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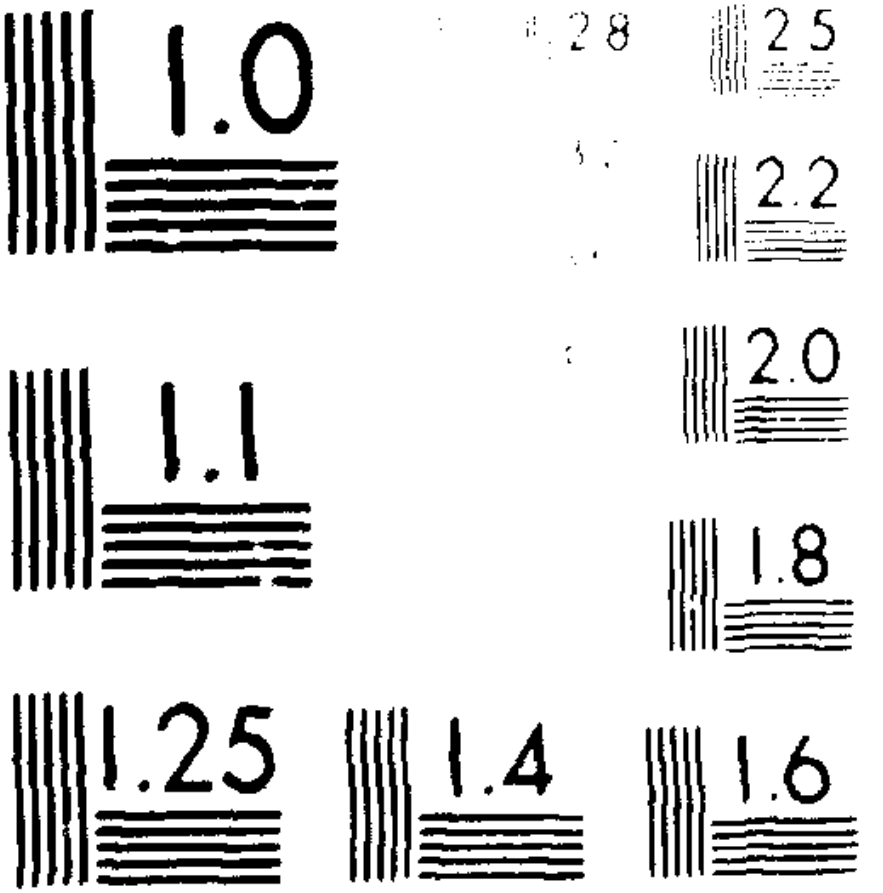
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DP/ID/SER.A/250
23 September 1980
English

DIVERSIFICATION AND DEVELOPMENT OF NEW FABRICS : PHASE II

DP/IND/76/023

INDIA

Technical Report: Progress Made and Preparation for Phase II*

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

Based on the work of Malcolm.S. Burnip, Project Consultant

United Nations Industrial Development Organization
Vienna

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C O N T E N T S

Annexes

Explanatory Notes

References to dollars ($) are to United States dollars.

The monetary unit in India is the rupee (Rs). During the period covered by this report, the value of the rupee in relation to the United States dollar was approximately US$ 1 = Rs 9. This value and conversion rate has been used in this report.

The following abbreviations of organizations are used in this publication:

SITRA - South India Textile Research Association

ATIRA - Ahmedabad Textile Industries Research Association

BTRA - Bombay Textile Research Association

CSIR - Council for Scientific and Industrial Research

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INTRODUCTION

The Government of India requested assistance from the United Nations Development Programme (UNDP) for a project (1) Diversification and Development of New Fabrics, South India Textile Research Association which after approval (DP/IND/73/004) commenced in 1975 for a period of eighteen months.

The United Nations Industrial Development Organization (UNIDO) was the executing agency with the Council of Scientific and Industrial Research (CSIR) acting through the South India Textile Research Association (SITRA) as the cooperating agency.

The UNDP contribution totalled $ 64,350; the contribution of the Government of India totalled $ 99,710. That proposal constituted Phase I of the current project.

A. Phase I

During Phase I a UNIDO expert (Mr. K.P. Moltu) spent eighteen months at SITRA to assist in the implementation of the first phase. His report (2) contains his findings and recommendations concerning those activities with which he was concerned.

Towards the end of Phase I an UNIDO consultant (Dr M.S. Burnip) went to SITRA for one month to assess the achievements of Phase I and to review the proposal for Phase II, which had then been prepared, in the light of his findings. His report (3) included a review of the work in progress in relation to the objectives of Phase I, the development of a comprehensive research and development programme (4) and recommendations for the modification of the Phase II proposal.

His conclusions in relation to Phase I were:

(i) two technical officers had been trained through UN Fellowships and, in part, by the UN expert in knitting technology;

(ii) one technical officer with a background in knitting technology already was in post; the partial development of a knitting laboratory had taken place in a laboratory of more than adequate proportions though air-conditioning should be installed if research was to be carried out for comparison with other sources; the development of a range of exemplar fabrics had been undertaken; and some progress towards the objectives of the programme had taken place.

The report listed the shortfalls of the Phase I programme as:

(a) a lack of trained personnel of experience and knowledge to direct both the research and training functions;

(b) until August 1977 the most knowledgeable (at that time) knitting technologist was away from SITRA;

(c) the other (at that time) UN fellow would not have recommenced his duties until August 1977 and would need to spend a substantial amount of time devising training courses and procedures;

(d) any UNDP support under a Phase II project would not only be required to commence from the base evaluated in this report, but would, by its various inputs, generate more demands upon staff who already have a full time commitment in progressing the incomplete aims referred to above.

following from this analysis the Phase II project as conceived in the project document was analysed and a revised proposal drafted (5) and agreed with the Director and staff of SITRA.

The recommendations made for such a revised proposal included:

(a) the appointment of a suitably qualified and experienced person with either a sound knowledge of knitting technology or other qualities fitting him for the position of project leader;

(b) the appointment of at least five technical officers to undertake specific duties with respect to technical services, research and development in knitting, making-up, dyeing and finishing, and training;

(c) the provision for UNIDO experts in training, dyeing and finishing and making-up totalling 12 man months and a consultant for 1 man month;

(d) the provision of UN fellowships in dyeing and finishing and making-up totalling 18 man months, with a possible increase by three months for the project leader, dependent upon his background;

(e) an increased Government input of indigenous equipment to allow for additional making-up and dyeing activity;

(f) a redetermined UNDP machinery input totalling an estimated £ 62,000 with a 10 per cent allowance for spares and packing;

(g) the provision of an operating timetable to ensure experts and fellows are present at SITRA at the same time;

(h) the provision for the machinery input to arrive in the second part of the project, so that it can be utilized readily on receipt (this should not prevent the ordering of agreed items at an earlier date);

(i) the implementation of the detailed research and development programme (Annexe III refers);

.../..

(j) the detailing of more complex dyeing and finishing equipment, as originally specified in Annexe III (d) by the dyeing and finishing expert during his period of duty; and

(k) the purchase, notwithstanding (h) and (j) above of certain limited items of equipment costing an estimated $ 5,000 at the commencement of the programme, to enable certain of the research studies to be carried out. It was also agreed that the revised proposal offerred an obtainable objective to SITRA, designed to leave them with considerable expertise in knitting technology and related topics, and the textile industry especially in South India, better served with training facilities, instrumentation, processing assistance and techno-economic data of knitting processes, knitted products and end-use requirements and as such this revised proposal be recommended to the UNDP.

B. Interregnum Phase

During the period between the termination of Phase I and the resubmission of a revised Phase II proposal, some implementation of the requirements of the revised proposal as detailed above, were implemented. These included:

(i) the appointment of Dr. V.R. Sivakumar as project leader and head of a newly created division of knitting technology at SITRA;

(ii) the implementation of aspects of the research and development programme specified in the UNIDO consultant's report;

(iii) the return of the UN fellows designated under Phase I and their intergration into the ongoing work;

(iv) the operation of some training courses for industry and other organizations; and

(v) the build up of the knitting laboratory at SITRA by the acquisition of certain items of indigenously available equipment.

C. Phase II

A new Phase II proposal (6) was submitted to the UNDP by the Government of India on 12 November 1979 and signed by UNDP on 12 December 1979. This project Diversification and Development of New Fabrics, Phase II (DP/IND/76/023) named UNIDO as the Executing Agency with the Ministry of Industry as the Indian Government Co-operating Agency acting through SITRA. The estimated started date was envisaged as April 1980 with the UNDP contribution totalling $ 259,300 and the contribution of the Government of India $ 121,500: the duration of the project is two years.

The proposal seeks the aid of a UNIDO consultant at the end of the project, but in April 1980, SITRA requested through the Government of India and UNIDO subsequently agreed that there should be a visit by a consultant at the commencement of the second phase.

.../..

In addition to his assigned duties (7) the consultant was asked by UNIDO to review progress in relation to the development of the second phase programme and to produce job descriptions for the three UNIDO experts required during Phase II.

I. FINDINGS

A. Phase II Proposal

Project Objectives

The overall project objective is: to contribute to increased employment opportunities in the knitting industry in South India, to greater manufacturing stability and to the development of a strong and viable knitting sector capable eventually of developing larger export markets.

The immediate objectives of this phase of the project are:

(i) to increase the capacity of the South India Textile Research Association to provide training and specialised technical advisory services to the spinning mills and the knitting industry of South India in th production, dyeing and finishing of yarns, knitted fabrics and garments;

(ii) to strengthen SITRA's capacity for applied research and development;

(iii) to provide through SITRA, technical assistance to industry, including the development of instruments and machine accessories and the provision of advice related to improved yarn, fabric, making-up and dyeing and finishing routines.

Outputs

The project is seen as producing the following outputs in order to achieve those immediate objectives:

(i) a trained team of at least six qualified technical officers, including a team leader, to undertake research and development and to provide training and extension services to industry in knitting, garment making and dyeing and finishing;

(ii) a suitably equipped research and development facility for product development and testing and for development work on instruments and machine accessories for the fabric, garment and finishing industries;

(iii) a long term research and development programme;

.../..

(iv) syllabuses and course material for practical training courses in modern knitting methods of setting, operation and maintenance of existing equipment, in management and quality control techniques, in garment making, and in improvement and control of fabric finishing using existing equipment;

(v) development of new instruments and machine accessories to assist in the production of articles with improved characteristics, low fault rates and increased performance by a more efficient and reproducible use of manufacturing equipment;

(vi) recommendations to improved yarn, fabric, making-up and dyeing and finishing routines; and

(vii) selected research studies.

Activities

The proposal perceives (8) a number of activities being undertaken to achieve the above outputs. These include the development and training of five technical officers and these subsequent deployment to provide services to industrial units; the provision of resources and installation of equipment; the preparation and implementation of a research and development programme; the assessment of training requirements and the preparation and implementation of training programmes.

Inputs (1) Government of India (Personnel)

The inputs for the second phase of the project are listed (9) in the proposal. They include a project leader and five 5 technical officers, three 3 technical assistants and 7 other personnel all the duration of the project.

(2) UNDP (Personnel)

As recommended previously this includes 15 man months of UN expert help, 1 man month of a consultant and 18 man months of UN fellowships.

(3) Machinery

The Government of India input excluding premises comprises equipment as shown in Annexe III (a) of the proposal (10) and totalling $ 55,000.

The UNDP input of equipment, given in Annexe III (b) of the proposal (11) totals $ 138,500.

Programme

1. On arrival at the duty station a briefing meeting was held with the Director of SITRA about progress on the project to date and with the research programme (12) previously prepared. Several subsequent meetings about various aspects of the project were subsequently held with the Director. A number of factors including the absence of the project leader on a study tour, inability to recruit staff and pressure on existing staff from other sources had resulted in progress being less rapid than had been anticipated.

.../..

2. To judge the development of the research position overall and the position in relation to the project in particular all the annual and research reports over the past four years were read and studied. A list of those received is given in Annexe I.

3. A tour of the SITRA laboratories and inspection of equipment installed in conjunction with the various divisional heads enabled the progress with the development of resources to be judged.

4. In order further to assess the progress made in SITRA in relation to the project, a series of meetings was held with the project leader, the technical officers in post and the deputed UN fellows.

5. A series of separate meetings was held with divisional heads in SITRA to ascertain their progress to date with the research programme and to judge their contribution to the project. Subsequently a joint meeting was held with all divisional heads including the head of administrative services to ascertain progress overall and to discuss some of the difficulties that had arisen with the project.

6. Concurrently heads of the appropriate divisions and the appropriate technical officers in conjunction with the project leader were asked to indicate their requirements from the UN experts to be provided, so that appropriate job descriptions could be prepared.

7. A similar procedure was carried out in respect of the machinery inputs both by the Government of India and the UNDP in order that machinery specifications could be prepared.

8. To judge the continuing applicability of the research programme previously provided and to ascertain how the industrial situation in the South Indian textile industry had changed, a series of visits to spinning, knitting, dyeing, printing and making factories was held. In addition a visit to a knitting machinery building firm in Coimbatore was made and discussions held with industrialists from spinning and dyeing organizations. A list of the organizations visited is given in Annexe II. A visit was also arranged to the UNDP project (13) based on the Punjab State Hosiery Company in Chandigarh to ascertain progress in the knitting industry in North India.

