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APPLICATION OF COMPUTER-BASED TECHNIQUES TO THE PATTERN-MAKING AND  
GRADING OPERATIONS AT THE PYONGYANG GARMENT DESIGN INSTITUTE

DP/DRK/88/009

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Technical report: Garment technology - November 1990 - January 1991\*

Prepared for the Government of the Democratic People's Republic of Korea  
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## EXECUTIVE SUMMARY

The assignment of 2 months duration 9 November 1990 to 8 January 1991 was part of a project with the objectives to assist the Garment Design Institute in Pyongyang DPR Korea, to modernize its pattern making and grading operations and related services to the industry, thus contributing to product quality and reduction of fabric waste.

- Project title

Application of computer - based techniques to the pattern making grading operations of the Pyongyang Garment Design Institute.

- Project number

DP / DRK / 88 / 009 / A / 01 / 37

- Purpose of the project

Introduction of computer - based techniques in pattern making and grading.

- Work done

Training and upgrading a group of patternmakers designers in systematic pattern making and grading procedures related to gents' wear and ladies' wear.

The method of pattern making and grading commonly applied in the institute is not based on any reliable standard measurements for use in a computer system.

The main output is the introduction of a different construction system which is adapted to industrial requirements, tested and proved reliable in computer based pattern making.

**- Main conclusions and recommendations**

1. Reorganization and modernization of pattern making and sample making sections in the garment institute.
2. Training and upgrading of supervisors in applied methods and techniques related to the production processes in garment manufacture, pattern making, cutting and sewing operations, production and quality control.
3. Market information and quality control to know customers reaction on delivered garments. To adapt and improve the quality accordingly.
4. Seminars and workshops for improvement of quality standards.
5. Purchase of technical books and magazines to provide technical personnel with necessary information and reference material.

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## INTRODUCTION

The Garment Design Institute in Pyongyang, North Korea is operating as a service agency to the Korea UNHA General Trading Corporation ( K U G T C )

The institute is responsible for assisting KUGTC in its negotiations with customers, producing designs and sample garments for customer approval, preparing detailed specifications for the manufacture of these garments in the associated factories and for monitoring the manufacturing process, providing technical assistance where required.

In order to fulfil satisfactorily the work duties described above it was considered important to:

- upgrade the competence in pattern making , pattern grading and patten design.
- introduce a computer based system in pattern making, patterngrading, lay planning and marker preparation - organize training programmes in related methods and techniques.

By introducing a computer based system all through the pattern development process in the institute will gradually increase its capacity and improve the quality of services rendered to the garment factories.

Expected output;

- a more consistent quality level throughout the manufacturing process
- productivity improvement
- better material economy

Through UNDP / UNIDO project, the basic equipment for computeraided design, pattern making and grading operations has been purchased and installed at the Pyomgyanf Design Institute. Various training programmes are included in the project in order to prepare the institute staff for new advanced techniques and to upgrade their level of competence in pattern making, pattern grading and garment manufacturing.

## II BACKGROUND INFORMATION

The Garment Design Institute is the co-ordinator of all activities connected with the accomplishment of an order, from negotiations with customers through styling, pattern making and pattern grading, stitching and assembling, finishing and quality control procedures. It is the institute's responsibility that garments produced in the associated factories conform with specifications and / or approved sample garments.

The institute is divided in sections. Each section has a special function and well defined responsibilities.

The following sections are directly connected with garment design and production;



1 design section, 4 pattern making sections, 1 cutting section and 1 sample making section.

The four pattern making sections are specialized in different areas of pattern making and design;

1. product specifications and instructions for garment manufacture including pattern making sizing and packing to accompany the approved sample garment when submitted to the factory plant.
2. technical drawings to complement the product spec. instructions and related sample garments for the purpose of preparing a counter sample.
3. product specifications and instructions for production of textile fabrics.
4. quality control instructions related to specific orders and the preparation of technical instructions for the process of manufacture.

Sample garments prepared in the institute are based on ideas and sketches made in the design section. Alternatively sketches and style specifications are presented by foreign customers. In both cases, master patterns are developed by the pattern making sections in the institute.

A sample garment is prepared based on the original master pattern. After approval by the customer, the master pattern and related sample garment is converted into technical drawings and scaled diagrams and forwarded to the designated factory for the preparation of a new pattern. A counter sample is then cut from the new pattern, stitched and assembled by the factory and returned to the institute for approval.

The section responsible for final control will compare countersample with the original sample garment, study the technical specifications for cutting, sewing and assembling and if accepted a cutting order will be prepared and sent to the factory for production purposes.

#### COMMENTS

There are a couple of factors in this process of work that may affect the result negatively:

- the process is extremely slow and unreliable. It is unlikely that the produced garments will be identical with the approved sample garment.
  
