OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

20992

Distr.
RESTRICTED

ISED/R.1
17 January 1994

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ORIGINAL: ENGLISH

STRENGTHENING OF THE INSTITUTE
OF GARMENT TECHNOLOGY

DG/DRK/92/019

THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Technical report: First mission of the garment processing expert to the Institute of Garment Technology, Pyongyang, October/November 1993*

Prepared for the Government
of the Democratic People's Republic of Korea
by the United Nations Industrial Development Organization

Based on the work of Richard Chmielowiec,
garment processing consultant

Backstopping officer: J. P. Moll,
Agro-based Industries Branch

---

* This document has not been edited.

V.94 20226

Table of contents

ABSTRACT

The mission lasted one month and was the first part of a planned 3 months consultancy on garment processing methods within a main Project No. DRK/92/019/A/01/99, entitled: "Strengthening of the Central Institute of Garment Technology(IGT)" in Pyongyang. Total project duration 3 years. After the completion of the project, the IGT should be able to effectively provide guidance to 300 garment factories in the field of garment manufacturing. It is anticipated that the 3-month consultancy period will accomplish its aims (provided in the job description; Appendix I) through a series of lectures, seminars, workshops, group discussions, technical experiments supported by A/V aids in the form of video-films, slides, transparencies, the newest technical literature, the technical catalogues of machinery and equipment, computer programmes etc. The aim of the first mission was to outline the basic characteristics of the garment industry and its modern processing methods, based on a comparative global survey of industrial data (indices). Such information should help the IGT to establish a realistic background of time utilisation in its domestic industrial environment. The list of topics covered in the first mission is included in Appendix II. The lecturing needs for the 2nd and 3rd visits were discussed and will include factory workshops and experiments (Appendix III).

I. INTRODUCTION

1. Basic data of the Main Project

The basic aims of the Project of the Government of the Democratic Peoples's Republic of Korea are provided in the Project Document entitled "Strengthening of the Institute for Garment Technology" project no DRK/92/019/A/01/99. Project duration 3 years. Sector (UNDP Class. and code): 0520 Manufacturing Industries, Sub-sector: 0520 Textiles Manufacturing.

Government Implementing Agency: Commission of Light Industry. Cooperating Agency: UNIDO. Starting date of the project: May 1992. Location: Central Institute of Garment Technology, Pyongyang.

2. Main objectives of the garment processing consultancy

According to the terms of the above mentioned Project Document this technical report is related to the mission of Richard Chmielowiec, an expert in garment processing, who is one of several consultants involved in the whole project.

The main objective of the 3-part consultancy (each of one-month duration in: October/November 1993, May and August 1994) was to

widen the knowledge and familiarise the technical research staff of the ITG with contemporary garment processing methods, garment technology and production management with particular emphasis on time and fabric optimization. The first part of the visit consisted of lectures on a wide range of pre-selected topics presenting the textile and clothing industry interface with respect to lead-time factors of the preproduction-production-and-postproduction stages. The relationship between quality - technology - and productivity was explained in case study and survey results. World-wide comparison of indices related to relevant technologies was provided, equipping the ITG with the basic necessary data of structuring its experiments to achieve productivity improvement in its industrial undertakings.

The following forms of consultancy were used, which were agreed with the ITG Directorship:

- -hard-core lectures (9:00-12:00am) daily,
- -seminar or A/V presentation (Video-film or a series of slides) 2:00-3:00pm or longer, daily,
- -group discussion (in the last week) with the staff of the specialised research rooms,
- -one only factory visit organised by ITG,
- -ad-hoc meetings with the Director or participation in the relevant meetings (UNDP, GBCIO, UNIDO),
- -semi-informal meetings with the heads of the different research rooms.

During the final meeting with GBCIO and ITG on the last day of the visit (19.11.93) the accomplishments of the first visit were discussed. Plans for the next, 2nd part were outlined, on the assumption, that the first mission had been satisfactory to the hosts and that the consultant would also carry out the second part of the mission the following year.