9. A lecture was given to the South India branch of the Textile Institute on the subject of Economic Models of Fabric Production. A meeting to discuss the training of textile technologists at SITRA and elsewhere was held with the trainees and attended by some of the divisional heads at SITRA.

10. Discussions were held with both the deputed UN fellows. In the case of the fellow in making-up some confirmatory correspondence was made about his programme. In the case of the UN fellow in dyeing and finishing, doubts were expressed about his suitability without adequate industrial training.

.../..

Findings

Generally the progress made over the past three years was disappointing, though there were some achievements

A. Equipment

The knitting laboratory has received inputs of equipment, mainly of Indian origin in the form of knitting and making-up equipment, but including some fabric pressing and washing facilities. Detailed specifications for all equipment to be provided by the Government of India were prepared and estimated costs made against the budgetted cost in the proposal. Several items of equipment had been obtained in advance of the project commencement. Several additional items had been added to the list of equipment following preparation of the proposal. Estimated and budgetted costs for all these items are given in Annexe V which contains both a summary and detailed specifications.

No equipment from that to be provided by the UNDP had been obtained, nor had any orders been placed. Advice was given on the types of equipment required and detailed specifications for all equipment was drawn up. **These are given in Annexe VI which also contains a summary and estimated and** budgetted prices.

Some ammendments to the proposed list of items were made.

It should be noted that the budgetted prices in the proposal for items contained in the UNIDO consultant's report (15) of three years ago had not been changed in price despite substantial increases in world textile machinery prices. Consequently there is an estimated shortfall of ^ 55,700 for the purchase of equipment. Similarly because of additions to the Government purchased listing there is an estimated short of ^ 14,730 on that part of the programme.

B. Staff

The project proposal lists a project leader and five technical officers as being available to the programme, but appears to provide financial resources (16) for only three.

Currently there are in post the project leader and four technical officers, two of whom require training before they can provide any substantial or worthwhile inputs to the work. There is currently no technical officer with expertise in training available to the programme.

In addition the demands of any research and training programme would be expected to require considerable inputs from other divisions of SITRA.

The number of other personnel such as knitters, mechanics and other assistants available to the programme is at this time less than specified.

.../..

C. Training Programmes

The number of training programmes run specifically in relation to the needs of the project following the consultancy visit in 1977 which stressed the importance of ad hoc programmes to aid the hosiery and related industries, was found to be disappointingly small. Two courses for the executives of knitting factories and a small number of practical courses of instruction on hand flat machines had been held.

Whilst the confidence of the executives of the local knitting industry had been gained by the two courses run in 1978, no attempt to capitalize on this had been made. Equally no attempt to meet the needs of training at technician or mechanic level had been made. The effect of the time lost in this important area of activity is difficult to judge; certainly the requirement for a more concerted effort in this aspect of the programme was realised.

Other than the official training programmes arranged through UN fellowships, little systematic training within SITRA had undertaken to ensure those associated with the project developed an appropriate understanding of fabrics and an attitude to the aims of this endeavour.

D. Research and Development Programme

The meeting with heads of divisions individually and collectively enabled the research programme developed in 1977 to be assessed. It was agreed that only approximately 20 per cent of the topics had been fulfilled. The work in the knitting division had been hampered by the absence on study leave of the project leader and by the resignation of one of the technical officers in knitting technology, nevertheless a useful study on hosiery yarn had been completed and the first part of a more fundamental study of knitted fabric geometry commenced.

The divisions of instrumentation and engineering had fulfilled a number of studies which manifested themselves in instrument - some of them taken up commercially, or protype machinery.

A full survey of work to date is given in Annexe VIII whilst the publications and reports arising from the work are contained in the general publications reported in Annexe I.

E. Other Activities

A certain amount of technical liason work and problem solving of an ad hoc nature had been undertaken including assessments and feasibility studies on behalf of other organizations.

From the extensive number of visits to industrial firms, the following impressions were gained:

(i) there is a general acceptance that SITRA is attempting to provide assistance to the knitting and associated industries of South India;

.../..

(ii) there is a considerable interest amongst knitters in the manufacture of outerwear as opposed to the traditional product of underwear;

(iii) there is a wish, certainly amongst the more progressive firms to raise their standards;

(iv) there is a wish to see greater use of synthetic fibre either alone or in blends and especially for outerwear.

(v) there is realisation that current dyeing and finishing practices - especially in relation to the attainment of dimensional stability, pose substantial difficulties in the way of improved processing capability;

(vi) there is an equally strongly held view that the printing of knitted fabrics and garments as currently practised is an even greater fundamental weakness;

(vii) with the movement to the production of outerwear the need for design becomes a greater reality;

(viii) a movement towards larger organizations capable of taking advantage of the benefits of technology and size, is taking place;

(ix) there was a need for short term training courses for foremen, mechanics and similar personnel in knitting, dyeing and making-up.

Noting these matters, it was considered important to frame any further research programme in the light of these industrial requirements.

II. RECOMMENDATIONS

A. Equipment

In drawing up the detailed machinery specifications two points became evident:

(i) the shortfall previously mentioned in the estimated cost of equipment due to not up-dating the cost of items specified three years ago and due also to the rapid world rise in machinery prices;

(ii) the need to change the equipment listed in some instances. To enable an adequate range of activity to be pursued in the revised research programme (- see later) a supplementary list of desirable equipment was also made. This is shown in Annexe XI.

.../..

1. It is recommended that the ordering of equipment, both that provided by the Government of India and by the UNDP be implemented as quickly as possible using the equipment specifications detailed in Annexes V and VI.

2. In the case of the UNDP funded equipment, because of the specialized nature of a Research Association's requirements it is also recommended that the consultant is retained to advise on the results of tenders and if necessary to provide further information to likely suppliers.

3. In the case of the Government of India's contribution, it is recommended that equipment from that source be purchased against the specifications made as soon as possible.

B. Fellowships

4. **It is recommended that Mr. Venkathaparthy follows from September 1980** as planned the post experience Diploma in Clothing Technology at Manchester Polytechnic in England.

5. In the case of Mr. Narasiman it is recommended that he does not take up his UN fellowship until he has completed satisfactorily an approved programme of practical training in India: it is further recommended that his fellowship programme in detail be advised upon by the dyeing and finishing expert when he visits the project.
Details of these fellowship programmes are given in Annexe III.

C. UN Experts and Consultant

6. Detailed job specifications for all four posts were drawn up and are given in Annexe IV. It is recommended that these be adopted and suitable personnel searches made. The consultant could be used to advise on appropriate candidatures where necessary.

7. It is recommended that a consultant visit the project at the end to review the progress made and the extent to which the objectives have been met. Unless previously provided for, this will entail a further UNDP contribution of approximately $ 10,000.

D. Training Programmes

8. To meet the objectives of the programme a substantial effort must be made to develop and operate appropriate training courses of a short term nature.

An analysis of potential needs is given in Annexe VII. It is recommended **that an orientation course related to the project and its background technology be arranged internally and immediately for all heads of divisions at SITRA.**

.../..

9. It is recommended that all technical officers and junior staff at SITRA from other divisions likely to be involved in co-operation with the knitting division in the detailed implementation of the project be required to attend a lecture and practical course in the appropriate technological subjects including knitting technology and managerial topics encompassed by the programme: this training course to be implemented immediately after the background course for divisional heads.

10. It is recommended that at least one technical officer be appointed full time to the project to assist in the development, operation and evaluation of short training courses to the industry.

11. It is further recommended that the technical officer for training be given an internal technological course before commencing his duties.

12. It is recommended that the analysis of training needs made in Annexe VII be acted upon and appropriate courses developed and put into operation.

E. Research and Development Programme

13. A revised and comprehensive research programme for each division of SITRA was developed. This is in addition to those items of research left over from the previous programme which are to be carried forward. This research programme is shown in Annexe IX. It is recommended that this be implemented by all divisions and that appropriate staff provision to contribute to this programme is made.

F. Work Plan and Bar Chart

14. In view of the amended timings of the programme indicated earlier, it is recommended that July 1980 be accepted as the starting date for the project.

15. It is further recommended that the revised Work Plan shown in Annexe X is adopted.

G. Project Finance and Additional Requirements

16. In view of the findings given in this report and the identified shortfalls in the budgetted figures for equipment, it is recommended that the Government of India input be increased by the equivalent of $ 14,450 to $ 62,615 and that the UNDP contribution be increased by $ 55,700 to $ 194,200.

.../..

17. In addition to allow for additional items of equipment identified as necessary for the programme under Phase II, the Government of India contribution it is recommended is increased by the equivalent of $ 11,170 and the UNDP contribution is increased by $ 30,000.

18. To provide for an additional UN Fellowship and the provision of a UN Consultant at the end of the project it is recommended that the UNDP contribution is increased by $ 20,000.

19. Should the need for annual consultancy reviews be adjudged necessary for this project, their cost would be additional to the above figures and estimated at approx $ 10,000 per annum.

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2. K P Moltu : UNIDO Expert Terminal Report 1977
3. M S Burnip UNIDO Consultant Report 1977
4. idem ibid. Appendix III
5. idem ibid. Appendix VI
6. Diversification and Development of New Fabrics Phase II SITRA 1979. DP/IND/76/023.
7. UNIDO Knitting Consultant : Job Specification 1980.
8. Diversification and Development of New Fabrics Phase III 1979 Page 7
9. idem ibid page 8
10. idem ibid page 26
11. idem ibid page 27
12. M S Burnip, UNIDO Consultant, Report 1977, Appendix III.
13. DP/IND/73/021
14. Diversification and Development of New Fabrics Phase II, 1979 Annex II p.23
15. M S Burnip, UNIDO Consultant Report 1977, Appendix VI
16. Diversification and Development of New Fabrics: Phase II 1979, page 15

ANNEXE I

DOCUMENTS RECEIVED AND USED AS BACKGROUND TO PROJECT

1. South India Textile Research Association:

Annual Report - 1976-77
1977-78
1978-79
1979-80

2. Joint Technological Conferences by ATIRA, BTRA and SITRA

18th Conference 3-4 Feb. 1977
19th Conference 10-11 Feb. 1978
20th Conference 9-10 Feb. 1979
21st Conference 14-15 Feb. 1980

3. Individual Publications:

(i) V.Rudraswamy: A survey on absenteeism - an inter-firm comparison, SITRA, Vol.22, No.2, Aug. 1977.

(ii) P.V.Veeraraghavan and G.F.S.Bagyam: Technical and Clerical staff in textile mills, SITRA, Vol.22, No.5, Oct. 1977.

(iii) K.Govindarajulu and R.Nataraj: Optimum process stock, SITRA, Vol.23, No.1, March, 1978.

(iv) M.Ramachandran: A technical survey of carding engines, SITRA, Vol.23, No.4, December, 1978.

(v) V.Rudraswamy and D.Mohanraj: A comparative study of strike prone and strike free mills, SITRA, Vol.23, No.2, Nov. 1978.

(vi) S.Rajagopalan: Labour and machine productivity and stores cost in weaving (sixth survey), SITRA, Vol.24, No.1, July, 1979.

(vii) Indra Doraiswamy: A survey on spinning costs (3rd survey), SITRA, Vol.24, No.3, August, 1979.

(viii) R.Rajamanickam, R.Ranganathan and T.V.Ratnam: Labour and machine productivity in spinning (17th Survey for Sept.78), SITRA, Vol.24, No.4, October, 1979.

(ix) V.Rudraswamy and D.Mohanraj: A study of participative management in the textile industry, SITRA, Vol.25, No.1, Feb. 1980.

(x) ATIRA, BTRA and SITRA - Inter-firm comparison of financial performance - an inter-laboratory project(for 1976-77),SITRA, 1980.

(xi) SITRA - A study of organisational and technical methods necessary for improving and maintaining exports of readymade handloom garments (Project sponsored by Indian Government), SITRA, Oct. 1979.

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(xiii) T.M.K.Varma and V.R.Sivakumar: A survey of the quality of knitting yarn, SITRA, Vol.24, No.2, August 1978.

(xiv) Indra Doraiswamy: Product standardisation in spinning, SITRA, Vol.23, No.3, October, 1978.

(xv) Indra Doraiswamy and C.P.Ramaswamy: Productivity in reeling and cone winding, SITRA, Vol.25, No.2, May, 1980.

(xvi) S.G.Vinzanekar and V.R.Ingale: A study of hairiness in ring spun blended yarns with special reference to measuring techniques, 18th Tech. Conference, BTRA, 1977, 7.1.

(xvii) S.S.Raje and S.S.Moraye: The effect of some sizing parameters on the hairiness of yarns, 18th Tech. Conference, BTRA, 1977, 11.1.

(xviii) K.S.Shankaranarayana and K.T.Thomas: Effect of waxing and moisture on knitting performance, 18th Tech. Conference, BTRA, 1977, 12.1.

(xix) H.U.Mehta, P.Neelakantan and J.T.Sparrow: A laboratory study with the aid of the scanning electron microscope in wet processing of cotton fabrics

(xx) K.S.Shankaranarayana, V.R.Sivakumar and T.M.K.Varma: Study on use of mercerised single yarn for knitting, 19th Tech. Conference, ATIRA, p.97.

(xxi) S.D.Supanekar: Mathematical representations of Interlacements 19th Tech. Conference, ATIRA, 1978, p.122, Part I.