- the customer has no opportunity to verify and approve the counter sample.

Who is then responsible in case of deviation from the original sample garment.

### III ACTUAL TASKS COMPARED TO JOB DESCRIPTION

Considering the original objectives and duties in the terms of reference. I expected my work duties to be more closely related to factory level and the execution of orders rather than classroom teaching.

( Ref. Job Description, annexe 1).

Since this matter was of major concern it was taken up for discussion a couple of times with the project director Ms. Li. She was however of the opinion that the on-going training programme in pattern making and related subjects would lay the necessary foundation towards a better understanding of industrial requirements in pattern making and style development and thus prepare for necessary changes and an improved patternprocess.

#### COMMENTS

Although I agree in principle I am convinced that to change a process through training only is very slow and inefficient. A more efficient approach would be to combine two ways of solving the problem;

- 1 training and upgrading institute staff in order to introduce new work methodes and techniques.

Such training should focus upon;

- the use of standard measurements and how to adapt standards to various market and customer requirements.

- pattern construction, style adaptation and the preparation of final production patterns for cutting.
- quality specifications, cost and quality control.

2 direct assistance in the factory plants related to the follow up of product specifications and instructions for the manufacturing process.

#### IV PLANNING AND IMPLEMENTING THE CONSULTANCY JOB

A meeting was organized at the very beginning of the mission in order to plan the work programme. Ms Li, the project director and Mr. Sang the head of cutting section participated. Mr. Sang presented the identified training needs. Ms. Li gave complementary information about the patternmakers - designers work duties, professional background and training objectives.

The conference room was put at our disposal for the duration of the training programme. The space was obviously a bit small for the type of work involved but it was agreed that two groups of maximum 7-8 participants could alternate if necessary.

The Lectra equipment for computer aided design had been installed but the system was not yet in full operation. Staff members practiced their patternmaking and grading skills for the purpose of learning how to operate the system.

- A PROFESSIONAL CATEGORIES AND WORK DUTIES

Definition of stylist, designer and patternmaker / designer

These three are often confused, although each one represents a specific competence.

The stylist sets a trend. A style trend may be broad shoulders, low waistline etc. or very definite colour combinations.

The designer creates specific products according to the trend.

The fashion designer works exclusively with garments.

The patternmaker / designer drafts the pattern applying geometric principles and imagination to develop a variety of styles.

The patternmakers / designers who participated in the training programme in pattern making are permanent staff of the institute since many years. They are university graduates with minimum five years of study in garment technology which is a comparatively long study period. It takes four years in England to prepare students for the Higher National Diploma in Clothing and three years in Sweden for the equivalent qualification. These courses provide a broad range of studies in garment design and garment construction, pattern cutting and garment manufacture.

It would have been useful to know the content of the five years curriculum in garment technology so as to better adapt the upgrading programme in pattern making and update the participants' competence with reference to their technical background and experience. Despite several inquiries it was not possible to obtain this information.

Recommendations:

To cooperate with the university, other institutions and industrial enterprises with knowledge and experience in garment and textile technology, design and manufacture so as to discuss curriculum and programme implementation, identify present needs and plan for future development.

- B TRAINING NEEDS AND PROGRAMME OUTLINE

The identified needs presented by the head of cutting section, indicated however some weaknesses in certain areas of pattern making and garment manufacture.

A preliminary programme was prepared based on these needs.

First week

Standard measurements and sizing system for ladies' outer wear. Figure types and modification of the measurement chart. Construction of different blockpattern

foundations, sample size C. 36

- ladies' bodice

sleeve

shirt

trousers

collars

Second week

Construction of intermediate blockpatterns for ladies'

- kimono

raglan

semi fitted jacket

fitted "

tight fitted blocks

Third week

Grading of blockpattern foundations

- grading chart for ladies' wear

grading points

" rules

balance marks

control of pattern pieces before grading

numbering of style and pattern pieces

grading and control of graded pattern

Pattern design, adaptation of blockpatterns, style development.

Fourth week

Construction of standard blockpatterns for gents' outer wear.

Standard measurements and sizing system for gents' outer wear

Figure types and modification of the measurement chart

Construction of blockpattern foundations, sample size C. 50

- shirts, classical slimfit and casual

trousers

classical jacket

casual "

overcoat



Fifth week

Pattern design, adaptation of blockpatterns, style development.

Sixth and seventh weeks

Preparation of production patterns and manufacturing of gents' classical suit. Cutting, trimming and assembling.

13 pattern makers / designers participated from the very beginning in the training which was organized as a full time course from 9.00 AM to 5.30 PM six days/week.

The problem of space for pattern drafting and the understanding of maximum

7-8 participants in a group was given up.

