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Workshop on the
Production of High-Quality Cotton Knitgoods*

Manila, Philippines
17-20 March 1987

REPORT**

* Organized by the International Institute for Cotton (IIC) and the
United Nations Industrial Development Organization (UNIDO).

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BACKGROUND

Cotton accounts for approximately 50% of world consumption of major textile fibres. It is grown in about 70 developing countries including 16 of the 31 countries classified in 1980 by the United Nations as "least developed". For many of these countries it is a key commodity. The total value of the exports of raw cotton and cotton seed products was about \$570 million in 1980-81 (IMF data).

The share of the developing countries in the growth of world cotton production is increasing. Over the last 20 years the average production of the developing countries has risen by approximately 50%, whereas the production of the developed world has declined by 6%.

Cotton is one of the most important generators of employment and economic activity in the Third world. It is estimated that at least 125 million people (cotton farmers, farm workers and their dependents) in the developing countries derive their livelihood from growing and handling raw cotton. A high proportion of these people live in countries where unemployment and under-employment are problems of the highest priority.

Cotton provides the spearhead of industrial development for many countries of the Third World. Some 45-50 million people are dependent on the jobs which have already been created by the rapidly developing cotton textile processing industries in these countries. In order to ensure maximum employment in the rural areas of the cotton producing countries it is essential that their textile industries continue to use cotton as their basic raw material.

Cotton and cotton products provide the developing nations with a major source of foreign exchange. The annual value of the combined exports of raw cotton, cotton seed products and cotton textiles from the developing countries is currently about \$7,000 million. Raw cotton and cotton seed products ranked either first or second in importance as agricultural export earners in about 22 developing countries in 1979/80 and accounted for more than 20% by value of agricultural exports in 15 of these countries.

Cotton is also an important source of food. The cotton seed is the world's fourth most important source of edible oil and the meal provides a valuable cattle food. If fully utilised it could provide 5-6% of the world's total requirements of crude protein.

The growing, processing and exporting of cotton and its products provides an almost ideal means of social and economic development and it is not therefore surprising that the development plans of many of the developing nations are based on the assumption that production of cotton and cotton textiles will remain a major growth factor in their economies. These plans could, however, be frustrated if they had to compete between themselves for a static or declining market.

Although world demand for textiles is forecast to expand at an average of about 1.5-2.0% per year it does not follow that cotton will automatically share in this expansion. The man-made fibres have already captured major sections of the market and, although in absolute terms raw cotton production is at record levels, cotton's share of world fibre consumption has dropped from 72% in 1954 to about 50% in 1984.

Encouraged by their great advances in the 1960's, the man-made fibre producers embarked on massive expansion programmes aimed at capturing an even greater share of the world's textile markets, including the local textile markets of the cotton producing countries themselves.

The Technical Research Division of the International Institute for Cotton (IIC) was set up in 1967 to undertake technical activities necessary to safeguard cotton's position in world markets. Much of its work is concentrated on products or processes which offer the greatest growth potential for cotton and on solving problems which, if unresolved, might lead to loss of markets. In order to remain competitive it is absolutely essential to upgrade the performance of the product at every level.

One of the areas which offers considerable growth potential for cotton is knitted outerwear. There is a strong consumer demand for garments which combine comfort and fashion appeal and which conform to the more relaxed life-style of today. Cotton has always enjoyed great popularity in knitted underwear. The production processes and performance standards for underwear are relatively undemanding but the production of high-quality, dimensionally stable cotton outerwear in attractive colours and fashionable styles introduces completely new considerations. The cotton processor is often faced with unacceptable uncertainties in attempting to produce in volume for the new market.

About nine years ago IIC's Technical Research Division, with substantial financial support from the Overseas Development Administration of the UK Government, embarked on an in-depth programme involving extensive full-scale trials and development work, aimed at putting the manufacture of knitted cotton fabrics on a sound technical base, to encourage the production of high quality products by a larger number of companies.

The project established quantitative relationships between the knitting parameters, the finishing routes and the final product performance for the most important cotton knit constructions. The enormous body of data which was generated (over 1,700 separate fabric samples were produced) has been converted into user friendly programmes which can be handled by semi-skilled personnel on inexpensive computers. Thus, for example, whenever there is a change either in customer specifications or in the finishing process, the knitter can quickly calculate, without resorting to trial and error, what his new knitting parameters should now be. In this way manufacturing risks, development time and cost can be very much reduced and new markets can now be opened up in knitted outerwear from which cotton has hitherto been excluded.