(xxii) A.M.Dave, T.K.Das and G.L.Madan: Studies on soiling and soil removal behaviour of crosslinked cotton fabrics, 19th Tech. conference, ATIRA, 1978, p.55, Part 2.

(xxiii) G.V.Sarma, S.Singh, A.P.Singh, A.K.Jain, M.R.Maji and J.K.Gulati: Prediction of in-service wear performance of cotton durable press shirts, 19th Tech. Conference, Part II, ATIRA, 1978, p.63.

(xxiv) G.V.Sarma, M.R.Maji, B.C.Verma, A.K.Aggarwal, A.P.Singh and S.Singh: Studies in dilute polyester cotton blends, 19th Tech. Conference, Part II, ATIRA, 1978, p.70.

(xxv) K.N.Seshan and T.V.Ratnam: Frictional behaviour of blended fibre assemblies, 19th Tech. Conference, ATIRA, Part II, 1978, p.95.

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(xxvii) K.N.Seshan and T.V.Ratnam: Irregularity of blended fibre assemblies, 20th Tech. Conference, SITRA, 1979, 15.1.

(xxviii) S.G.Vinzanekar and C.D.Kane: A study of cotton-polynosic and cotton-viscose blended yarns, 21st Tech. Conference, BTRA, 1980, p.20.

(xxix) S.D.Supanekar, S.N.Misra, R.Vasudevan and P.H.Kothari (BTRA): Increasing the efficiency of the Autoconer, 21st Tech. Conference, BTRA, 1980, p.33.

(xxx) G.M.Venkatesh, T.K.Das and S.Pal (ATIRA): Durable and non-durable antistatic agents - structure/property correlations, 21st Tech. Conference, BTRA, 1980, p.68.

(xxxi) K.P.R.Pillay and N.Ramani (SITRA)m Mercerisation of cotton/man-made cellulosic fibre blends and its influence on yarn quality, 21st Tech. Conference, BTRA, 1980, p.81.

(xxxii) K.T.Aswani, V.S.Risbud and G.V.Aras (VJTI): Some aspects of resistance to abrasion of fabrics, 21st Tech. Conference, BTRA, 1980, p.91.

(xxxiii) D.V.Muniswamy and N.Sriraman (SKSJT): Fabric engineering - intra and inter relationships of geometrical and physical properties of commercial fabrics, 21st Tech. Conference, BTRA, 1980, p.95.

ANNEXE II

Organisations and Firms Visited, and Discussions Held.

Monday 21-7-80

i. Gopalakrishna Mills Ltd.,
Palladam
(Spinners of 40s combed knitting yarns)

ii. Knitting and Textile Machinery Works (Knitmac),
Coimbatore-6
(Manufacturers of knitting machinery)

Tuesday 22-7-80

Coimbatore District Industrial Workers
Co-operative Society, Coimbatore-11
(Handloom weaving)

Wednesday 23-7-80

i. Leela Hosiery Mills,
Tirupur (Mr. Gangadharan)
(Knitting and making up)
(Dyeing)

ii. Printing Factory,
Tirupur
(Hand printing of knitted fabrics and garments)

iii. Quick Knitting Mills,
Tirupur
(Terry Fabrics)

iv. Tirupur Textiles Pvt Ltd.,
Tirupur. Knitting Division
(Knitmac-SITRA Positive feed)

v. Crystal Garments - 2 Factories
(Mr. Jayabal) Tirupur
(Making-up of Cotton outerwear and underwear)

vi. Panama Hosieries,
Tirupur
(Exporters of Outerwear)

vii. City Knitting Mills,
Tirupur
(Raising of knitted and woven fabrics)

Monday 28-7-80	United Bleachers Ltd., Mettupalayam (Mr.Bangaruswamy) (Dyeing, Finishing and Printing of woven fabrics)
Tuesday 29-7-80	i. SITRA Powerloom Service Centre, Kumarapalayam (Mr. Murugesan)
	ii. Braiding Factory, Kumarapalayam
	iii. Powerloom Factories, Kumarapalayam - 2 Units
	iv. S.S.M. Processing Mills, Kumarapalayam (Dyeing, Finishing, Printing and Embroidary of woven fabrics)
	v. Tirupur Textiles Private Ltd., Bhavani (Mr. Baskaran) (Bleaching and Dyeing of Knitted Fabrics)
	vi. Handloom Carpet Weaving Factory - Bhavani.

ANNEXE III

U N Fellowship Programmes

(1) Mr.N.L.Narasimhan

Introduction

This candidate has been recommended to undertake a period of industrial training in India prior to his UN Fellowship. The programme is expected to pre-date Mr. Narasimhan's UN Fellowship and to have been completed satisfactorily and in full before the UN Fellowship is taken up. The purpose of the Technical Officer in Dyeing and Finishing is that he should contribute to:

i. research and development;

ii. training and technical liaison services, in the bleaching, dyeing, printing and finishing of knitted goods, especially those made of cotton and cotton blended yarns.

Analysis

The candidate has a first degree in physics with chemistry, but has subsequently followed a post-experience training course in textile chemistry. He has no practical experience of the dyeing and finishing industry and none of hosiery and knitted goods finishing in particular.

Programme

(1) This must include experience in a modern dyeing and finishing works dealing with cotton and cotton blended fabrics.

This experience must include hands-on operation of all stages of processing including the operation of equipment and not just the observation of others. It should include a minority of the time dealing with testing and quality control and some time dealing with dye kitchen control and recipe production.

(2) It is essential that a period of time in the dyeing, printing and finishing of knitted goods is included in this works-experience. This should include both a modern dye-works dealing with knitted goods and a bleaching and dyeing plant for hosiery goods of the type used by the majority of knitters in South India.

Durations: (i) Modern dyeing, printing finishing works : 3 months

(ii) Modern hosiery dye house : 2 months

(iii) Country bleaching and dyeing works for knitted goods : 1 month.

Timing : this programme should if possible commence in September 1980 until March 1981.

In view of the timing of other UN experts' visits it is suggested that the candidate takes up his UN Fellowship after the visit of the UN expert in dyeing and finishing, ie. approximately October 1981. This would give some opportunity for the expert to suggest some of his programme.

(2) Mr. D. Venkatapathy

Introduction

This candidate had been given an industrial training programme in making up involving periods in several factories before his proposed Fellowship commences.

Arrangements have been made, subject to confirmation from the receiving institution, for Mr. Venkatapathy to spend an academic year at Manchester Polytechnic taking a post experience diploma course in Clothing Technology, followed by a period of industrial training in the making-up industry in Great Britain.

This programme is due to commence in September 1980 and the candidate will have returned by the time the U N expert in making-up is scheduled to arrive in Coimbatore in October 1981.

ANNEXE IV

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO 11 September 1980

PROJECT IN THE REPUBLIC OF INDIA

JOB DESCRIPTION

DP/IND/76/023/11-01/31.7.B

Post title	Training Adviser
Duration	Three months
Date required	January 1981
Duty station	Coimbatore
Purpose of project	The project aims to strengthen and develop the capacity of the South India Textile Research Association (SITRA) to undertake research, provide specialist advisory services and to conduct industrial training courses for the benefit of the spinning, knitting, dyeing and finishing and making-up mills and factories of South India.
Duties	The expert will work in conjunction with the Director and Project Leader at SITRA and will be expected to:

(i) familiarize himself with the state of organization and development of the knitting, bleaching, dyeing, printing and finishing, making-up and related textile industries of South India;

(ii) identify those areas and job function both within SITRA and in the above industries which require training programmes;

..../..

Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

(iii) with the assistance of the local counterpart responsible for training, develop a training programme suitable for the knitting industries in India and with particular reference to the needs of small-scale organizations;

(iv) prepare with the assistance of the local counterpart and technical staff of SITRA a detailed syllabus for the training programme;

(v) organize, implement and evaluate the first course as a demonstration of training activities, and advise, if necessary on the modification of the programme for optimum results;

(vi) advise on the schedule for the implementation of other internal and external training programmes for dyeing and making-up.

The expert will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government.

Qualifications — A degree or professional qualification in textile technology or mechanical engineering or chemical technology with supporting studies in textiles. A formal qualification in training would be advantageous.

Experience — Experience of the textile industry, especially the knitting or making-up sectors and extensive experience in the preparation and evaluation of curriculum for training courses in knitting, and preferably making-up or dyeing and finishing.

Language — English

Background Information — During the first phase of this project the UNDP/UNIDO assistance concentrated upon the improvement in yarn quality, training in knitting technology and the provision of technical services to the knitting industry.

The present phase aims to build upon the achievements of the first phase and to develop further the expertise of SITRA staff in relation to the needs of the knitting, dyeing and finishing and making-up industries. It will also extend appropriate research and development activities in these areas related to the needs of the hosiery and associated industries both short term and longer term. It will also institute technical liaison and training courses in these three areas of industrial activities.

In addition to the duties performed by the expert in training, other UNIDO experts in knitting, dyeing and finishing and making-up as well as the services of an overall project consultant will have been, or will be, made available to the project.

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO 11 September 1980

PROJECT IN THE REPUBLIC OF INDIA

JOB DESCRIPTION

DP/IND/76/023/11-02/31.7.B

Post title	Dyeing and Finishing Technologist
Duration	Six months
Date required	April 1981
Duty station	Coimbatore
Purpose of project	The project aims to strengthen and develop the capacity of the South India Textile Research Association (SITRA) to undertake research, provide specialist advisory services and to conduct training courses for the benefit of the spinning, knitting dyeing and finishing, and making up mills and factories of South India.
Duties	The expert will work in conjunction with the Director and Project leader at SITRA and will be expected to:

(i) survey practices in the bleaching, dyeing, printing and finishing of knitted fabrics and garments together with the associated dyeing and finishing of yarn, and to familiarize himself with the current mode and scale of operations;

(ii) advise on the specification and planning of laboratory scale equipment and instrumentation for the bleaching, dyeing, printing and finishing of textile materials, especially those of knitted fabrics and garments;

..../..

(iii) advise on a continuing research programme in dyeing, printing and finishing, including the development of equipment and instrumentation for use both internally and by the industry;

(iv) assist in the internal training of SITRA staff;

(v) assist in the development of training courses for industrial bleachers, dyers, printers and finishers;

(vi) assist in the setting up at SITRA of a technical service facility in dyeing and finishing.

(vii) to advise on a programme of overseas visits, experience and training in the dyeing, printing and finishing of knitted goods for the local counterpart on a UN Fellowship of six months.

The expert will also be expected to prepare a final report setting out the findings of his mission and his recommendations to the Government.

In addition to the duties performed by the expert in dyeing and finishing, other UNIDO experts in knitting, making-up and training for the textile and garment industries as well as the services of an overall project consultant will have been, or will be, made available to this project.

Qualifications — A degree (and preferably a post graduate qualification) in colour chemistry, textile chemistry or chemical processing.

Experience — Extensive experience in the dyeing and finishing of knitted fabrics and garments especially those from cotton and cotton blended yarns. Knowledge and experience of the printing of knitted goods would be advantageous.

Language — English

Background Information — During the first phase of this project the UNDP/UNIDO assistance concentrated upon the improvement in yarn quality, training in knitting technology and the provision of technical services to the knitting industry.

The present phase aims to build upon the achievements of the first phase and to develop further the expertise of SITRA staff in relation to the needs of the knitting, dyeing and finishing and making-up industries. It will also extend appropriate research and development activities in these areas related to the needs of the hosiery and related industries both short term and longer term. It will also institute technical liaison and training courses in these three areas of industrial activities.

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO 11 September 1980

PROJECT IN THE REPUBLIC OF INDIA

JOB DESCRIPTION

DP/IND/76/023/11-03/31.7.B

Post title Clothing Technologist

Duration Six months

Date required October 1981

Duty station Coimbatore

Purpose of project The project aims to strengthen and develop the capacity of the South India Textile Research Association (SITRA) to undertake research, provide specialist advisory services and to conduct courses for the benefit of the spinning, knitting, dyeing and making-up mills and factories of South India.

Duties

Duties The expert will work in conjunction with the Director and Project leader at SITRA and will be expected to:

(i) survey garment making from knitted fabric, especially in South India and familiarize himself with local and national practices and resources for garment manufacture;

(ii) advise on the selection and organization of making-up equipment at SITRA;

(iii) advise on a continuing research programme in making-up, including the development of equipment and instrumentation;

..../..

Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

(iv) advise on the development of internal training programmes in making-up for SITRA staff;

(v) assist in the development of training programmes for the hosiery making-up industry;

(vi) advise SITRA staff on the operation of technical service functions to industry in factory organization and quality control.

The expert will also be expected to prepare a final report setting out the findings of his mission and his recommendations to the Government.

Qualifications — A degree, diploma or professional qualification in clothing technology or the manufacture of knitwear and knitted goods (circular).

Experience — Extensive experience in the making-up of knitted underwear and outerwear garments from cotton and cotton blends, especially in small scale production units.

Language — English

Background Information — During the first phase of this project the UNDP/UNIDO assistance concentrated up on the improvement in yarn quality, training in knitting technology and the provision of technical services to the knitting industry. The present phase aims to build upon the achievements of the first phase and to develop further the expertise of SITRA staff in relation to the needs of the knitting, dyeing and finishing and making-up industries. It will also extend appropriate research and development activities in these areas related to the needs of the hosiery and related industries both short term and longer term.