All 13 managed to work very tightly side by side without trouble or disputes.

- C METHOD OF TRAINING

Construction of block patterns, style interpretations, standard measurements and sizing tables etc. has been introduced theoretically in lecture form, drafted in 1:1 scale on the blackboard, prepared as paper pattern construction and finally as production pattern for cutting purpose. At least one pattern of each category, shirts, jackets, trousers etc. for both ladies' and gents' has been cut out in a muslin material for control of pattern construction and fitting.

Recommendations:

The patternmakers/ designers who participated in the training were all set and limited in their approach and methods of work and therefore too dependant on principles.

A characteristic of a competent pattern designer is both knowledge of fundamental principles and the ability to apply them in practice in a flexible way using good judgement and fashion sense. To acquire the desired competence, work methods and techniques must change. The improvement of work places and self upgrading through frequent study of technical books and magazines would contribute towards a higher competence level.

- D PRODUCTION OF MEN'S SUIT

Tailoring know how exists in the institute but there is a need for more simplified work methods and techniques. However related trimmings and adequate equipment is as important as manual skills in tailoring in order to improve the efficiency and minimize production costs.

The need for modern and more efficient work methods and techniques applies not only to gents' suits but to all different categories of garments.

Such methods and techniques include:

cutting, sewing, assembly and pressing techniques which can be learnt through training and practical experience in a factory plant where the use of modern machines and production aid devices like folders and special machine attachments are applied.

The somewhat outdated methods seem to affect particularly the heavier type of garment production more seriously since all aspects related to apparel quality control and quality rating are influenced; appearance, durability and function. Defects in a suit may harm sales to a much higher degree than corresponding defects in sports wear or light weight apparel.

To improve methods, modern machines should be used so as to obtain maximum benefits. The replacement of an old machine by a modern high speed machine must be done with careful consideration and knowledge regarding available sewing machines and selection of an appropriate machine type.

#### RECOMMENDATIONS

- training and upgrading of personnel to develop special skills in different areas of garment making.
- gents tailoring is a skill which cannot be acquired through short, intensive upgrading or demonstrations only. It requires a genuine workmanship training and practical work experience.

- subscription of technical books, trade magazines and other literature dealing with apparel manufacturing.
- to keep in contact with sewing machine manufacturers and collect all machine brochures and related information which they may distribute.

## V PROBLEMS AND RECOMMENDATIONS

### - A PATTERN DEVELOPMENT

According to the method applied, every new pattern was constructed step by step on the blackboard in 1:1 scale. All related measurements for construction of a standard sample size and the proper calculations for correct proportions were introduced and explained in detail before each lecture and before every new construction. This knowledge is important to the patternmakers in order to gain confidence and produce quality work.

### - B DEFINITION OF BLOCKPATTERNS

A blockpattern or foundation pattern is a basic outline on the flat, of the figure or some part of the figure. From a wellplanned and detailed block, a skilled patternmaker / -cutter can understand and visualize the type of figure it represents. Blockpatterns are generally made in a strong long lasting material like card board or plastic.

Blockpatterns are constructed without extra fullness, only with the necessary ease allowed for normal movement.

Blockpatterns are prepared without any seam allowance in order to facilitate adaptation and manipulation of the block and to ensure correctness in proportions and fit of the final garment.

#### - C THE STANDARD BLOCK PATTERN

There are different types of blockpattern depending on their use. A blockpattern which is adapted to industrial manufacturing and methods of work may not be suitable for tailor made garments. Each type has its specific features making it suitable for the requirements of each type of work.

The standard blockpattern prepared in a common standard size can be used as it is or as foundation for pattern adaption and design.

### COMMENTS

A simple inquiry revealed the inconsistency of existing block patterns used in the garment institute. Each patternmaker has developed individual blocks and then adjusted them according to their own standard of requirement. This is acceptable when a patternmaker / designer repeatedly works for the same customer and this customer is satisfied with and has approved that particular standard of fit. The situation or work procedure in the institute is however organized differently.

It is important to establish one basic standard block of the garment institute based on a standard body measurement and sizing system. Through adaptation of the basic standard block, trade blocks may then be developed to suit various requirements of different firms, markets or individual customers.

### RECOMMENDATIONS

The pattern making section should develop block patterns for different kind of garments and fit;

Ladies' standard block for jackets, coats, sports wear, under wear etc.

Gents' standard block for shirts, trousers, classical suit, overcoats etc.

All patterns must be carefully tested and controlled before entered into the computer system for grading. All necessary information about the **pattern pieces** should be written on the patterns for digitizing.

**- D STANDARD MEASUREMENTS AND SIZING**

In order to produce patterns for mass production, it is necessary to work with standards ie. a particular size must indicate a certain number of basic standard measurements, representing the average body dimensions.