Implicit in the agreement with the ODA was the obligation to disseminate this new knowledge as widely as possible in both developed and developing countries so as to create new markets for cotton and thereby increase cotton utilisation to the benefit of the producing countries. Cotton processors in other countries are now showing an interest in this work and the time is opportune to make this knowledge available to processors in the developing world.

During the course of its work IIC also acquired a great deal of experience and information on many aspects of knitgoods production and this too should be made available to knitters in the developing countries some of whom may not yet aspire to the production of quality knitted outerwear.

Financed by the UK Government's Special Purpose contribution to UNIDO, the IIC organised, in April 1984, a seminar in Manchester to discuss recent developments affecting quality and efficiency in the processing of cotton knitgoods. These included the results of recent research and development work by IIC and demonstrations of the Institute's computerised predictive models, designed to reduce time spent on empirical trials and to ensure greater consistency of product quality.

As a follow-up of the seminar a workshop was held at the South India Textile Research Association (SITRA) in Coimbatore, India from 15th to 19th October, 1984. It was conducted by two IIC experts, Mr. R.D. Leah and Mr. J.T. Eaton. SITRA was responsible for the organisation of the workshop and its technical staff assisted in the practical demonstrations that formed part of the workshop.

A second workshop was held in Mexico City from 19th to 23rd November, 1984 at the premises of the Camara Nacional de la Industria Textil (CANAINTEX). It was also conducted by Mr. Leah and Mr. Eaton.

Because of savings accrued from the seminar and the two workshops sufficient project funds remained to consider holding a third workshop. It was agreed by the UK Government and UNIDO that the location of this extra workshop should be in Brazil which has a large cotton knitting industry.

The staff of Centro de Tecnologia da Industria Quimica & Textil (CETIQT) offered full cooperation to IIC and one of their representatives visited the IIC laboratories for two weeks in February 1986 in order to become familiar with all aspects of the IIC knitgoods work including the use of the computer programmes.

The workshop was held from 2nd to 6th June, 1986 in the facilities of CETIQT and was attended by about 25 senior technical staff from the major knitgoods producers in Brazil. Two directors from SENAI and the UNIDO representative from Brasilia also attended the opening session. The workshop was again conducted by Mr. Leah and Mr. Eaton from IIC Manchester.

In the later months of 1986, ODA agreed that additional funds from the UK contribution to the UNIDO Industrial Development Fund could be made available for further dissemination of IIC's data and know-how on manufacture of knitted cottons.

Following discussions between UNIDO, ODA and IIC, an extension project was developed which included three elements:

- a workshop in Manila, Philippines
- a workshop in Seoul, Republic of Korea
- preparation of "packages" of information for use by knitting mills in developing countries

WORKSHOP IN PHILIPPINES

The logical place to hold a textile workshop in the Philippines is at the Philippine Textile Research Institute (PTRI) in Manila. Following an approach by IIC, the Director, Dr. Eduardo Villanueva, offered the full cooperation of his staff.

In January 1987, the Director of the Technical Research Division of IIC visited PTRI and also had several discussions with the Board of Investment, the Textile Mills Association, the vice president of one of the leading mills, the local UNDP representatives and some UK consultants. The purpose of these meetings was inter alia to:

- review the facilities at PTRI
- confirm the relevance of the workshop in the light of the local political and industrial scene
- make arrangements for the visit of a member of PTRI to visit IIC

On January 31st, 1987, Mr. A.T. Alcantara arrived in Manchester, UK for about a week in order to become more familiar with the technical matters to be presented at the workshop and the arrangements (selection of delegates, participation of PTRI staff, facilities needed, invitations to VIP's etc).

The workshop was held between March 17th and 20th and was attended by 27 senior technical staff from the local textile industry. These included spinners, knitters, finishers, garment makers and a chemical supplier. A full list is attached (Annex 1).

The workshop was conducted by Mr. R.D. Leah and Mr. J. Eaton of IIC Manchester. The programme is attached (Annex 2).