It will also institute technical liaison and training courses in these areas of industrial activities.

In addition to the duties performed by the expert in making-up, other UNIDO experts in knitting, dyeing and finishing and training for the textile and garment industries as well as the services of an overall project consultant will have been or will be, made available to this project.

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO 11 September 1980

PROJECT IN THE REPUBLIC OF INDIA

JOB DESCRIPTION

DP/IND/76/023/11-04/31.7.B

Post title	Consultant
Duration	6 week
Date required	July 1982
Duty Station	Coimbatore
Purpose of project	The project aims to strengthen and develop the capacity of the South India Textile Research Association (SITRA) to undertake research, provide specialist advisory services and to conduct industrial training courses for the benefit of the spinning, knitting, dyeing and finishing, making-up and associated industries of South India.
Duties	The consultant will work in conjunction with the Director and Project leader at SITRA and will be expected to:

(i) assess the progress made by SITRA in determining the requirements and needs of the knitting and associated industries in India, especially in South India;

(ii) assess the implementation of the research and development programmes prepared during Phase I and at the commencement of Phase II;

(iii) assess the build up of staff and equipment within SITRA for the purposes of fabric research and development, especially in relation to knitted products;

(iv) assess the extent to which the provision of technical and other advisory services to these industries have been implemented;

..../..

(v) assess the extent to which technical and other training programmes have been developed;

(vi) summarize the extent to which Phases I and II of the project have met their aims;

(vii) draw conclusions and make recommendations.

The consultant will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government.

Qualifications — A degree (preferably with post graduate qualifications) in textile technology or related studies.

Experience — Extensive experience in the development of textile fabrics, especially knitted goods and in the development and evaluation of research, development advisory and training programmes.

Language — English

Background Information — During the two phases of this project SITRA has been attempting to develop its own expertise in research, development, advisory and training services in order to aid the development of the textile industry, especially in South India. This development was intended to aid: spinning firms to diversify into the production of yarn for knitting and perhaps other more diverse areas of fabric manufacture; knitting firms which are mainly small scale, to improve their production processes, quality and product range; bleaching, dyeing, printing and finishing firms to improve their processes and meet the demands of diversified products; and making-up firms to improve their productivity, quality, product range and hence potential markets. An important corrollary to this activity lies in the parallel need, where possible to develop also, products that require the minimum of sophisticated factory organised technology, but whose production would create jobs, especially in villages and rural areas.

ANNEXE V

Machinery Specifications for Non-expendable Equipment to be Provided by the Government of India under Phase II

Machinery Specification : Summary Sheet

Item	Estimated Cost $ US	Description	Budgetted Price $ Phase II US $
I/80/1(a)	2800	Fabric Inspection table	2800
	550	Garment Inspection table	550
I/80/2	120	Needle pliers	120
I/80/3	4500	Steam pressing table	4500
I/80/4	175	House-hold electric iron	175
I/80/5		Hand flat-knitting machines	
	650	(i) 14 gg	500
	650	(ii) 12 gg	500
	650	(iii) 10 gg	500
	650	(iv) 10 gg	500
	650	(v) 8 gg	500
	5000	(vi) 3.5 gg†	500

† imported machine.

July 1980

Machinery Specification : Summary Sheet

Item	Estimated Cost $ US	Description	Budgetted Price $ Phase II US $ proposed
I/80/6	2900	Circular interlock knitting machine	2350
I/80/7	2700	Circular rib knitting machine	2200
I/80/8		Hand operated half-hose machine	
	120	(1)	90
	120	(2)	90
I/80/9	2350	Circular sinker top knitting machine	1700
I/80/10		Yarn speed meter	
	240	(1)	170
	240	(2)	170
I/80/11	550	Positive yarn feeding units for circular knitting machines	550

July 1980

Machinery Specification : Summary Sheet

Item	Estimated Cost $ US	Description	Budgetted Price $ Phase II proposal
I/80/12	28,000	Airconditioning plant	22,000
I/80/13	7,000	Project Vehicle	5,500
I/80/14	2,000	Tumble Drier	2,200
Total	62,615		48,165
Additional items requested or obtained			
I/80/15	280	Three thread over-lock machine	220
I/80/16	90	Lockstitch machine	120
I/80/17	3,000	Industrial Laundering machine	2,800
I/80/18	2,200	Hydroextractor	2,200
I/80/19	600	Yarn tension meter	550
I/80/20	5,000	Steam Boiler	5,000
Total	11,170		10,890
Adjusted total	73,785		59,055

July 1980

Government of India Non expendable Equipment input to SITRA for Phase II of Project on Diversification of New Fabrics.

Item	Quantity	Description
I/80/1(a)	1	Knitted Fabric Inspection table for flat fabric. i. motor driven with speed control ii. inspection on both sides of fabric iii. provision for re-rolling iv. fitted with illuminating lamps.
I/80/1(b)	1	Knitted Fabric Inspection Unit for Tubular Fabric i. motor driven with speed control ii. inspection all round fabric iii. provision for re-rolling iv. internal dimension adjustment v. internal illumination
I/80/2	2	Needle pliers i) for fine gauge machines ii) for 10-12 gauge machines
I/80/3	1	Fabric/garment Pressing Table (Hoffman type) (already acquired) i. Size 60" x 30" ii. Steam injection from top and bottom buck iii. Fabric pressure adjustment iv. Temperature control
I/80/4	1	House hold iron i. 1000 watts, single phase ii. Steaming provision iii. Mass 1 kg.

Item	Quantity	Description
I/80/5	6	Hand flat knitting machines
		of which 1 at: i. 14 gg, 40 in width ii. high and low butt needles iii. cardigan cams iv. two feeders v. course counter vi. 5 needle racking vii. terry attachment viii. setting up combs ix. take down rollers and weights
		1 at: 12 gg with similar specification
		2 at: 10 gg with similar specification
		1 at: 8 gg with similar specification
		1 at: 3½ gg* i. 40 in width ii. 4 or more colour striper iii. high and low butt needles iv. bed opening and racking v. automatic needle widening device vi. autocom facility
		*This machine to be purchased from Edouard Dubied & Cie, Neuchatel, Switzerland.
I/80/6	1 each	Interlock machine. i. 18 in dia, 20 gg, 18-24 feeds. ii. all tricks cut 'long' to enable eight lock to be produced iii. tuck and miss provision on dial and cylinder. iv. dial height and gating adjustment v. Individual motor drive vi. electric stop motions and needle protectors.
I/80/7	1 each	Circular rib machine (already acquired) i. 14 gg, 16 in diameter, 14 feeders ii. stops motions iii. individual motor drive iv. tuck and miss cams v. dial height adjustment.

Item	Quantity	Description
I/80/8	2 each	Hand operated half machine (Griswold type) (one already acquired) i. 4½ in diameter cylinder and dial ii. course counter iii. stitch cam adjustment of both dial and cylinder iv. take down buckle and weignts
I/80/9	1 each	Single Jersey Circular Machine (already acquired) i. 24 gg, 16 in dia, 22 feeders ii. stop motion iii. individual motor drive iv. fitted with SITRA designed positive tape feed.
I/80/10	2 each	Yarn speed Meters (already acquired) i. range 0- 100 m/min ii. range 0- 300 m/min iii. battery operated iv. portable
I/80/11	1 each	Positive Tape Yarn Feed Unit (already acquired) Fitted to 24 feed single jersey machine
I/80/12	1 each	Air conditioning Plant (already at SITRA, - to be relocated)
I/80/13	1 each	Project vehicle
I/80/14	1 each	Tumble Drier (already acquired) i. dry load 10 kg. ii. electric heaters iii. individual motor drive iv. temperature control

Item	Quantity	Description
I/80/15	1 each	Washing Machine (already acquired) i. Liquor capacity 250 litres ii. fabric load 10 kg. iii. reversing control via timer iv. temperature adjustment
I/80/16	1 each	Hydro-exctractor (already acquired) i. individual motor drive ii. 5 kg wet load capacity
I/80/17	1 each	Boiler (already acquired) i. Oil fired ii. 100 psi iii. Steam temperature control iv. automatic controls
I/80/18	1 each	Overlock Machine (already acquired) i. three thread machine with hemming attachment ii. max speed 2000 stitches per minute iii. stitch length control iv. tension control
I/80/19	1 each	Lockstitch Machine (already acquired) i. foot controlled/mannual operation ii. adjustable stitch length iii. tension control
I/80/20	1 each	Yarn Tension Meter (already acquired) i. Electronic tension meter 0-10 g and 0-20 g ii. Portable, battery operated

Item	Quantity	Description
I/80/21	1 each	Fabric Relaxation Tank (already acquired) i. Size 45 x 45 x 8 in. ii. electric heaters and temperature controls iii. removable relaxation trays
I/80/22	1 each	Course length tester (already acquired) i. wall mounted, collapsible Scale 0-300 ins.
I/80/23	1 each	Fabric Extensiometer (already acquired) i. as per BSI specification ii. suitable for woven and knitted fabrics iii. Loading capacities 3 and 6 kg

ANNEXE VI

Machinery Specifications for Non-Expendable Equipment to be Provided by UNDP Under Phase II

Machinery Specification : Summary Sheet

Item	Estimated Cost $ US	Description	Budgetted Price $ US in Phase II proposal
80/1	5,000	Table top tufting machine	3,000
80/2(a)	40,000	Intermediate Rib Jacquard Machine	30,000
or			
80/2(b)	40,000	Rib Jacquard Machine	
80/3	5,000	Linking machine	4,000
80/4	10,000	Electronic clearers and yarn lubrication units	8,000
80/5	7,000	Half hose machine	4,000
80/6	10,000	Teaching (knitting) machine	6,000
80/7	6,000	Yarn/Fabric Evaluation knitting machine	4,000
80/8	1,500	Rotary hand fabric cutter	1,000

July 1980

Machinery Specification : Summary Sheet

Item	Estimated Cost $ US	Description	Budgetted Price in Phase II proposal
80/9	1,500	Reciprocating fabric hand cutter	1,000
80/10	3,000	Cubex washing machine	1,000
80/11	35,000	Single jersey circular machine	30,000
80/12 (a)	600	Yarn speed meter	1,000
(b)	600	Yarn length counter	
80/13 †	(20,000)	Slit-opening edge Gumming Machine for tubular fabric	10,000
80/14	35,000	Laboratory heat setting stenter	20,000

July 1980

Machinery Specification : Summary Sheet

Item	Estimated Cost $ US	Description	Budgetted Price ~~Machinery Suppliers~~ in Phase II proposal
80/15	4,000	Overlock machine	1,000
80/16	6,000	Flat lock machine	2,000
80/17	4,000	Chainstitch machine	1,000
		Allowance for variation in prices	6,500
		Miscellaneous	5,000
Total	$ 174,200		$ 138,500

† 80/13 not included, but replaced by Laboratory Jet Dyeing Machine estimated price $ US 20,000. Adjusted total $ 194,000

July 1980

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/1	1	TABLE TOP TUFTING MACHINE i. multineedle table mounted tufting machine capable of loop and cut pile effects suitable for cotton carpet yarns. ii. table width upto 1 metre iii. gauge 5/32 or similar iv. needles upto 80 v. infinitely variable stitch rate vi. complete with table mounting, motor foot controls. vii. yarn creel. Accessories: facility for gauge change; others as available. Spares : usual, but including needles, loopers, cutters, guides, fuses, belts, sample book, handbook and spares catalogue (2 of each english version). Erection charges. 400-440 VOLTS A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accesscries where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/2(a)	1	INTERMEDIATE JACQUARD RIB MACHINE

i. 30 ins diameter
ii. 18 gg
iii. 36,48 (or more) feeders if necessary
iv. Pattern key, comb or similar patterning device
v. Pattern area, at least 24x18 in reflex, two colour design repeating once per revolution.
vi. Self lubricating system
vii. Revolving or similar self cleaning system
viii. 4 track dial (or similar)
ix. Provision for tuck, miss facilities on cylinder and dial.
x. 4 tape positive feed device.
xi. Variable speed control and speed indicator
xii. Overhead or side creel.
xiii. Electronic stopmotions and needle protectors

Accessories: Pattern cropping or setting device.

Spares: Usual, but including cams, sliders, needles, pattern keys, etc. pattern samples, hand books and spares catalogue (2 copies of each english version) fuses, belts, full set of tools, setting instruments.

Erection charges.

Comment: Because of its use in a Research Institute, maximum feeds are not a necessity.

400-440 VOLTS A.C. THREE PHASE 50 CYCLES.