The sizes and related measurements used in the institute are very few and insufficient.

There is no standardized system for pattern making and garment manufacturing.

The method applied in pattern making is based on calculation from a couple of basic measurements (divisional system of drafting). It is applicable in the production of men's tailored garments but the method is not suitable for ladies' garments which are much more influenced by fashion changes and a wider variety of textile fabrics.

The standard measurement and sizing system introduced is based on average swedish body measurements for ladies' and gents'. This system is however useful not only for the swedish market but all scandinavian countries and also Germany. With minor modifications it can easily be adapted to several other markets as well.

## E SIZE DESIGNATION OF CLOTHES

The first step in developing a table of measurements for pattern making and grading purpose or to adapt an existing table to specific market requirements, is to make a study of anthropometric data available for the market(s) in which the garment is to be sold.

A size designation is a title or a number for a given range of anthropometric measurements to fit a person whose body measurements lie within certain tolerance limits of the size measurements. A grading table is a scale of correlated length and width measurements for this range of sizes.

Considering the question of "size" it is important to differentiate between those based on body measurements and those based on final garment measurements. The two are frequently confused, creating difficulties both in the production and in the sale of ready made garments.

Technical personnel in the garment institute are confronted with two kinds of sizing systems depending on common practice among clients. It is extremely important to clarify this matter, the basis for sizing, before preparing the sample pattern and the cutting order.



The sizing system introduced ie. the tables of standard measurements for ladies and gents are all body measurements.

These body measurements are nett measurements, to which nothing has been added for fit. The "size" applies to the figure to be fitted and not to the garment that fits it.

#### - F PATTERN MAKING METHODS

The common method of work in the garment institute, is to finalize patterns directly on the drafting table without testing them on the stand or a figure. This way of work "on the flat" may be satisfactory when preparing basic patterns or style modifications but is quite unreliable when **dealing with advanced design. Even the most experienced** pattern designers do verify style lines, fit and proportions on a stand in order to see and correct any mistakes or improve lines and balance before cutting. Every pattern made in the training course has been cut in a muslin material, stitched and fitted before finalizing the pattern.

Trough this method of work the pattern maker / designer has a much better control of style interpretation, balance, proportious and good fitting of the final the pattern.

There was a clear tendency among patternmakers to find short-cuts in development of patterns, when preparing a new style or a different size of a jacket or shirt they would mix patternpieces from previous patterns and styles, having the same or similar shape with a new construction for example sleeves and collars were often used for several different style patterns, minor adjustiments were made to fit a sleeve into a new armhole.

There is a great risk involved in that way of intermixing patternpieces which may lead to serious fitting problems and even size defects. This method of work is out of question when applying computer based pattern making and-grading in as much as every style must have its own style number and every piece a connecting piece number.

There are no short cuts in the production of patterns. Each style variation and size must have its own pattern and any attempt at reducing pattern costs by using the same pattern for two similar styles will create problems of manufacturing and poor quality as a result.

### RECOMMENDATIONS

For improvements, both technically and with regards to quality, of the pattern making and-cutting sections I strongly recommend some changes of working conditions such as bigger and better organized work places.

Each patternmaker who is responsible for pattern and style development should be provided with sufficient work area: a drafting table of minimum dimensions 1x1,5 meters. If cutting has to be done on the same table it need to be longer. Such a table should have shelves and drawers where to keep the necessary tools and other work materials for pattern drafting and cutting.

Dress stands or model forms must be available for testing and fitting the patterns.

Satisfactory type of pattern paper should be selected for the pattern production of the institute. A well organized workplace is a precondition for efficient work performance and improved quality.

#### - G SAMPLE PATTERN AND SAMPLE GARMENT

The first sample garment made from the original sketch and style specification is generally cut out and assembled by one of the design and pattern making sections of the institute.

At this stage the sample is mainly intended for testing the sample pattern and the fitting. It may be cut in a muslin material or in a sample fabric similar to the original one for check-up of stretch, drape etc.

The pattern is then adjusted and a new sample garment is prepared according to alterations made, this time by the sample making section for exact assembly methods and fit. A preliminary calculation should also be made at this stage.

Once the sample has been approved for cut, fit and standard of making, the production pattern is drafted in a usual sample size and prepared for grading.

For a satisfactory end result it is important that adequate cutting, sewing and pressing equipment is available during all stages of this process.

### RECOMMENDATIONS

Block patterns should be prepared in a strong paper board or plastic, permitting hard usage and yet maintaining its accuracy. For style development a thinner and soft type of paper quality is recommended in order to cut and join pattern pieces for checking and testing paper models on the stand.