3. The duration of the visit

Departure from residential location in the UK - 17.10.1993. Briefing in UNIDO/Vienna on 18.10.1993. Briefing in Hong Kong(one day with Mr Frankie Ng, who visited Pyongyang in August 1993 and one day travel rest). Departure to DPRK via Beijing(2 days for

visa collection) at DPRK Embassy after having obtained visa for entering PRC in London. Arrival in Pyongyang on 23.10.1993. Departure from Korea on 20.11.1993. Private stop-over in Hong Kong on the invitation of the Hong Kong Polytechnic (as a Visiting Fellow) to provide consultancy to PhD and MPhil research staff on modern fabric sewability evaluation in high-speed sewing and give seminars and lectures to the textile(TQM) and clothing(modern approach to sewability) degree students of the Institute of Textile and Clothing. Due to the help of Dr C.K. Chan (who is CTA of the DPRK Project) I also participated in the 3-day seminar given by Mr. Hiroshi Iwayama organised by the Hong Kong Productivity Council. Although the stopover in Hong Kong was of a private character it happened to be extremely useful in connection with this consultancy. Arrival in Vienna for debriefing on 01.12.93 and same day arrival in London. Total UNIDO assigment 36 days.

II. REPORT

1. Situation found after arrival

The hosting institution representatives met me at Pyongyang Airport(Saturday 23.10.93) and arranged accommodation at the Koryo Hotel for the whole period of the visit. Assistance was provided by the following persons: Mr Jong Song Ho; Interpreter and Mrs Koo, a Guide; both from ITG. Also a chauffeur-driven car was available throughout the visit.

2. Hosting institution: Central Institute of Garment Technology

According to Mrs. Song Un Suk, the ITG Director General, who outlined the Institute structure on the first working day of the visit(Monday 25.10.93):

Pyongyang Garment Institute was founded in 1961. Initially it had concentrated on childrens' uniforms and standardisation work. In the 1970's it started to measure the DPRK population in the form of anthropometrical surveys, conducted every 6-7 years Sample size was in the region of 7000-8000 people. The size

In the next years the Institute started to design ladies' dresses and childrens' garments. Also garment processing and assembly technology become an additional specialisation. In the last few years the need for the automeasurement of the body sizes of the population became a priority, with the use of image processing techniques(an instrumented 4 DCC cameras measuring system was developed by ITG and was presented at the National Exhibition Centre in Pyongyang during the so called 3 Revolutions Exhibition (Ideological, Technical and Cultural, which I visited on the 7.11.93 - during the demonstration only one camera was in the working order). The Institute is interested in the implementation of fusing technology, initially on a semi-industrial scale. One of its activities, which is extremely useful for the 300 factories selected to specialise in production for the domestic market, is the dissemination of fashion catalogues published by the ITG, where sketches and technical drawings are included. This allows the factories to make use of the predesigned patterns(an example of such a catalogue appears in the recorded video-film made by the consultant).

The research establishment is structured in the following specialised research rooms:

-Standardisation Room,	-Design Room,
-Manufacturing + Processing	-Traditional Clothing,
-Computer Applications,	-Material Testing,
-New Technology Dissemination,	-Style Construction,

additionally: -2 sample making rooms.

Total employment: 130 people including 70 research staff, the majority are specialised university graduates(industrial engineers, garment technologists, electronic engineers, computer programmers, mathematicians etc). The Director of the Institute is also Chairman of the DPRK Garment Industry Association.

The relocation of the ITG to new, purpose-built premises is planned for 1994.

3. Research and lecturing facilities

The lecturing facilities provided were satisfactory, the A/V equipment consisted of a colour video-monitor, slide-projector, overhead projector and adequate black-and-white boards.
The ITG research facilities appeared to me to be inadequate in the field of hardware and software as well as testing instrumentation(the latter, by western standards - was virtually non-existent). As a result of the Project's financial input the situation will be improved by the acquisition of specialised instrumentation in the area of testing laboratory and computer aided design. Also the purchase of some specialised sewing and pressing machines should improve the quality and capability of the most important research facilities, although they will still be insufficient for a central research institution such as the ITG.
The Library. There did not appear to be any organised library provision apart the fashion catalogues published by ITG. This field needs particular attention. I, to the best of my ability, provided a list of the most important specialised books in English. I shall also provide a list of technical journals before the next trip to Pyongyang. I gained the impression that the ITG has so far relied mainly on Japanese publications. It was explained that although these are not bad - there is also a need to have a wider range of technical literature which can be met by the acquisition of various publications in English, especially in the field of clothing manufacturing and fashion design.
The same relates to the published specialised standards (ISO, national and industry). The Testing Room does not have any reputable world-wide known standards. It was agreed that a list of the standards and some literature related to testing would be provided.

