-wet treatments or finishing processes the textile materials change their dimension. It is useful to know the shrinkage properties of the fibres before working them up. This can be done by a model FM-17 tester.

Invoice-mass measuring cabinet

Different national standards allow for moisture regain, natural or added oils, dressings etc., up to a limit which can be included in the invoice mass. Above the given limit values the invoice mass has to be reduced.

To measure the components of mass the determination of the water content is one of the most important and generally the first measurement to be carried out. A conditioning cabinet (predrier) with a built-in precision digital balance is therefore needed. A model FL-02/A cabinet would be suitable.

Fibre homogenization device

Only homogenized samples are appropriate for testing. The preparation of the fibres requires homogenization. To achieve the best results she use of a motor-driven Labormixer, model FM-10, is suggested.

Yarn-testing equipment

Yarn length measuring devioe

A motor-driven measuring reel is needed to prepare skeins and to determine the linear density of yarn. Unit FY-14/B would be suitable.

Crimp-rigidity measuring device

Crimp rigidity affects the dimensions and general characteristics of fabrics produced from crimped filament yarn. A measuring device produced by Hatra(Nottingham, United Kingdom) is recommended.

Yarn evenness analyser

The Institute has a yarn evenness tester. The Wave Analyser developed for measuring and recording the periodic changes of mass evenness of the different products of a spinning mill should be acquired. Model FY-27 is suggested.

Board-type yarn evenness tester

In the course of the project covered by this report FIIR received a yarn evenness tester which gives numerical values representing the mass unevenness of yarns. For practical purposes however, a board type yarn evenness tester is very useful, because the evenness of different yarns can be checked and the comparison of the evenness can be made far quicker than with the yarn evenness tester. A suitable unit, model FY-20, is available.

Ring spinning machine

For checking the quality of raw materials, economy of operation and any further studies relating to spinning, the acquisition of laboratory ring spinning machine is highly recommended. This machine would enable FIIR to produce yarns under controlled conditions for further investigation. A small and versatile laboratory ring spinning machine, model FD-01, would be suitable

Yarn-working tensile strength tester with oaloulator

The yarn-working tensile strength tester operates automatically, and through an interface a small table oaloulator performs the necessary calculations. However, the Institute has at present another type of automatic tensile strength tester. The yarn-working tester is strongly recommended beoause it alone meets the standards of the International Organisation for Standardisation. The table-calculator is designed to process, through special interfaces, electronic data from other machines, thus eliminating the element of human error. The acquisition of such equipment would therefore bring a high level of sophistication to the laboratory work. A suitable system can be obtained through Metrimpex (Hungary).

Fabric-testing equipment

Tester of abrasion resistance

The abrasion resistance of textile materials is an important factor in fabric durability and wear performance. Although place abrasion of fabric surfaces is not the only source of strains which affect the service life of fabrics, a knowledge of abrasion resistance properties is often very useful. There are special finishing processes and treatments for restoring the abrasion resistance of fabrics. To test this property an apparatus, such as the Rubtester (based on the Schiefer principle), model FF-25, is suggested.

Water repellency testers

In a tropical climate where there is rainy season it is advisable to have equipment capable of determining the water repellency or resistance of fabrics. For this purpose two instruments are suggested: the spraytester, model FF-22, used to determine fabric resistance to surface wetting; the water repellency tester, model FF-10, used to determine fabric resistance to an artificial shower,

Heat permeability tester

The tropical climate of Nigeria makes it necessary to wear mainly light clothes with sufficient air and heat permeability. An effective and simple heat permeability tester developed in Hungary at the Textile Industry Quality Control Institute (Teximei) is recommended. A very good correlation was found between test results and actual fabric performance.

Air permeability tester

Because of climate conditions in Nigeria an air permeability tester will also be needed. A model FF-12/A rotameter type measuring system would be suitable.

<u>Equipment for measuring the thickness of textile floor coverings and carpet thickness loss after prolonged heavy static loading</u>

The measurement of the thickness of a textile floor covering is necessary for the assessment of performance. The compacting of the fibres and the ability to recover from compression are determined on the basis of thickness. A useful instrument family has been developed for measuring the thickness of carpets, and for loading them with the prescribed compacting force. Models FC-01 and FC-02 are examples of each equipment.