Unfortunately all working time was confined to the training course and teaching. This was planned before the mission started and clearly expressed during the first meeting. Due to this condition already set, I could not easily move around in other parts of the institute to make observations related to pattern making, pattern design and sample making.

To study the entire process of work would have been very useful in order to better understand related problems and to make improvements according to the needs.

The participants in the training course however expressed very sensible views regarding their needs and requirements for pattern making and garment construction.

They stressed the need for following information and training;

- all measurements for construction purpose and how to calculate the proportions.
- pattern adaptation for different figures, different fabrics etc.
- fitting problems and how to solve them.
- how to prepare patterns and sample garments to customers satisfaction when necessary specifications are not available.

These and many more questions have been the subject for discussions during the training programme.

A library with useful reference books and materials would be of great help to the institute staff in the absence of an expert

There was a very active communication both ways throughout the programme which was extremely valuable and contributed considerably towards the training progress and foreseen accomplishments.

- H FACTORY VISITS

Two factory visits were organized

1 / SONG YO GARMENT FACTORY

12 production lines working in two shifts

Main products: sport jackets for export

Output: 150 pieces per day /per production line

1 line = 25 machine operators

1 piece = 1,3 hours

2 / DEA DONG GANG GARMENT FACTORY

Main product: trousers and suits for export

Output: 200 trousers per day / per production line

1 line = 40 machine operators

1 piece = 1,6 hours

Both factories are working as Cut Make and Trim contractors to foreign garment manufactures through Korea UNHA General Trading Corporation.

The ongoing production of sport jackets and trousers was supervised by the production manger and controlled by the foreign manufacturer which means that the garment institute was not at all involved.

Sample garments and patterns, cutting orders and markers in connection with specifications for assembling, finishing etc. were transferred directly to these designated factory plants. As a result it was not possible to see and study on the job, a production line with related instructions and product specifications prepared and controlled by the garment institute.

### - I OTHER ISSUES

Through personal contacts with some clients to the KUGTC, having the experience of garment production in DPR Korea, following observations have been commented with regards to the average performance in the garment industry:

production capacity	under utilized
productivity	very low
work discipline	generally good
absenteeism	almost non existent
machine maintenance and repair	unsatisfactory
production control and scheduling	must improve to meet delivery dates
machine loading and line balancing	should be analyzed and improved

- Sewing guides and machine attachments not available in DPR Korea
- Tools and equipment for material spreading and cutting processes as well as related methods and techniques are too old fashioned and need to be improved urgently.
- Machine layout, transport of materials and cut pieces between work places and stations are not well balanced, should be examined and adjusted.

- Number of work places and provision for storage before and after every operation, is a matter of space available but also how to arrange the equipment related to the sequence of assembly.

All these factors are however of major importance for improved work flow and a maximum production capacity.

The garment industry in DPR Korea is confronted with several other problems as well;

- poor knowledge about product adaption and standardization
- poor knowledge regarding specialized machinery, machine attachments and equipment to up grade the quality of production.
- lack of market information
- lack of competent trainers and training programmes to improve the performance of production personnel at all levels from the design and construction of the product through all the subsequent processes involved.



Many problems related to efficiency and productivity depend upon managerial capability rather than upon workers skills, machinery and the presence of sophisticated equipment. Many manufacturers are still applying rather crude methods which are inappropriate for massproduction.

### RECOMMENDATIONS

Seminars and workshops should be organized in areas related to garment production so as to promote an awareness among garment manufacturers about topics such as productivity, efficiency production and quality control, product adaptation, diversification and standardization.

## VI ADAPTATION TO NEW TECHNOLOGY AND METHODS OF WORK IN THE GARMENT INSTITUTE

During 1991 certain changes will take place regarding pattern making procedures in the garment institute. Manual grading and layplaning will gradually be replaced by a computer based method of pattern making, pattern grading and marker planning, (C.A.D. Computer Aided Design). This will also influence the preparatory work, as the patterns must be adapted to the computer system.

This means that the basic block pattern must be drafted according to a set of standard measurements in a given size and carefully controlled so that lines, shapes and dimensions are well balanced before finalizing the block and that all necessary information is recorded on the block.

It is important that the basic structure of the block pattern is so prepared that all necessary adjustments can be introduced easily with the help of CAD, without upsetting the balance of the whole pattern. The main purpose for introduction of a different construction system has been the absolute need for a system which is adapted to industrial requirements, tested and proved reliable in computer based pattern making and grading.

#### A THE CONSTRUCTION SYSTEM

The new system, related to ladies' and gents' wear, has been applied throughout the training programme. It is based on a standard body measurement and sizing system which has the advantage of being quite simple, logical and easily adapted to different countries with different standards and body dimensions.

The necessary information on the block refers to fitting ie. darts for correct body shape and lines indicating different levels of the figure, body measurements, balance marks and allowances included in the construction, size indication etc.