4. Relevance of the topics presented in the lectures

Basically, it was difficult to pre-select the lecture topics based only on the information outlined in the main Project Document, without an on-the-spot assessment. Some help was

provided by visiting a garment company in Pyongyang, which represented an "average organisational level". The report from this visit is included in the Appendix IV. As an consultant with experience of the Far-East I was aware of the buyers opinion (mainly from Hong Kong), that the quality of CMT type exports from the DPRK is one of the highest in the Far-East, but that the execution of "delivery schedules might be a...headache". The cost of achieving such high quality had to be another matter. Therefore the production management efficiency had to be also addressed, as equally vital for the domestic markets as for the export. Such topics as lead times, quick response in manufacturing, adequate machinery and equipment to be used was found to be of a considerable interest to the lectures' attenders.

An important first assumption was made to treat the lecturing as an advice platform to the already experienced listeners, highlighting their role as further disseminators of the knowledge acquired and to be included routinely through research projects when relevant. The second assumption was to provide the research staff with the information on "the state of art" technology, even if unavailable in the foreseeable future. This always improves the "professional morale", being aware what "the others achieved". This task appeared easier than expected because some of the staff underwent Study Tours and Fellowship Assignments within the programme of the Project. One of the most important events in the "Apparel World" was the International Clothing Machine Fair IMB'93 in Cologne, which was attended by some of the staff, who "confirmed" that some technological solutions shown by me on the post-exhibition video-films were seen and are realistic, although some of them might be only a prototypes.

The important part of the lecturing was the use of various indices allowing comparison of own industry with the rest of the world, what appeared to be very welcomed information. The areas of particular attention were: work content and its measurement methods, engineering of work stations, indices for different production systems with respect to work area, flow-length and ergonomics, the role of attachments in the non-investment field.

Also the numerous catalogues and manuals from the world-renown machinery producers were provided with the technical comments. The importance of the CAD/CAM system within a CIM concept was highlighted. The considerable interest was drawn to GSD method of operation time establishment, based on the MTM data base and newest CAD/CAM modules of the production design. The GSD Ltd equipped me with some of their proposals, e.g. to enter franchise agreement with the IGT (DPRK), as a dissemination centre in DPRK. The message was conveyed for further consideration by relevant authorities.

The importance of the fabric quality evaluation was outlined and found a well received response as a need for the complex Quality Control system, to be designed on a multiple modular base to be later offered to the manufacturing companies. The advice was given to treat such a system as one of the modules within CIM and to include it as a first step in the future activities of TQM(if ISO:9000 series time arrives!).
The quality of the uniforms (trousers) currently being on the "important agenda of IGT" was discussed and advice was provided with respect to style and make-up solution, as well as the production system.
Due to specific needs of the institution like ITG - the first visit therefore - was a "flash-pointing" of wide variety of the most important topics aiming to prepare background for the next, more specialised topics, a list of which is presented in the Appendix V.

5. ITG hospitality

There is no complaint with respect to the entire period of the first visit. Satisfactory lecturing facilities and sincere attention from the Directorship and assisting staff were provided. Also the extended hospitality enabled several visits to many interesting places and cultural institutions to be made, which enriched knowledge about the host country. Special thanks are due for the provision of a car for visits to the Embassy of the Republic of Poland.

6. UNDP (Pyongyang) aid

The initial problems in obtaining an entry visa to the DPRK were finally resolved successfully by the UNDP in Pyongyang. The relevant DSA funds were provided in sufficient time. The meetings with the RR and Deputy RR were very informative and focussed on an optimum outcome from the project activities.