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/2 (b)	1	RIB JACQUARD MACHINE i. 30 ins diameter ii. 18, 22 gg iii. 36, 48 (or more) feeders iv. Mechanical pattern system by disc, wheel or drum v. Pattern area (3 cols) approximately 100 x 200 vi. 4 track (or similar) dial vii. Provision for tuck and miss on dial and cylinder, with or without jacquard patterning. viii. Variable speed drive and speed indicator ix. Self lubricating system x. Revolving or similar self cleaning system xi. Electronic stop motions and needle protectors xii. Overhead or side creel. Accessories: Storage feed system Plush attachments Manual pattern setting equipment Spares: Usual, but including cams, sliders, needles, pattern discs, bits or pegs, spare disc mandles, pattern wheels or cylinders, fuses, belts, full set of tools, setting instruments, pattern samples , hand books and spares catalogue (2 sets of each english version). Erection charges: Comment: Because of its use in a Research Institute maximum feeds are not a necessity. 400-440 VOLTS A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable.		
		2. Voltage, phase(s) and frequency must be stated for electrical goods.
80/3	1	LINKING MACHINE
		i. Suitable for linking plain and rib garments made on vee bed machines of 8-10, and 12-14 gauge from cotton and cotton blended yarns.
		ii. gauge of linking dial 8, with provision of gauge change to 12 or 14
		iii. double chainstitch
		iv. automatic cutting and clearing mechanism
		v. variable speed and turn back adjustment.
		vi. clockwise or counter clockwise dial motion
		vii. single phase earthed power supply
		viii. pedestal or table mount with bobbin stand
Accessories:	interchangeable dial; others as available	
Spares :	usual, but including linking points, cutting blades, needles, belts, fuses, handbook and spares catalogue (2 copies of each : english version)	
Erection charges:	if applicable	
	200-230	VOLTS A.C. SINGLE PHASE 50 CYCLES.

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable.		
		2. Voltage, phase(s) and frequency must be stated for electrical goods.
80/4		**YARN CLEARING AND YARN LUBRICATION SYSTEMS**
	2 each	i. free running disc waxing device, wax mounted horizontally
	2 each	ii. driven waxing device with provision for one or two driven wax discs. with may be mounted horizontally or vertically, with provision for changing pressure of wax on mounting ring. The waxer may be driven via the drive mechanism of the winding machine or via a separate motor.
	2 each	iii. emulsion lubrication system for yarn consisting of trough with reservoir and drainage system, rollers mounted parallel with trough to rotate in emulsion. Provision for speed and direction of pick-up roller to varied.
	12 each	iv. Loepfe yarn clearer model FR 60 with adjuster and centralized programming and data recording unit.
These items are all different and potentially from different supplies. The Loepfe yarn clearer is available only from Loepfe Bros, Zypressenstrasse 85, CH-8040, Zurich, Switzerland.		
Accessories: As applicable in each case Spares : Usual in each case Erection charges: Where applicable		
	200-230	VOLTS A.C. SINGLE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable.		
		2. Voltage, phase(s) and frequency must be stated for electrical goods.
80/5	1 each	**HALF HOSE MACHINE**
		i. 4 ins - 4.5 in. diameter. ii. 168 N or similar iii. 2 upto 4 feeds iv. positive elastic feeding device v. draw-thread feeding vi. reciprocated heel vii. automatic speed control viii. provision for terry sole. ix. electronic stop motions/needle detectors.
		Accessories: Solis takedown/automatic sock separation Positive yarn feeding.
		Spares : Usual, but including sliders, needles, control chain, links, bolts, cams, belts, pattern samples, handbooks and spares catalogue (two copies of each : english version) Setting instruments and full set of tools
		Erection Charges.
		400-440 VOLTS A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/6	1	**TEACHING MACHINE (KNITTING)**
		i. 8 to 14 in diameter ii. 10 to 14 gg iii. Cylinder and dial with changeable gaiting arrangements iv. 4 to 6 feeds v. positive feed vi. storage feed vii. pattern wheels (or other patterning mechanism) viii. variable speed drive and speed indicator ix. top creel x. electronic stop motions/needle detectors
		Accessories: Interchangeable sinker-top cylinder for cylinder and dial Striping mechanism at one or more feeds.
		Spares : Usual, but including cams, needles, sliders, pattern wheels (one set), bits, belts, setting instruments and full set of tools, pattern samples, handbook and spares catalogue (2 sets of each, english version)
		Erection charges.
		Comments: This machine is available only from Wildt Mellor Bromley Ltd., Leicester, England. Other machinery builders could be asked to quote for a machine to perform similar functions.
	400-440 VOLTS	A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
30/7	1	YARN/FABRIC EVALUATION KNITTING MACHINE i. Small diameter sinker top machine ii. Interchangeable cylinders (1 to 4) with different numbers of needles. iii. Variable speed drive and speed indication meter iv. Yarn metering systems of calibrated positive feed type for 1 to 3 or 4 yarns. v. gear ratio adjustment between yarn feeding devices and knitting cylinder. vi. preset counters for each feeding system vii. Striping arrangement viii. electronic stopmotions and needle detectors ix. provision for input tension control x. provision for take down tension control xi. yarn creel **Accessories:** As available. **Spares :** Usual, but including needles, sinkers, for each type of cylinders, cams, bolts, belts, setting instruments and full set of tools, handbook and spares catalogue (2 copies of each : English version). **Erection charges** **Comment:** This machine is normally only available from Lawson - Hemphill Inc. USA, Model FAK. Other machinery makers should be asked to quote for a machine to perform similar functions. 400-440 VOLTS A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable.		
2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/8	1	HAND HELD ROTARY FABRIC CUTTER
		i. Suitable for knitted and woven fabrics. ii. Adjustable fabric thickness foot iii. blade diameter approx 3 in iv. self sharpening device v. blade cooling device vi. electrically earthed, single phase power supply vii. blade guard and all safety devices.
Accessories:	as available	blades of different profile/diameter for varying fabric types
Spares :		Usual, but including blades, guards, sharpening device, fuses, setting instruments and full set of tools, handbook and spares catalogue (2 copies of each : english version)
200-230 VOLTS A.C. SINGLE PHASE 50 CYCLES		

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/9	1	RECIPROCATING HAND HELD FABRIC CUTTER i. Suitable for use with knitted and woven fabric. ii. adjustable fabric thickness foot iii. blade cutting length approx. 9 in. iv. self sharpening device v. electrically earthed, single phase power supply vi. blade guard and all safety devices.
Accessories: as available.		
Spares : blades, guards, sharpening device, fuses, setting instruments and full set of tools, handbook and spares catalogue (2 copies of each : english version)		
200-230 VOLTS A.C. SINGLE PHASE 50 CYCLES		

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/10	1	**CUBEX SHRINKAGE WASHING MACHINE** i. top loading, corner mounted laboratory shrinkage testing washing machine. ii. self contained motor with reversing switch as appropriate. iii. stainless steel or appropriate non corrosive internal finish. Accessories: as available. Spares: usual, but including rubber seals, bearings etc. handbook and spares catalogue (2 copies of each : english version) Erection charges: If necessary Comment: because this specific piece of equipment is available only from Precision Processes, Ambergate, Derbyshire, England, other machinery manufacturers should be asked to quote for a machine performing similar functions. 400-440 VOLTS A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/11	1	**SINGLE JERSEY KNITTING MACHINE** **i. 26 in diameter** **ii. 26 - 28 gg** **iii. 32 or more feeders** **iv. multitrack cylinder with facilities for knit, miss, tuck.** **v. self lubricating system** **vi. revolving or similar self cleaning system** **vii. 4 tape positive feed** **viii. variable speed control and speed indicator** **ix. overhead or side creel** **x. electronic stop motions and needle protectors**
Accessories: as available		
Spares : usual, but including cams, needles, sinkers, fuses, belts, setting instruments and a full tool kit, sample book, hand book and spares catalogue (2 copies of each : english version)		
Erection charges:		
Comment: because of its use in a Research Institute, maximum feeds are not a necessity.		
400-440 VOLTS A.C. THREE PHASE 50 CYCLES		

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/12	1 each	YARN SPEED METER i. a portable device for the determination of yarn consumption per unit time on revolving cylinder circular knitting machines. ii. battery operated (rechargeable if possible) iii. calibrated in metric and imperial units. iv. carrying case/storage box. Accessories: as available Spares: usual but including measuring wheel, guide wheel, handbook and spares catalogue (2 of each : english version)

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/12 (b)	1 each	YARN LENGTH COUNTER i. a portable device for the determination of yarn length delivered per given number of revolutions on rotating cambox circular knitting machines. ii. dial calibrated if possible in metric and imperial units. iii. mounting brackets. iv. carrying case/storage box
Accessories: as available.		
Spares: usual, but including measuring wheel, guide wheels, handbook and spares catalogue (2 of each : english version)		

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/13	1	LABORATORY JET DYEING MACHINE i. Suitable for dyeing sample lengths of tubular or openwidth weft knitted fabric from synthetic fibres, cotton/synthetic blends or cotton yarns. ii. stainless steel or equivalent fabrication. iii. fully instrumented with appropriate safety devices iv. facility for additives v. automatic and manual controls. Accessories: as available Spares : usual, but including bolts, filters, fuses, handbook and spares catalogue (2 of each : english version) Erection charges: 400-440 VOLTS A.C. THREE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/14	1	**LABORATORY STEAMING, BAKING, HEAT SETTING UNIT** **i. Batch unit, floor or table mounted, suitable for the heat setting of fabric samples from synthetic and synthetic/ cotton blends of size atleast 600 x 900 mm** **ii. fabric pinning arrangement with facility for lengthwise and widthwise adjustment suitable for knitted and woven fabrics.** **iii. adjustable stretcher board for heat setting tubular knitted fabric or part garments.** **iv. facility for dry heat setting and steam heat setting and steaming only.** **v. variable cycle time with timer** **vi. variable temperature and indicator** **vii. execution in stainless steel or similar material.** **Accessories: facilities for fabric coating so that backing of resins can be effected; other accessories including instrumentation as available.** **Spares : usual but including internal fabric frames, stretchers, fuses, switches, handbook and spares catalogue (2 of each : english version.** **Erection Charges: if necessary.** **400-440 VOLTS A.C. THREE PHASE 50 CYCLES**

July '80

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/15	1	THREE THREAD OVERLOCK MACHINE i. suitable for overlocking a wide range of thicknesses of knitted fabric of both underwear and outerwear varieties from cotton and cotton blends at upto 6,000 stitches per min. ii. Single phase earthed power supply iii. complete with motor, table mounted with foot controls. iv. provision for overseaming, serging, blind stitch hemming and welting. v. automatic lubrication vi. adjustable differential feed and seam stitch length control viii bobbin stand **Accessories:** folding attachment, others as available. **Spares:** usual, but including, needle, cutters, tensioners, feeding, fuses, belts, handbook and spares catalogue (2 of each : english version) **Erection charges:** if applicable. **200-300 VOLTS A.C. SINGLE PHASE 50 CYCLES**

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accesscries where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/16	1	FLATLOCK SEWING MACHINE i. three needle, four thread machine suitable for sewing cotton and cotton blends of knitted underwear and outerwear fabric at upto 6,000 stitches/min. ii. single phase earthed power supply. iii. complete with motor, table mounted with foot controls. iv. differential speed. v. provision for variation of seam stitch length. vi. interchangeable needle clamps vii. needle cooling viii. automatic lubrication ix. bobbin stand. **Accessories:** elastic attaching device; roller elastic tensioning device; others as available. **Spares:** usual, but including needles, tensioners, feeding devices, fuses, belts, hand book and spares catalogue (2 of each : english version) **Erection charges:** if applicable. 200-230 VOLTS A.C. SINGLE PHASE 50 CYCLES

Machinery Specification

Item	Quantity	Description and Comments
N.B. 1. Specifications for all items must include spare parts, accessories where appropriate and erection charges, if applicable. 2. Voltage, phase(s) and frequency must be stated for electrical goods.		
80/17	1	CHAIN STITCH SEWING MACHINE i. two thread machine capable of sewing a wide variety of knitted underwear and outerwear fabrics from cotton and cotton blends at speeds upto 6,000 stitches per minute. ii. single phase earthed power supply . iii. complete with motor, table mounted with foot controls. iv. changeable needles. v. automatic lubrication vi. differential fabric feed vii. bobbin stand. **Accessories:** folding attachments; T attachment; others as available. **Spares:** usual, but including needles, tensioners, feeding devices, belts, fuses, handbook and spares catalogue (2 copies of each : english version) Erection charges: if applicable. 200-300 VOLTS A.C. SINGLE PHASE 50 CYCLES

ANNEXE VII

ANALYSIS OF TRAINING PROGRAMME REQUIREMENTS IN KNITTING AND RELATED AREAS

Introduction

Within Phase I some training of SITRA staff was achieved at Technical Officer and knitter level in relation to the production of samples. Unfortunately one of the Technical Officers so trained has left and one of the sample knitters is expected to leave shortly. No internal training programmes to familiarize other SITRA staff with the objects of the programme, or the technology of the production of knitted fabrics and garments from cotton yarns, and the dyeing, finishing and making up of these goods, appear to have been held.

The return of the Project Leader from a study tour, together with the existence of two Technical Officers who have been in receipt of U N Fellowships for study and training in knitting technology suggests that it would be appropriate to introduce a series of such training courses for others joining the project team as well as those contributing to the research and development programme. In addition assessment of the potential market for industrial training courses suggests an urgent need to offer more courses.

Analysis

To date two external and a number of internal courses have been held:

A. Externally Held Courses

(i) Executive Development Programme for the Knitting Industry

Circular Knitting

Programme 1: for members of the South India Hosiery Manufacturers Association.

Two weeks (Part-time) Tirupur ; April 1978.

32 participants mainly owner/managers of knitting factories.

(ii) Programme 2: for members of Tamil Nadu Hosiery Factories Association.