<u>Equipment for determining the thickness loss of textile floor coverings under dynamic loading</u>

When a textile carpet is exposed to considerable walking there is a relatively large decrease in thickness during the initial period as a result of compacting rather than fibre loss. A model FC-03 mechanical treader has been developed to measure the initial compacting.

<u>Equipment for textile finishing and dyeing</u>

Certain types of laboratory equipment are used to produce the same conditions as in textile mills with regard to finishing and dyeing processes. They make it possible to finish textiles in strictly controlled laboratory conditions, which is very important for textile processing, or chemical analysis and quality control. A Labor-jigger, Labor-foulard and Velodif Digital, together with a dyeing tester and scourotester, are suggested for this purpose.

The Labor-jigger and the Labor-foulard are useful apparatuses for finishing and dyeing textiles, for analysing the best processing method for a given textile or dyeing material, and for comparing different textiles and dyestuffs. Models FE-40 and FE-10 would be suitable.

The Velodif Digital measures the shrinkage, elongation and the speed with which these changes take place in the textile material during the finishing process.

In the present UNIDO project a dyeing tester and a scouro tester (launderometer) were supplied but they do not include the facility of high temperature (HT) dyeing and testing. To deal with materials made of synthetic fibres HT dyeing is essential. Both apparatuses must therefore be provided with HT tubes and tube holders for HT dyeing. They should be ordered from the original supplier of the apparatuses.

Equipment for testing the colourfastness of fabrics

Proper quality control is not possible without testing the colourfastness of the products, since a significant part of the claims made are the result of improper colourfastness. The following apparatuses should be obtained.

Tester of light colourfastness

One of the most durable instruments of this kind is the Xenotest, produced by Original Hanau, Hanau, Federal Republic of Germany. They manufacture different types of this equipment. Model 150 would meet the needs of FIIR.

Tester of rubbing fastness

The Hungarian staining tester, model FD-17, is an automatic tester of rubbing colourfastness. The apparatus is very versatile and can be used for testing not only fabrics but also yarns and ready-made clothes without cutting the material.

Knitting machine

To measure the dyestuff absorption capacity of different yarns or the varying absorption capacity of the same yarn, it is recommended that a fabric should be knitted from the yarn. This could also solve the problem of uneven dyeing. A small knitting machine which can handle all types of yarns of different linear density would help to solve dyeing and quality control problem. Inquiries could be made to various firms, for example British or Hungarian, to choose the most suitable machine.

Staff training

Staff training will be needed to ensure the best use of the recommended equipment. At present, the most effective training method seems to be that applied by UNIDO, whereby an international expert takes part in the installation and on-the-spot training, and one or two staff members are sent ot the country which produces the equipment to study maintenance and the practical application of findings.

Further training will be needed, because more equipment is involved in the proposed project than in that covered by this report. It is recommended that the international expert's assignment in Nigeria should be for one year, and that of the staff members should be about five or six months in the country producing the equipment.

In case the recommendation to acquire a computer is accepted, the international expert has to be familiar not only with textile testing equipment, but also with the basic knowledge required for the use of this computer in a textile laboratory. The staff members could receive fellowship training in Hungary, at the Textile Industry Quality Control Institute, where a very effective system has been worked out to ensure the best use of the Hewlett Packard 9830 computer in textile laboratories.

Equipment cost estimate

The price list available at the time this report was written covered only a small part of the listed apparatuses. In case the project is accepted or more detailed price information is needed for a final decision, the relevant price lists must be requested from the producing or exporting firms.

For the suggested equipment excluding the computer and staff training, a cost of from $US 150,000 to $US 200,000 is estimated. With the computer included the estimate has to be increased to from $US 200,000 to $US 250,000.

Annex II

COUNTERPARTS AND FELLOWSHIPS

Counterpart staff

Akerele, L.L.	Principal Research Officer
Igwilo, F.N.	Research Officer, Grade I

Fellowship awards

Recipient	Duration (m/m)	Place of study
Aladeselu, I.	3	Budapest, Hungary
Redemi, S.	3	Budapest, Hungary

C-344

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