CONCLUSIONS

The universal comment was that the timing and the subject matter could not have been better. There is a major garment exporting industry in the Philippines but it buys virtually all (about US \$32 m) of its knitted fabrics from abroad - Taiwan, Hong Kong etc. The principal reason is that the quality of the locally produced fabric is not good enough for the export market. These quality problems have been made worse by the move to cotton and away from synthetics in response to market demand. Shrinkage is not normally a problem in polyester or nylon fabrics whereas the technology involved in stabilising cotton is more complex. It was precisely this subject which was covered by the workshop.

The knitgoods producers in the Philippines have, in general, good equipment with the necessary means to control quality but none of the delegates was aware of what factors had to be controlled, how such control could be affected and what quality improvements could be expected. This information was provided by the IIC experts and there is no doubt that it will be put into practice. Indeed, when they visited one mill after the workshop, they found the management had already implemented some of their recommendations.

The IIC information presented contained two types of predictive model for calculating the properties of knitted fabrics from the production and processing inputs.

The sophisticated programme was demonstrated on a hired computer and it highlighted the need to measure and control all the essential production parameters in order to produce a quality product. In addition, delegates were each given a slide rule type calculator which had been developed for a similar purpose. Again, demonstrations by the experts emphasized the need for controlling key variables.

All delegates contributed actively and all agreed the event has been extremely valuable. This latter point was reinforced by two decisions taken during the week.

A committee was set up to organise further dissemination of the data and know-how into the Philippines textile industry. Its members are drawn largely from the industry but there are two representatives from PTRI. PTRI has also offered its secretarial facilities to the committee. The Textile Mills Association has also agreed to buy a computer and to buy a copy of the IIC programme when it becomes available in the late summer of 1987. The computer will be sited at PTRI.

One possible weakness exists which needs to be remedied if the industry is to gain full benefit from these very positive actions. PTRI has excellent testing facilities and the staff will be able to operate the IIC computer programme but they lack a sufficient knowledge of knitting technology to be able to offer a full technical service based on the results from the laboratory and from the computer predictive model.

This account would not be complete without a mention of the extremely valuable help which the IIC experts received from the director of PTRI, Dr. Villanueva, Mr. Alcantara and all their staff. They gave demonstrations and explanations of the various test methods and provided classroom accommodation, transportation, meals and refreshments for all involved.

It was a very successful event.

LIST OF PARTICIPANTS

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Vice-President : Mr. Vicente G. Bendicion (PKGMC)
Secretary : Ms. Gloria G. Bondad (PTRI)
Treasurer : Ms. Juliet G. Calangi (LTMI)
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Mr. Robert T. Leah
Technical Manager
Technical Research Division
IIC

Mr. Alfredo T. Alcantara
Chief, Technical Assistance Division
Philippine Textile Research Institute

WORKSHOP PROGRAMME

DAY 1

Introduction and Welcome

Short summary statements by participants

Introduction to IIC -
R.D. LEAH

Outline of the IIC approach to the production of
high quality cotton knitgoods
R.D. LEAH

Terminology -
J.T. EATON

Adjustments and monitoring of fabric quality
on the knitting machine -
J.T. EATON

PRACTICAL SESSION

- measurement of yarn count on cone
 - measurement of yarn count from fabric
 - measurement of stitch length from fabric
- LABORATORY PERSONNEL

Discussion

DAY 2

Knitting to Specification -
J.T. EATON

Outline of useful yarn tests -
J.T. EATON

An assessment of the quality of local yarns -
INSTITUTE STAFF MEMBER

PRACTICAL SESSION

- measurement of courses and wales
 - measurement of weight
 - measurement of spirality
 - measurement of shrinkage
 - measurement of yarn strength
 - measurement of fabric strength
- LABORATORY PERSONNEL

Discussion

DAY 3

The setting of realistic finishing targets -
R.D. LEAH

Achieving the finishing targets in practice -
R.D. LEAH

The Starfish Predictive System

- Description and Outline - R.D. LEAH
- Practical Application - J.T. EATON

The Starfish Fabric Property Calculator -
R.D. LEAH/J.T. EATON

Discussion

DAY 4

Quality and Presentation - Video

New developments in dyeing and finishing -
R.D. LEAH

New developments in knitting -
J.T. EATON

Fabric mercerisation -
R.D. LEAH

Discussion and concluding session