Two weeks (Part-time) Tirupur ; July 1978.

29 participants mainly owners/managers of knitting factories.

B. Internally Held Courses

Hand Flat Knitting (theory and practical)

(i) Introduction to hand flat knitting

1 week full time. December 1978.

For 1 member of staff from Rajapalayam Polytechnic.

(ii) Training in Hand Flat Knitting.

5 weeks full time. August 1978.

For 3 trainees from Khadi and Village Industries Board.

(iii) Training in Hand Flat Knitting.

8 weeks full time. May 1980.

As a pilot scheme for 1 trainee from a Society for Handicapped Children.

Note: Machinery limitations at present prevent more than 2-3 trainees being accommodated for such practical courses.

Future Requirements and Needs

1. Courses for Executives

There are three Knitting Manufacturers' Associations in South India, viz: the South India Hosiery Manufacturers' Association;
the Tamil Nadu Hosiery Factories Association;
the All India Hosiery Association.

The total membership of these organisations is some 450 firms. In addition there are at least 100 firms not in membership with any Association.

In India as a whole there are 23 Manufacturers' Associations representing 5000 firms. Already some Associations outside South India (Calcutta) have approached SITRA about such courses. The estimated demand in South India alone however is for a further 15 courses - say 4 to 5 per year for the next 3 years.

2. Hand Flat Machinery Programmes

These programmes are full time, last 4-5 weeks and the numbers attending will depend upon the availability of flat machines at SITRA. (N.B. the Government of India input to Phase II includes an additional six hand flat machines).

Estimated Demand

(i)	for colleges in South India with textile departments	6
(ii)	for Universities and similar institutions with textile departments in South India	4
(iii)	Village Industries Boards	2
(iv)	Handicapped Children's Societies	3
(v)	Kerala Rural Industries	3
(vi)	Self employed knitters	1
(vii)	On demand, especially if advertised	3
	Total	22

This would be equivalent to 7 per years for the next 3 years.

3. Circular Machinery : Foreman/Mechanics Programme

Such a programme is yet to be devised, but it represents perhaps the most fruitful and useful area of work in which to be involved. Most mechanics are self taught and whilst some will have developed sound practises many have not. Thus their influence upon the future development, especially if quality and product range are to be increased is crucial. Equally if SITRA is unable to influence their current way of working, the opportunities to transfer successfully the developing know-how at SITRA will be largely frustrated.

Estimated Demand

(i)	for South India Hosiery Manufacturers Association;	
(ii)	for Tamil Nadu Hosiery Factories Association;	50
(iii)	for the All India Hosiery Association	
(iv)	for non-Associated Hosiery firms	
(v)	for other firms/Associations outside South India	20
(vi)	for machinery builders	10
(vii)	for staff from educational, research and training institutions	5
(viii)	Others on demand (especially if advertised)	10
	Total	95

Equivalent to approximately 30 courses per year for 3 years.

NB. this figure is based on a number of participants of 5 per course (governed by the practical content and availability of machinery) and a take up rate (amongst South India hosiery firms of one mechanic per firm from approximately one-third of the firms.

4. Other Categories of Knitting Course

At a lower level still lie courses for knitting operatives. Whilst this is not something which SITRA could organize directly, what it should certainly do is to run courses for the trainers of knitting operatives. Such persons may well be foremen, supervisors or senior knitters selected for this purpose. Such courses would have the effect of producing, in participating firms, a developing work force committed to good practices and to raising quality standards. On the basis of estimation used previously, demand might be seen as at least 100 initially, though in fact this may be an underestimate.

Related Areas of Industrial Activities

What has been estimated in some detail for knitting firms holds true in principle for bleaching, dyeing and printing, and garment-making.

There is no reason to believe a similar approach to that adopted for the executives of knitting factories should not be followed, viz courses for executives to convince them of the

need for assistance, followed by more detailed and specifically orientated courses at the level of bleaching, dyeing or printing foreman, making-up supervisor, pattern cutter or sewing machine mechanic. In operating such courses SITRA will have the advantages of prior practices and also the fact that, from an examination of syllabus content, covering as it does all aspects from textile fibres to knitting, testing and wet processing, management and marketing, but excluding making-up, some of the content will be in common. There is a definite need, however to increase substantially that section devoted to dyeing, printing and finishing and to include sections on making-up as well as some general review of the training concept.

Estimated Demand

1. Executive Courses

(i)	Courses for bleaching, dyeing, printing and finishing executives	30
(ii)	Courses for garment making executives	80

/ It must be recognised that some of the above categories, because of dual or multi-facited nature of their activities, might have been included in the courses for hosiery executives /

This is equivalent to approximately 40 per year for the next 3 years.

2. Wet Processing Supervisors

(i)	Courses for bleaching supervisors/foremen	20
(ii)	Courses for dyeing supervisors/foremen	4
(iii)	Courses for printing supervisors/foremen	4
(iv)	Courses for finishing supervisors/foremen	4
(v)	Courses for other personnel	4
	Total	36

This is equivalent to 12 per year over a three year period.

3. Garment-Making Supervisors

(i)	Courses for making-up supervisors/foremen	20
(ii)	Courses for pattern cutters	5
(iii)	Courses for sewing-machine mechanics	5
(iv)	Courses for other personnel	3
	Total	33

This is equivalent to 11 per year over a three year period.

The need to provide courses for trainers to inculcate good practise at operative level will also be evident, but no attempt has been made to estimate this because the preparation and enactment of the other courses in the dyeing and making-up sectors is some considerable way off.

Summary

To ensure transfer of technological know-how and the results of ongoing research, and to improve current practises and attitudes in the knitting, dyeing and making-up industries of South India, there is a pressing need for ad hoc courses of a short duration. Some of these will part-time in nature and carried out in industry, some will be full-time and carried out at SITRA. The number estimated as being required is substantial, even when contemplated over a three year period. However, it is considered extremely important to the ultimate success of the second phase of this programme that some systematic attempt is made to undertake this task.

ANNEXE VIII

Review of the Research and Development Programme arising from the Phase I Activities

Introduction

Some topics of the previous research programme have been completed, some are currently in progress, but a substantial numbers have not yet been commenced. A meeting with the Heads of the various divisions concerned and with the Director confirmed this point/was due to staff shortages and staff being deployed on UN Fellowships. It was agreed in a review of the continueing relevance of the research topics that all items were still relevant and would therefore be carried forward to a future research and development programme.

1. Projects Completed

Knitting Division

i. Survey of quality of knitting yarn supplied by spinning firms in South India.

ii. Dimensional Stability of Knitted Fabrics Part I.

iii. Operation of a number of training programmes on hand flat knitting.

Physics Division

i. The effect of waxing and humidity on the performance of knitting yarns.

3. X-Ray and Instrumentation Division

i. Development of electronic yarn speed meter (now being made commercially)

ii. electronic temperature measuring instrument designed and made.

iii. production counter or measured length indicator designed and made.

iv. electronic tachometer developed (now being made commercially)

v. temperature measurement and control device designed and made.

4. Mechanical Processing Division

i. The use of mercerised singles yarn for knitting.

ii. The conditioning of hosiery yarn by steam.

iii. The spinning requirements of hosiery yarns.

5. Engineering Division

i. Development of a tape-type positive yarn feeding device for circular weft knitting machines (process licenced and industrial prototype made).

ii. Production of a thermostatically controlled fabric relaxation tank for experimental fabric studies.

6. Human Relations Division

Preliminary
i. /Survey of management structure of hosiery firms.

ii. Development and operation of course for knitting Factory Owners/Managers.

7. Operational Research Division

i. Inter-firm Comparison of Hosiery Yarns with respect to Knitting Performance and Fabric Appearance.

8. Library and Information Services

i. Build up of recommended text books and journals on fabric technology including knitting technology.

ii. Inclusion of knitting topics in SITRA news letter.

iii. Development of a fabric library - but not for knitted fabrics.

2. Projects Currently in Progress

Knitting Division

i. Dimensional stability of knitted fabrics - Part II

ii. The effect of yarn twist on the properties of plain fabric

iii. Techno-economics of Open-end Spun Yarns for Knitting.

Physics Division

i. Survey of Yarns faults used the Classimat System

3. X-Ray and Instrumentation Division

i. Development of an electronic fabric stiffness meter

ii. Development of a combined yarn speed and machine rpm meter.

iii. Development of a yarn tension meter.

iv. Development of an electronic patterning device for a fancy doubling unit.

4. Mechanical Processing Division

   i. Development of a fancy yarn doubling machine

   ii. The wear life of knitted underwear from viscose/cotton blends.

5. Engineering Division

   i. Fabric raising machine for knitted fabrics

   ii. Tubular fabric callender for knitted fabrics

6. Human Relations Division

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7. Operational Research Division

   i. Simple quality control routines for knitting and making -up units.

   ii. Survey of fabric faults - woven fabrics only to date.

8. Library and Information Services

   i. Development of Machinery Catalogues and Leaflets

   ii. Development of books/journals on design including knitted fabric design

Summary

A number of projects have been completed and as a result a better understanding of the needs of the hosiery and related industries exist. However, the amount of work remaining to generate a research, information and data base in fabric and garment manufacture by weft knitting remains substantial and a number of projects will need to be carried over to the next phase of the project.

ANNEXE IX

Research and Development Programme for Phase II and beyond of the Project Diversification and Development of New Fabrics.

Introduction

As with the previously suggested research programme the following is neither definitive nor inviolate. Other projects will develop that are not present in this programme, but will need to be included. The order of operation is to some extent self evident and has been discussed broadly with the heads of the divisions concerned and the project leader.

The need for collaboration between divisions on many of the projects listed has also been drawn to the attention of the appropriate divisional heads and the project leader, because whilst the topics are listed under the division most appropriate to initiate and evaluate a given project, many are in fact multi-disciplinary and will require inputs from more than one division.

These projects are in addition to any on going projects commenced under the previous research programme. They are also in addition to the substantial number of projects listed in the previous research programme that have not yet been commenced and it is assumed that those projects, unless otherwise agreed, will also be included in the programme for Phase II.

Knitting Division

1. The geometry and dimensional stability of blends of cotton and man made fibres including synthetic fibres in plain fabric. The incorporation of the blended yarn could be by a variety of methods.

2. The geometry and dimensional stability of blends of cotton and textured yarn in plain fabric. The incorporation of the textured yarn could be by a variety of methods.

3. The geometry and dimensional stability of rib structures knitted from cotton. These should begin with 1x1 rib, but progress to more complex rib structures such as 2x2, 6x3 and other ribs used for underwear such as 'egyptian rib'.

4. A study of fabric faults in knitted fabric and a study of faults (of any type) in made-up garments. The project could include frequency, identification and rectification studies.

5. The effect of ambient conditions upon the knitting of cotton yarns and upon the properties of knitted fabric.

6. A survey of the quality of hosiery yarns. This would be the second survey in this series.

7. Development of job creation knitting operations by the devising of new products, for example: (i) hand operated half hose

manufacture; (ii) knitting of industrial gloves for subsequent coating; (iii) hand operated Waltex-type machinery manufacture of knitted cotton blankets; (iv) hand vee bed production of knitted car seat covers.

8. The effect of machine and process variables upon the performance of Indian made knitting machinery. This would include variation in rotational speed, imput tension, take down tension, yarn friction, needle timing and other factors.

9. An assessment of sewing threads including availability, product range, thread properties and performance in seams.

10. A study of the seam strengths of typical seams produced in industry and a comparison of their efficacy.

11. A study of cam angle on yarn and machinery performance, including power consumption for circular weft knitting machines.

12. A study of the dimensional properties and performance of Waltex-type fabrics.

13. A study of tufting and the factors influencing the production of tufted cotton products.

14. A study of the backing fabrics required for tufting.

15. A study of the constructions and knitting conditions most suitable for fabric raising.

Physics Division

1. The contribution of yarn faults to loss of fabric appearance, knitting efficiency and cost.

2. A comparative study of the properties and performance in knitted fabric of ring-spun and open-end spun yarns made from cotton/man-made fibre blends.

3. Yarn clearing and the appearance and properties of cotton hosiery yarns. This study would include some comparative studies of different types of yarn clearing system.

4. A comparison of solid and liquid yarn lubrication systems and the effect of various types and quantity of lubricant upon yarn properties and knitting performance.

5. The use of lustre or reflectance properties of knitted fabrics and their correlation with fabric appearance and regularity.

6. The pilling of knitted goods made from Indian cottons and blends with synthetic fibre.

7. The optimum blend proportions for various cotton/man-made fibre mixtures in relation to end use.

8. The abrasion resistance of knitted goods in the wet and dry state and the correlation with laundering performance.

9. The properties and performance of Indian made elastic waist band tapes.

Dyeing and Finishing Section

10. A study of factors influencing the soiling of knitted fabrics.

11. The effect of laundering on the properties and performance of Indian made elastic waistbands.

12. The effect of chemical treatments as a means of increasing the dimensional stability of knitted fabrics intended for outerwear.

13. The effect of chemical finishes upon abrasion resistance, crease resistance and pilling of knitted fabrics.

14. The relationship between the geometry of cotton knitted fabrics and the dimensional configuration during and after various commercial bleaching, dyeing and finishing conditions.

15. Experimental studies of mechanical methods, including Hoffman pressing and callendering for rendering cotton and cotton blended garments dimensionally stable.