All this information is important for the reliability of the block pattern from which both style patterns and production patterns are developed. It also adds to the speed and accuracy of pattern design.

#### - B PATTERN PREPARATION

The final production pattern for cutting the material has to be prepared with all seams included and adapted to the assembly methods and to the type of sewing machines used in production.

Every pattern piece belonging to the same style has to be prepared and given a style number and a piece number.

All pattern information must be written on the piece: size, grain line, balance marks and any instructions which may be required for correct layout and cutting.

The training in pattern making included also control and testing of all style patterns.

Since there was no dress stand available this was made on a live person.

Fitting problems were corrected and transferred to the pattern.

### - C TRAINING OBJECTIVES

This procedure may seem somewhat complicated but in connection with new style development it is in fact indispensable. It has also a training purpose in developing reliable work methods and a better standard of workmanship.

The training course was planned and implemented with two objectives in mind:

1/ to introduce a reliable system in pattern making and pattern grading and to focus the training on how to apply this system in practical pattern development and grading.

2/ to teach the importance of fundamental principles and methods in pattern making and at the same time encourage flexibility and stimulate the creative side of the work.

### VII EXHIBITION OF SAMPLE GARMENTS

A showroom of quite an impressive size, full of sample garments on display is located in the institute. Customers who consider to place orders and manufacture in DPR Korea may contact the garment institute where they have an excellent overview of the textile fabrics and garments produced in the country.

Examination of garments displayed in the showroom gives a clear idea of the general quality of styling, pattern design and manufacturing. My immediate reaction was that garments presented look as if they have been hanging there for too long. This may be due to the excess of garments on display, giving the impression of multiple repetition of styles and fabrics.

The showroom would improve if the amount of sample garments is reduced and the showroom organized differently so as to better expose the designs, highlight certain novelties and promote special project work.

Such a re-arrangement would make it easier for visitors and customers to distinguish the kind of garments and styles available and identify what is appropriate for the intended market. It would help satisfy the customers and also stimulate stylists and designers to present new fashion trends, develop ideas and style variations.

## VIII MAIN CONCLUSIONS AND RECOMMENDATIONS

- A The patternmakers / designers in the Garment Design Institute do not have what one would consider a proper work place where it is easy and convenient to do design work, pattern drafting, cutting and stitching, where they can experiment and develop new styles, cut materials, drape new fabrics and fashion etc.

The Garment Design Institute is quite large in terms of staff employed. It is a pity not to take full advantage of this valuable resource, reorganize the pattern making section and adapt the work places to the kind of work to be done.

The patternmakers influence on cutting and production is substantial because the actual pattern is only one phase of their work. The patternmaker / designer must watch the effect of his / hers patterns upon all operations and the final product.

Thus the patternmaker / designer has to be fully conversant with cutting, sewing and finishing since the patternmakers responsibility is to make patterns that can be applied as easily and economically as possible.

- 1 The sample making section with about 50 sewing machines could most likely operate with the same capacity but divided into groups or smaller units with a team of patternmakers who are specialized in a selected area of garment making.
  - 2 Alternatively the very spacious showroom in the institute, which is over dimensioned, could be reorganized and partly used for pattern making and sample preparation. It is also very well situated next to the computer equipped studio and may for that reason be the best alternative.
- B The present situation in the institute regarding skills upgrading in pattern making and assignment of responsibilities.

Gents' wear with reference to formal type of garments and ladies' wear with reference to light garments which are influenced by frequent fashion changes are prepared by patternmakers / designers having the the same background and experience. This means that they are not specialized in either of these two areas.

The construction system for gents' wear compared with that of ladies' wear is just so different that one patternmaker is rarely competent in both. Also the aptitude requirements are quite distinct in these two separate areas of garment construction.

For the benefit of the institute, its competence building and quality upgrading it is important to separate these production lines and develop special expertise in each of these two areas.

-C Training and upgrading of supervisors to a level where they would be responsible for the end results of pattern making and sample making; customers satisfaction with the produced garments and the entire delivery of orders.

The supervisory personnel in the Garment Institute have long experience in garment manufacture but they lack knowhow in applied methods and techniques including equipment used in the production processes. They are also rather unaware of customers quality requirements.

After training this person or persons would be qualified to control the complete process of manufacture including manpower, equipment and materials . He / she would also be useful as a permanent trainer in the institute.

One year work experience in a modern factory plant is recommended and should comprise all operational activities: pattern making, cutting and sewing operations, production and quality control.



Because of the Study Tour to Sweden, DRK 032. contacts with swedish garment firms have been established. New arrangements with the same firms should therefore be possible regarding a more extensive training period in garment production. The right person to contact in this connection would be:

Ms. Birgit Holm

PROTEKO

BOX 55008

500 05 Borås

Tel. (+46) 33-117348

- D Market information and quality control are important parts of the process and should be followed-up carefully.