III. RECOMMENDATIONS

To summarise Chapter II, the following suggestions are being made:

1. ITG should be better equipped with technical literature, provided on a continuing basis (technical books, journals, published standards related to quality and testing methods). The provision of an Institute Library should be considered in the new location.
2. The new technology and quality requirements provided by foreign buyers (CMT form of export) could also be acquired and disseminated by the ITG among factories orientated towards the domestic market.
3. The need for a systematic quality control(monitoring system) appears to be one of the important aspects of any future ITG research programme. A basic knowledge of this would have to be provided during the next visits.
4. Greater attention should be paid (in the research planning) to non-investment forms of productivity improvement, by means of wider utilisation of work study and workstation engineering. The IGT should have a leading role in the dissemination of modular aids and attachments, with which individual factories should be equipped.
5. It would be extremely useful for the consultant to visit the Pyongyang University; Garment Technology Faculty to become more familiar with the educational programme provided there. In return, the consultant could provide interesting information in the form of a lecture or a seminar. This would be beneficial to both parties and is practiced in many countries.

IV. APPENDICES

Appendix I

Job description

U N I D O

14 December 1992

Project in the Democratic People's Republic of Korea

JOB DESCRIPTION

DC/DRK/92/019/11-02/J13102

Post title:	Garment processing expert
Duration:	3 months (1+2)
Date required:	Mid-1993 + 1994
Duty station:	Pyongyang
Purpose of project:	To strengthen the Institute of Garment Technology (IGT) to effectively provide guidance to 300 garment factories in the field of garment manufacturing, assembly line organisation and design; and to establish a national size chart.
Duties:	The expert will co-operate with the IGT members for their acquisition of modern garment processing technology and method of grading garment quality. The expert is also expected to assist in optimizing assembly line outlay. The areas that need the expert's particular attention are:

-Undertake a detailed assessment of garment processing methods including cutting, sewing, work layout, assembly line organisation and identify training needs;

-Lecture on modern methods of garment processing through application of new garment foundations. Technical direction of rational methods of processing coats and T-shirts, through personal involvement in test manufacture;

-Lecture on technical characters and usage of newly developed special garment processing machines;

-Assist and advise on principle of selecting quality indexes of garments and scientific methods of quality evaluation;

-Lecture on quality examination facilities and methods of quality control in garment factories;

-Join in the test of quality of coats and T-shirts and direct its experiment;

-Instruct on technical specifications and economic effects of modern assembly lines;

-Lecture on methods of CAD prescription of assignable hours of garment processing and advise in the experiment;

-Aid in the design and experimental introduction of rational multi-style assembly line;

-Conduct workshops and seminars for the factory workers and supervisors;

-Introduce improved methods of garment processing to 4 model factories, factory workers and supervisors;

-Prepare training manuals;

-Evaluate results at factory level and document impact in the report.

Qualifications: Processing expert with knowledge of modern technology of garment processing and experience in technical guidance on mass production of garment and knowledge of assembly line organisation.

Language: English or Japanese.

BACKGROUND INFORMATION: (as in Project Document)

****

Appendix II

Lecture topics for IGT (General outline)
by Richard Chmielowiec of UNIDO
Period: 25.10-22.11.1993

Topic No.:

*1. Nature of Apparel Manufacture. General overview of the apparel industry in the World and Far-East. Introduction to current trends in the industry and the response to market changes affecting production systems and technology.
Duration * time 45 min. Lecture with A/V tools.
* time in all topics is given without translation!

*2. Comparative technologies based on a Bobbin Survey (world-wide). Aids: tables and technical machinery details.
Duration 45 min. Lecture with A/V tools.

*3. Recent developments in sewing machinery and related equipment. Based on the IMB'91 and '93 shows. A/V tools and video-films:

* - Sewing machines for T-shirts by: Yashima and Union-Special. Set of slides with technical comments.
- Sewing machines for ladies' and mens' overcoats by: Pfaff, Juki, Pegasus, Brother, Durkopp etc. Video-films(Video-8 and VHS. PAL system). This requires a TV PAL system colour monitor.
- Pressing and ironing equipment. Video-films by: Veit, Sussman, Adler etc. Technical comments by the lecturer. Details from specifications.
Duration: 2 hours.
(Some training material was provided as examples).