16. A study of the repeated laundering of garments upon performance and dimensional stability.

17. A study of printing pastes and backing/steaming/curing requirements for 100 per cent cotton fabrics and cotton/man-made fibre blends.

18. Transfer printing of cotton/synthetic blended fabric and cross linked cotton fabric.

19. The effect upon chemical processing of changes in blend composition of knitted fabrics from cotton/polyester blends.

20. Light, fume-and washing-fastness of dyed knitted fabrics.

21. The causes and rectification of fabric tendering when dyeing dark colours on cotton.

22. Studies of the factors affecting the control of the degree and type of raising achieved on knitted fabrics.

Mechanical Processing Division

1. Production and properties of acrylic/cotton blended yarns for use as hosiery yarns for outerwear.

2. The production and properties of acrylic/cotton high bulked yarns for knitwear.

3. The production and properties of sized acrylic and acrylic/cotton yarns for handloom weaving.

4. The production and properties of core-yarns and their use in knitted fabrics.

5. The blend proportions of cotton/man-made fibre in (say) cotton/polyester, cotton/polynosic, and cotton/viscose for (i) optimum spinning and yarn performance; (ii) for optimum fabric acceptability.

6. The relationship between yarn strength (and the various measures of it commonly performed) and the performance of yarn during knitting and in fabric by suitable measures of fabric properties including strength.

7. Following from the above, a study of the means of achieving acceptable yarn regularity and cleanliness and acceptable fabric performance from different cotton mixes.

8. The relationship between fibre properties, including micronaire value, maturity, and fibre friction with the dimensional behaviour of knitted fabrics.

9. The folding of textured nylon or polyester yarns with cotton and the production of hosiery yarns.

10. The production of coarse count carpet yarns suitable for tufting, from cotton.

11. The properties of cotton carpet yarns for handweaving and a comparison of the requirements for tufting.

12. A study of yarn shrinkage during wet processing of fabric knitted from steamed and unsteamed yarn.

Instrumentation and X-ray Studies Division

1. A study of knitted fabric performance during wet processing and correlation of performance criteria with X-ray and/or SEM studies of material at each processing stage.

2. An x-ray study of the internal structural changes caused by the steaming of cotton yarn under different conditions of temperature, wetness fraction and time and at different values of package hardness.

3. An instrumented study of the efficiency of commercial steamers for yarn.

4. The measurement of static electricity in synthetic and cotton/synthetic blended fabrics.

5. An x-ray study of the structural changes brought about by chemical crosslinking to improve the dimensional stability of knitted cotton outerwear fabrics.

6. Development of a digital yarn speed meter and evaluation of the direct reading commercial model.

7. Development of an electronic wet and dry bulb thermometer for humidity and t perature measurements.

8. Development and evaluation of an electronic fabric stiffness measurement device. The use of such a device in the measurement of stiffness of knitted fabrics should also be evaluated.

9. Development of instruments for the measurement of yarn tension and yarn friction.

10. Development of a meter to measure the hardness of water.

11. Development of instruments and gauges for the systematic setting of knitting machinery.

12. An x-ray study of cam metals annealed under different conditions.

13. An SEM study of fabric soiling.

Engineering Division

1. Development and evaluation of a raising machine for knitted fabric.

2. Development and evaluation of a tubular fabric steam callendar for cotton knitted fabric.

3. Extension of the cotton callendar to provide heat setting facilities for knitted fabrics from synthetic yarns and cotton/synthetic blended yarns.

4. Development of instruments and setting tools for the systematic setting of circular knitting machinery.

5. Development of mannully adjustable tuck/miss/knit cams for circular single jersey machinery.

6. Development of an automatic widening device for hand flat machines.

7. Development of flat, tubular and knitted garment inspection stands.

8. Development of a fabric laying device for both making-up and screen printing.

9. Development of a simple transfer printing press and a simple baking or steaming device for screen printed fabrics.

10. An improved take down mechanism for circular knitting machinery.

11. A power drive system for hand flat machines.

12. The development of a power waxer for hosiery yarn.

13. Modifications to circular sinker top machines to enable terry or plush fabric to be knitted.

14. Prototype studies for the profile milling of knitting cams.

15. The annealing of knitting cams and its effect upon their wear and fabrication.

Operational Studies Division

1. Determination of sizes offerred in (say) underwear and the relationship between sizes offerred and dimensions found before and after washing.

2. Determination of the variation in sizes of nominally the same (labelled) size.

3. The development of nationally acceptable label standards for washing instructions (especially for synthetic fibre fabrics).

4. The development of internationally acceptable standards of labelling.

5. The relationship between labelling standards and garment performance.

6. Labelling standards for fabric as opposed to garments.

7. Anthropological pilot study on relationship between age group/sex/size and the sizing standards used by hosiery manufacturers.

8. A sampling study of hosiery purchases and a sample determination of per capita hosiery purchases.

9. Correlation between per capita hosiery purchases and mill output of hosiery yarn.

10. The development of methods of estimating hosiery purchases for use by the Textile Commissioner's Office.

11. Inter firm comparison of labour and machine productivity in knitting.

12. Interfirm comparison of incidence of 'seconds' fabric or garment, damaged goods and stores consumption.

13. A study of the cost of fault rectification in knitted fabrics and garments.

14. A study of waste in knitting, dyeing and finishing and making-up and means of evaluating and improving waste control.

15. A study of export prospects for the hosiery industry.

16. A survey of making up practices in knitting and knitwear in India and comparison with international standards.

(qv Government of India sponsored project on making-up of Handloom Products).

Human Relations Division

1. A study of entrepreneurs in hosiery manufacture.

2. A survey of the knitting industry in India, by size, number of workers, machines, end products, sectorial organisation and Federation (Hosiery) affiliation.

(NB the Federation of Hosiery Association of India believes such a study to be required)

3. Development of training courses in spinning, knitting, bleaching, dyeing, printing and finishing, making up and testing for the hosiery and related industries at the levels of executive/owner/manager; supervisor/foreman; mechanic/dyeing technician/making-up technician; trainers of knitters, dyeing and finishing operatives, making up operatives.

(See Annexe VII for analysis of training programme requirements).

Library and Information Services

1. Contunued build up of book and journal stock in relation in fabric manufacture, fabric behaviour, garment manufacture, garment behaviour including back issues of more important technical and scientific journals.

2. Continued development of fabric library including the systematic cataloguing of internal development samples.

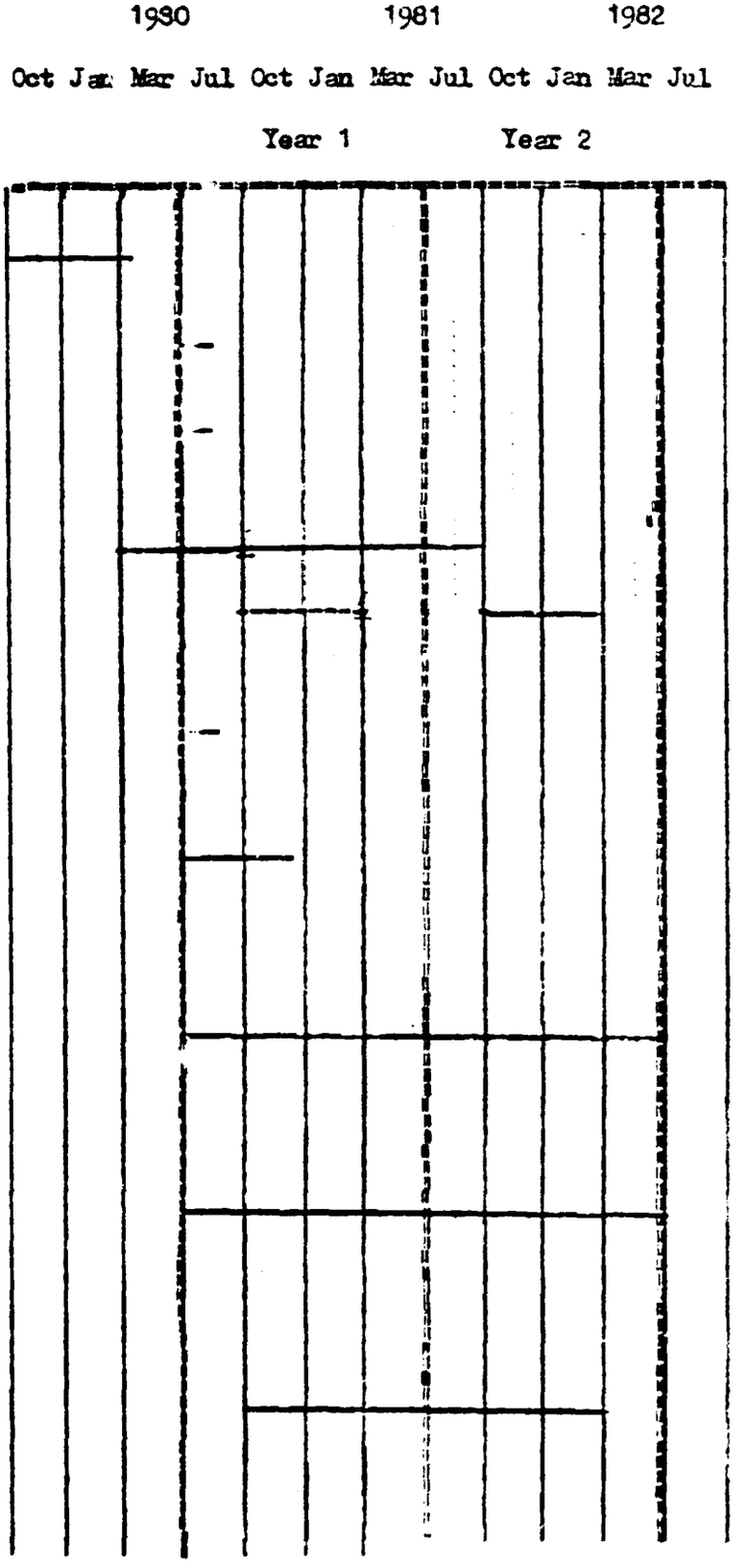
3. Subscription to design and colour forecasting journals in textile, knitwear and garment design.

4. Continued build up of dossiered information on textile machinery for the knitting, dyeing, finishing, printing and making up industries.

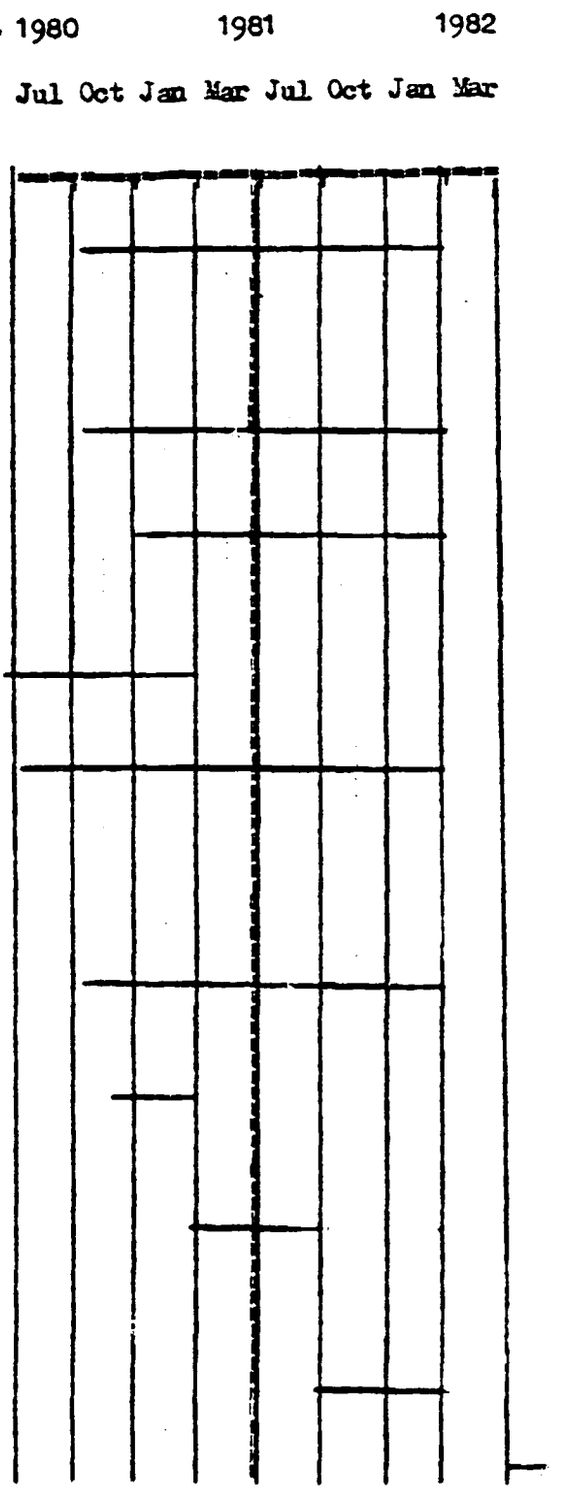
ANNEXE X

WORK PLAN AND BAR CHART : Revised Version

ACTIVITIES



1. Section Leader on European Study Tour
2. Assignment of UNIDO Consultant
3. Preparation of Job specifications for UNIDO experts in: training; dyeing and finishing; making up.
4. Deputation of technologists for industrial training and UN Fellowships.
5. Development of Research Programme
6. Development of Training Programmes
7. Undertake research on yarn and fabrics for improved knitting performance
8. Undertake research on machinery and instrumentation for knitting and associated activities
9. Undertake research in Operations Studies related to knitting industry



10. Undertake research in Human Relations aspects of knitting industry.

11. Undertake research in dyeing, printing and finishing of knitted goods

12. Undertake research in making-up of knitted goods

13. Implementation of internal training programmes

14. Implementation of further technical service activities in knitting and associated industries

15. Implementation of training programmes for the knitting and associated industries

16. Assignment of International Expert in Training

17. Assignment of International Expert in Dyeing and Finishing

18. Assignment of International Expert in Garment manufacture

19. Assignment of Consultant

ANNEXE XI

Additional Items of Equipment and Fellowship Requirements

Introduction

The current Phase II proposal draws extensively on the report of M.S. Burnip, UNIDO Consultant for the Phase I proposal. His report published in March 1977 listed equipment necessary at that time for a continuing programme. Whilst the current proposal has added somewhat to the equipment listed in the Phase I UNIDO report, changing circumstances suggest the following as desirable additions.