It is quite important to know whether garments produced are being sold in the intended market and to what extent these garments are accepted by the end consumer.

One person should be assigned the responsibility of communicating to the institute, customers reaction regarding style features, types of fabric, colours and costs, making, fitting, finishing, durability etc.

The purpose is to make designers and patternmakers aware of quality matters and in case of defects or complaints they would know what corrective measures to take in order to prevent repetition.

-E ESTABLISHING QUALITY STANDARDS

Technical drawings, related instructions and specifications presented to the industry for production purpose are not satisfactorily worked out by the garment institute.

Seminars and related workshops should be organized in these and other areas of garment production so as to improve quality standards and productivity;

- product and quality specifications
- market adaptation
- work studies
- cost estimation and cost control
- machine layout and line balancing
- quality control, inspection procedures for processing and of finished garments.

Foreign manufactures represented in Korea by technicians, supervisors, quality control personnel and mangement personnel may be willing to assist by giving talks and perhaps in-plant workshops in their specific field of expertise.

Such an approach may well open up other possibilities and call for a participation of the korean counterparts in local factory plants.

Inventory of the production capacity and performance in associated factory plants would help identify available resource personnel, analyze akute problems and determine training needs and other necessary improvments.

-F A library with the most useful technical books and magazines is indispensable in a garment institute of this size. Such a library need not be very extensive at the beginning but technical personnel must have the possibility of consulting reference books and also dictionaries in order to work confidently and efficiently.

-G THE USE EXPERT / CONSULTANT

The institute should consider in which way the expert / consultant would be most beneficial to the project and the institute. There was a special problem to solve in this project; (ref. job description, annexe 1) pattern making and grading procedures with respect to the execution of orders by the garment factories, has been identified as a special problem to review during this mission, in collaboration with both the institute and selected garment factories.

To study this problem and to find a way to minimize it would require a different approach and different disposal of the time available.

On the other hand, desired end results could well be achieved more effectively through an extension of activities to some associated factories instead of limiting the project activities to a classroom approach.

## RECOMMENDATIONS

The garment factories associated with the institute and KUGTC should be involved actively in any programme aiming at improving the garment manufacturing processes and upgrading of technical personnel in the institute as well as in the industry. Without cooperation with the industry, in the operational activities, the development programme and training of institute staff will not have the desired effect.

## IX SUMMARY OF RECOMMENDATIONS

1. Improved working conditions by establishing a well equipped pattern design studio for pattern development and sample preparation. More specifically, this means that enough space must be allocated to each specialized area of garment design such as; pattern design for ladies', gents' and childrens' wear, product specifications regarding garment and textile production, technical drawings and sample preparation, quality control.
2. To study the possibility of reorganizing the sample making section and the show-room for the purpose of more and better organized work places, improved efficiency and better work flow.

3. Obtain or manufacture drafting tables appropriate for drafting and cutting which means minimum dimensions 1 m. x 1,5 m. Table tops should be covered with a soft material like linoleum or something similar to linoleum. This permit the use of tracing and cutting tools without spoiling the surface.

4. Standard measurements and sizing charts should be readily available for construction and grading purposes and will serve as basis for control of patterns and sample garments.

5. Provide following tools and equipment for sample preparation:

- single needle lockstitch machine
- double needle overlock machine ( three or four threads )
- pressing table and special ironing boards for sleeves, tailored jackets, collars, suits etc. (egg-shape, bean-shape, body-shape and shoulder-shape )
- pressing iron, medium weight with thermostat.
- garment stands (or model forms) in sample size for ladies´, gents´and childrens´wear.
- complementary tools for pattern drafting
- pressing iron, medium weight with thermostat.
- garment stands (or model forms) in sample size for ladies´, gents´and childrens´wear.
- complementary tools for pattern drafting

Detailed information can be obtained to;

Schlemming CO. P.O. Box 7304

Brunnenstr. 22

D-4800 Bielefeld 1

W-Gemany / R.F.A. Telex 93 80 16 schle d

6. Training / upgrading of supervisors for extended duties and responsibilities in pattern making and sample preparation. Two persons should be trained, one specialized in ladies' wear and one in gents' wear.

One year of working experience in a modern factory plant would be ample time for practicing advanced methods and techniques related to garment design and manufacture. Sweden would be appropriate as host country for such a programme since the contact with Swedish garment factories has been established as a result of the Study Tour DKR 032.