* - Fusing equipment technology and hardware(Kannegisser). Film with technical background on garment foundations. Film duration 45 min. Video-8 system.

* - Transportation equipment. Video film VHS by Kannegisser. Technical comments throughout.

*4. Developments in CAD/CAM systems based on the IMB'93 exhibition.
Video-film (VHS) by Lectra Systems and additional slides with some more details. 90 min duration.

*5. Production times for various garment types including operation times. Industry-wide examples. Lecture with slides and A/V tools.

*6. Technology for T-shirts and Ladies coats. Production times, machinery and equipment.

7. Production control. Calculation of production losses. Three case studies. Cutting Room, Sewing Room and Plant Efficiency. Fabric utilisation and optimisation.

*8. CIM concepts. CAD/CAM. GSD Technology System. *Practical examples.
Recent developments in Production Simulation.
*Example of an Expert System. Duration according to client demand.

9. Recent trends in production system design. Automation and modular manufacturing.

*10. Workplace and Work-station layouts. Indices in the design of a sewing Room and Cutting Room. Safety requirements for mass production.

11. Quality. A wide range of topics from an introduction to Quality Control to TQM and ISO:9000 series standards.

**12. Fabric Objective Measurement Technology and Fabric Sewability in Quality Evaluation. Slides and transparencies.

Note:
The last 3 topics will be presented according to the time available and in the agreement with the IGT.

"The role of the Production Supervisor and training needs" will also be agreed with the IGT.

When an A/V or Video-film is required, the following equipment should be provided by the ITG:

- A TV colour monitor(PAL system) for the Sony Video-8 camera provided by the lecturer.
- A video-player(VHS type,PAL system)
- A video-8 Sony camera for playback.
- Overhead and Slide Projectors.
- A white framed screen.
- A PC notebook for the seminar will be provided by the lecturer.

Duration of lectures: 9:30-12:00am
Duration of seminars: 2:00pm-3:00pm (video presentation, group discussion etc).

Note:
* covered during first visit;
** just started.

****

Appendix III

Topics that the Heads of the Research Rooms requested should be covered during the next missions

1. Steam pressing technology. Parameters and adjustments.

2. Measurement of sewing efficiency with the use of a computer.

3. Optimum processing methods in the sewing rooms.

4. Quality indices of clothing materials(*).

5. World trends in PC application in manufacturing processes.

6. Material optimization in the garment factory.

Plus the other topics that were only outlined during the first visit, subject to time availability.

Note:
-*This topic is adequate for the textile testing field. The following request was made to the ITG for inclusion in the programme of the next visit:

- four factories were to be selected for he consultant to visit together with the ITG and factory management. Problem areas to be addressed in the workshops in the form of projects would be selected;
- Working groups consisting of the ITG staff, would attend workshops at one or two factories and undertake some problem-solving projects, which would be evaluated during the final visit of the consultant (in August 93). Factory staff would be welcome to join the workshops.
- the time ratio 2:3 days or 3:2 days (3 days lecture/seminar at ITG and 2 days at the factory respectively);
  Staff participation in the workshops would be continuous and they would not merely be assigned on an ad-hoc basis. The heads of the research rooms also undertook to supervise their staff.

****

Appendix IV

Date: Tuesday (26.10.93).
Factory visit at the
Songyo Clothing Factory in Pyongyang