Equipment

(1) Yarn friction measuring instrument and recording unit, capable of measuring at yarn speeds from 0-500 m/min. $ US 4,000.

(2) Hand operated warp knitting machine with arcuate guide bars, interchangeable gauge, suitable for use with coarse count cotton yarns, with or without weft insertion facilities. $ US 5,000.

(3) Cup seamer(chainstitch)machine for use with plain and rib knitted outerwear fabrics from 5-14 gg flat machines; interchangeable cups. $ US 3,000.

(4) High temperature laboratory package dyeing machine for capable of dyeing approximately 1 kg of top, hank or yarn on dye spring. $ US 10,000.

(5) Hand flat knitting machine with autocam, widening device and motorized drive $ US 8,000.

Total $ US 30,000.

Fellowships

Given the development of prototype equipment of a simple nature, designed to assist the knitting and related industries in South India, it would be helpful to the engineering staff concerned to have a view of modern textile machinery building practices. It is suggested therefore that a study tour of 3 months be provided for the Head of the Engineering Division to visit Europe, America and possibly Japan for this purpose.

$ US 10,000

UNIDO Consultant

The Phase II proposal asks for a UNIDO Consultant for 1 month at the end of Phase II. The South India Textile Research Association subsequently requested, and UNIDO agreed to a consultancy visit of 1 month at the commencement of Phase II. Provision for a further consultancy visit at the end of Phase II as originally planned is still required. $ US 10,000

Total Requested Additions:

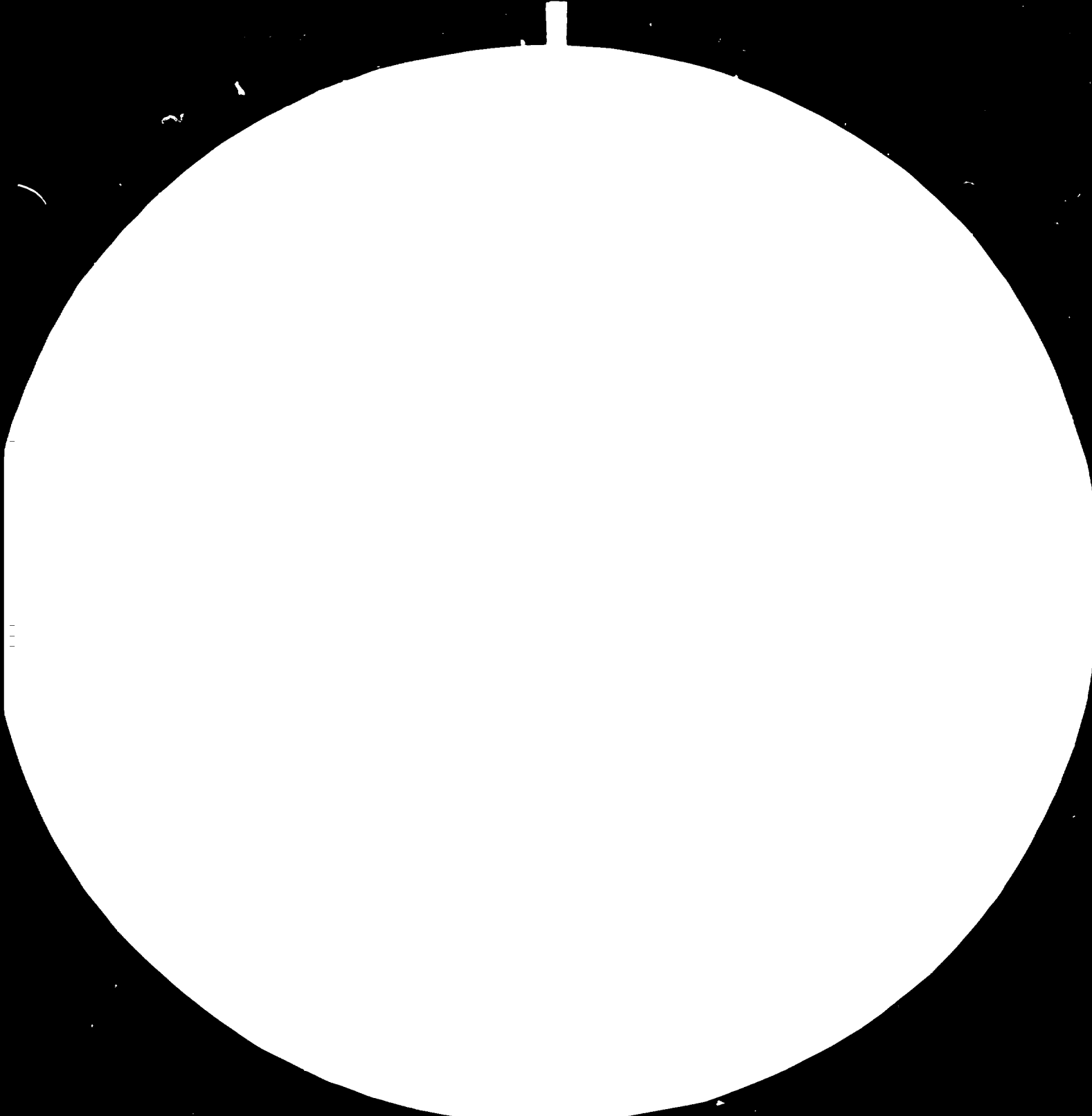
Equipment	$ 30,000	
Personnel	$ 20,000	
Total		$ 50,000

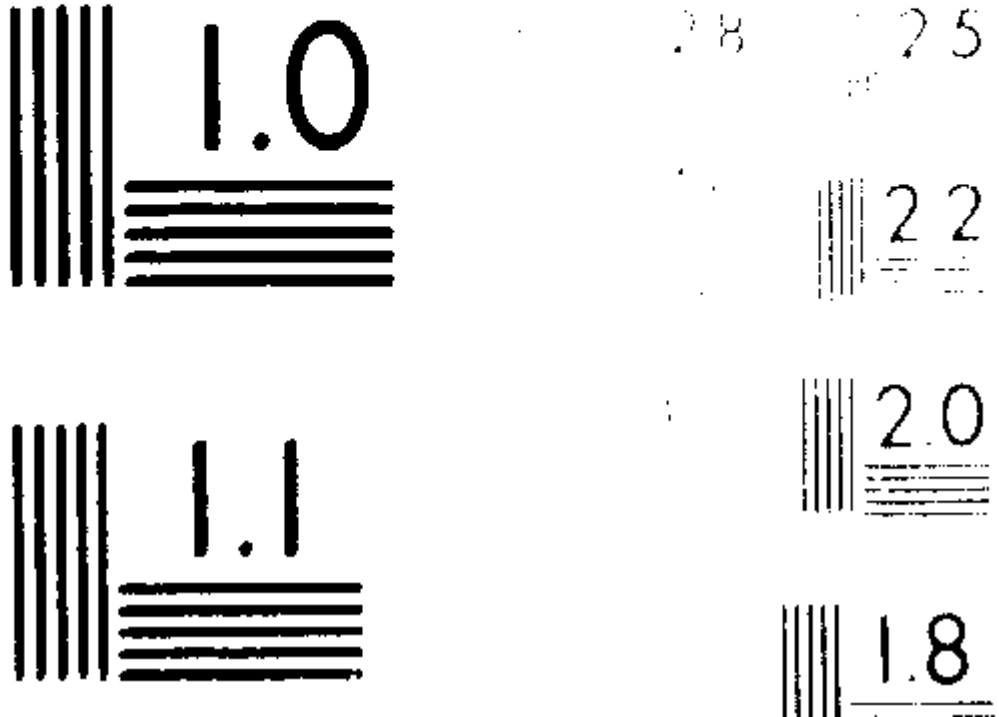
ANNEXE XII

PROJECT DP/IND/76/023: EQUIPMENT SUPPLIES

The following firms could be invited to tenders for the items listed

80/1	Table Top Tufting Machine	David Almond	UK
		Cobble	UK
		Dock	UK
		Hofmann	FRG
		PEP	UK
		Tuft Co.	USA
80/2(a)	Intermediate Jacquard Rib Machine	Albi	FRG
		Fouquet	FRG
		Marchisio	Italy
	and	Orizio	Italy
80/2(b)	Rib Jacquard Machine	Mayer et Cie	FRG
		Monarch	UK
		Stibbe	UK
		Sulzer Morat	FRG
		Terrot	FRG
		Wildt Mellor Bromley	UK
80/3	Linking Machine	Hague	UK
		Complett	Italy
		Exacta	FRG
		Mosso	Italy
		Savio. e. C.	Italy

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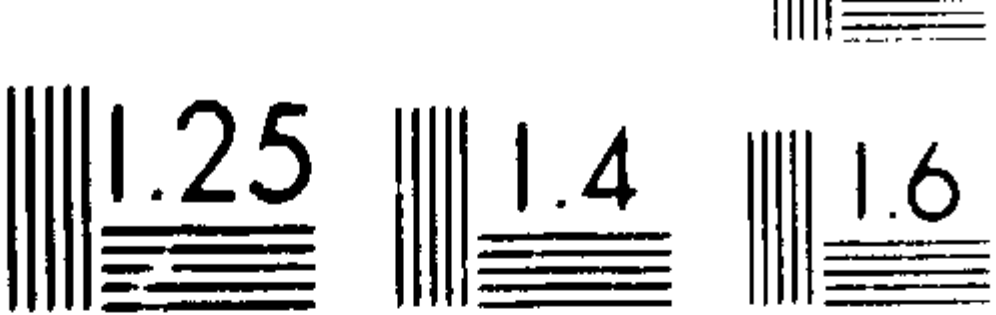
2.5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80/4	Yarn Clearers and Yarn Lubrication Devices	Ascotex	UK
		Crabtree	UK
		Loepfe	Switz
		Mettler's Soehre	Switz
		Peyer	Switz
		Serralunga	Italy
		Stuber	FRG
		Thorn Automation	UK
		Zellweger Uster	Swiss
80/5	Half Hose Machines	Bentley	UK
		Ester	FRG
		Lonati	Italy
		Matec	Italy
		Memotex	Italy
		Nagata	Japan
		Wildt	UK
80/6	Teaching Machine *	* Wildt Mellor Bromley	UK
		Camber	UK
		Krenzler	FRG
		Mayer	FRG
		Lucas	FRG
		Lebocey	France
	*Specialist Supplier	Supreme	USA
80/7	Yarn/fabric Evaluation * Knitting Machine	* Lawson-Hemphill	USA
		Krenzler	FRG
		Lucas	FRG
		Camber	UK
		Irmac	Italy
		Scott and Williams	USA

80/8 80/9	Rotary Hand Cutter and Reciprocating Hand Cutter	Eastman	USA
		Rockwell Rimoldi	Italy
		Perfecta	Switz
		Wolf	USA
80/10	Cubex Washing Machine *	* Precision Processes Ambergate	UK
80/11	Single Jersey Knitting Machine	Camber	UK
		Wildt Mellor Bromley	UK
		Monarch	UK
		Mayer	FRG
		Supreme	USA
		Orizio	Italy
		Jumberca	Spain
		Lebocey	France
80/12	Yarn Consumption Meters	Shirley Developments	UK
		Thorn Automation	UK
80/13	Sample Jet Dyeing Machine	Roaches	UK
		Farmer Norton	UK
		Pegg	UK
		Gaston County	USA
		Werner Mathis	Switz
		Jagri	FRG
		CMLI	Italy
		Thies AG	Switz
		Thies KG	FRG

*Specialist Supplier

80/14	Laboratory Stenter/Heat Setting Device	Bates	UK
		Werner Mathis	Switz
		Farmer Norton	UK
		Ehemann	FRG
		Roaches	UK
		Thies AG	Switz
		Thies AG	FRG
		Jagri	FRG
		Tube-Tex	USA
		Loyalrust	[illegible]
		Bolliot	France
80/15	Overlock Machine and Flatlock Machine and Chain Stitch Machine	Rockwell Rimoldi	UK
		Brother	Japan
		Juki	Japan
		Singer	USA
		Union Special	USA
		Pfaff	FRG
		Reece	USA