The person to contact concerning any complementary programme or information connected with textile or garment manufacture;

Ms. Birgit Holm, PROTEKO

Box 55008

500 05 Borås, Sweden

Tel. (+46) 33-117348

The supervisory functions after training should cover extensive areas of pattern design, garment technology and sample room supervision. It will include practical know-how in all aspects of pattern design, pattern adaptation and manufacture of garments through construction, cutting, sewing and assembly processes.

7. Computer based pattern development

It is of major importance that pattern making personnel, responsible for pattern making, grading and lay planning, are fully competent in computer based pattern making and grading techniques. The staff members in charge must adequately master this technique.

The six months programme to assist the garment institute in converting the manual process to a computer based system of pattern making and grading should be implemented as planned. To shorten it or to ignore the importance of this training need would probably lead to different kind of problems at a later stage.

A genuine basic training at an early stage is the best investment for a satisfying result.

8. Market information and quality control

As a means of giving the necessary feed back to the garment institute it would be relevant to assigning one person with knowledge in marketing and sales to follow up the initial orders, especially from foreign markets and customers and to collect information regarding consumer reaction and market requirements.

This person should be aware of fashion trends, textile and raw material development, garment construction, fit and sizing. He / she must also be familiar with the production capacity of the associated factory plants and control of quality standards.

9. Establishing quality standards

Technical drawings, instructions and specifications for production purposes is part of the process of maintaining given standards in the product.

Seminars and workshops should be organized in these and other areas of garment production;

- product adaption
- product and quality specifications
- work studies
- cost estimation and cost control
- machine layout and line balancing
- quality control inspection procedures for processing and of finished garments.



10. Inventory of production capacity and performance in selected factory plants would help identifying actual problems and weaknesses, determining the training needs and other necessary improvements.

11. A library is indispensable in the garment design institute. The following kind of reference books would be helpful to the staff and would contribute to the development of the institute through complementary studies and research or solving akute problems;

- textile fibers, the raw materials and fabrics
- pattern making, grading and cutting technology
- technical / historical reference books
- trend information and international fashion magazines.

Complete information through;

R.D Franks LTD. Kent House, Market Place

Oxford Circus, London W1 N 8 EJ

Telex: 89 55 855 Kenlin G

X

UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

JOB DESCRIPTION

DP/DRK/88/009/11-02/J13102

Post title	Garment technologist
Duration	Two months
Date required	June 1990
Duty station	Pyongyang
Purpose of Project	Introduction of computer-based techniques in pattern making and grading
Duties	Attached to the Pyongyang Garment Design Institute the expert will review the Instituts pattern-making and grading procedures - especially with respect to the execution of the orders by the garment factories associated with the Institute. He will advise the management of both the Institute and selected garment factories on procedures that will ensure an efficient link between the Institute and the associated factories.
Qualifications	Formal qualifications in garment manufacture and extensive practical production management experience in the garment industry - including the production of mens' suits.
Language	English

## BACKGROUND INFORMATION

Under the jurisdiction of the Korea UNHA General Trading Corporation (KUGTC) the Pyongyang Garment Design Institute is responsible for assisting KUGTC in its negotiations with customers, producing designs and sample garments for customer approval, preparing detailed specifications for the manufacture of these garments in the associated factories (about 100) and for monitoring the manufacturing process, providing technical assistance where required.

Specifically, when a garment sample has been approved by a customer the institute makes the patterns, grades them and then condenses the information into technical specifications with sketches of the garment and instructions about its manufacture. These specifications are sent to the designated factories where new patterns are made, graded and used for the subsequent cutting of the fabric.

This, completely manual, process is slow, produces an excessive amount of fabric waste and, above all, increases the likelihood of the mass-produced article deviating from the original, approved sample garment as the factory does not use the original, conformed patterns but prepares its own from the Institute's specifications.

This cumbersome process, with its built-in source of error must be changed, and this project aims to assist the Institute to do that by introducing a computerized system that will allow the factories to base their production directly on the original, conformed, graded patterns and thus respond to new orders quickly, efficiently and accurately.

Expected end-of-project situation

Based on sketches, specifications or sample garments received through the KUGTC the Garment Design Institute, using a computer-based system throughout, prepares the first patterns, modifies them until the resultant garment conforms to the original sample, grades them and prepares the "markers" for cutting the cloth, analyses the cost of production and sends the markers to the designated factories.

Here the markers are used either directly for cutting the cloth or, where repeated use of the same patterns is foreseen, patterns are cut out from the marker. In either case, the final, mass-produced garments will conform to the original, approved samples.

Furthermore, in addition to being fast - and thus permitting quick response to the customers' needs - the computer-based process saves fabric as the lay-planning on the computer screen (instead of manually on the cutting table) leads to a more efficient use of the available fabric area. The project's justification thus rests on three principal arguments: better and more consistent product quality, faster response to customers' requirements and reduced fabric waste.