1.5 hours were spent in the Sewing and Cutting Rooms guided by the factory Personnel Head. The factory specialises in CMT work for export to western markets, through an agent in Hong Kong. A few styles of winter blousons, wadded by a polyester needled lining were in production. The style was of an average level of design complexity with a total work content of 300 MSV. The Sewing Room had 150 operators working in two independent similar sub-assembly and assembly lines and finishing units.
The working hours: 1st shift: 9:00am-6:00pm and after a 3 hours break the 2nd shift from 9:00pm-6:00am. I was told that the night shift was a slightly more productive than the day one. Each shift had its own supervisor and three assistants. In-process inspection was carried out by two controllers. The final inspection was performed by external inspectors provided by an export inspecting organisation charging the CMT company an inspection fee. The prices were negotiated by an export agency and the company had little say in the CMT work costs. The order series in one style were in the range of 600-5000 garments. The daily output 2 garments per operator. Company employment 2000 people. Production employed 1500 (4 Sewing Rooms of 300 operators, Cutting Room 100, laboratory, QC, supervision). The relatively high level of non-production staff is due to the fact that it has its own school (100 pupils a year), nursery, surgery etc.
Having 4 similar sewing production rooms, which can simultaneously process the same style is relatively easy to supervise. The number of operators present was about 55. System of production: progressive bundle sectional line. A relatively low amount of WIP was noticeable. The basic machines were of the lock-stitch type (Toyota brand). There were two steam under-pressing and top-pressing work-stations with blow-and-suction capabilities (but the suction was blocked by many layers of fusible material, glued onto each other, which was overlooked by the supervisors). The other underpressing was performed with a domestic thermostat regulation electrical iron. There were no fusing presses either in the sewing or the cutting room.
The machines were run with a limited number of attachments and without any safety protection guides in the vicinity ot the needle area. The same was applicable to the stationary cutting machine of the Cutting Room.
The Cutting Room was inadequately equipped and had no spreaders and end-cutters nor portable vertical knife cutting machines in spread sections and likewise no drill-marking devices.

The mechanics were correctly located in the sewing room, although under the direct supervision of the factory Chief Mechanic.
The operators appeared to have a high manual dexterity in handling short runs of single seams (a common characteristic among operators in the Far-East). A total disregard of the basic rules of ergonomics was noticed in the existing equipment (operator chairs, height of the spreading tables; workers were kneeling on the top of the long tables instead of walking along on the floor level). Marker makers controlled fabric layouts on the factory floor, although there seemed no lack of production space). Also inter-transportation equipment was scarce and insufficient.
Summarising the visit it is important to state that the quality of garments was acceptable to the HK Buyer(only 3& of rejects). Nevertheless there were abundant opportunities for potential production increases. The factory has been working on a CMT basis for western markets for 7 years and it seems that it is not aware of the existing wide range of possibilities for productivity improvement through better work engineering.
Conclusion: the topics of ergonomics and engineering of the workstations have to be addressed in the lectures for the ITG staff. However it seems that there is some awareness judging by their professional handbooks.

****

Appendix V
List of the people associated with the mission

1. Host Institution:
   - -Mrs.Song Un Suk, Director-General of ITG
   - -Mr. Jong Song Ho, interpreter; ITG
   - -Mrs.Koo, the Guide; ITG

2. GBCIO:
   - -Mr. Li Mong San, Director of Division

3. UNDP (Pyongyang):
   - -Mr. Achikzad G.F., Resident Representative(RR)
   - -Mrs.Magallanes M.S, Deputy RR
   - -Mr. Li Song Ho, Programme Officer.

APPENDIX VI

UNIDO Substantive officer's comments

The first part of a three-month assignment was completed during November/December 1993. The garment processing consultant was briefed by UNIDO Hq. and the CTA of the project on his way to Pyongyang and the expert adjusted well to the prevailing conditions at the Centre.

He was able to motivate within this short period of time and convince the research staff of the improvements necessary for different methods of garment processing, garment technology and garment production management, with particular emphasis on time and fabric optimisation.

It is correctly stated that the research facilities are inadequately equipped with hardware and software as well as testing instrumentation and the acquisition of specialized instruments is recommended, including specialised sewing and pressing machines. A Library is practically non-existent and the expert provided the Centre staff with a list of specialised books in English and will provide them with a list of technical, internationally used journals. Until now, they were only using Japanese publications.

The research staff gained considerably from the study tours abroad, organized by UNIDO under the project. The lectures given by the expert were well received and the importance of a CAD/CAM system within a CIM concept was highlighted and the need for a complex Quality Control system understood.

We also support the idea of arranging a visit for the consultant during his next visit to the Pyongyang University to familarise himself with the educational programme and in turn, hold a lecture on specific garment topics which will be beneficial for both parties.

John-Peter Moll
ISED/AGRO
10/1/94