

STUDY OF VARIOUS KNITTED GARMENTS PRODUCED  
IN THE SELECTED UNITS AT TIRUPUR

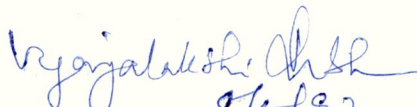
BY  
C. VANAJA

A THESIS SUBMITTED TO THE  
AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND  
HIGHER EDUCATION FOR WOMEN (DEEMED UNIVERSITY)  
COIMBATORE - 641 043.


IN PARTIAL FULFILMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
MASTER OF SCIENCE IN FAMILY AND COMMUNITY SCIENCE  
MAY, 1993

Certified as bonafide research work

Signature of the Head  
of the Department

  
3/5/93

Signature of the  
Dean of the Faculty



Signature of the  
Guide



Study of Various Knitted Garments  
Produced in the Selected Units at Tirupur

By

C. Hanaja

A THESIS SUBMITTED TO THE AVINASHILINGAM INSTITUTE FOR HOME SCIENCE  
AND HIGHER EDUCATION FOR WOMEN (DEEMED UNIVERSITY) COIMBATORE-641 043,  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE  
IN FAMILY AND COMMUNITY SCIENCE

**MAY 1993**

# Acknowledgement

## ACKNOWLEDGEMENT

The author expresses her deep sense of gratitude and sincere thanks to Dr.(Tmt).RAJAMMAL P.DEVADAS, M.A.,M.Sc.,Ph.d., (OhioState), D.Sc,(Madras), Vice Chancellor, of Avinashilingam Institute for Home Science and Higher Education for women (Deemed University) and to Dr.K.KULANDAIVEL, M.A., M.A., (OhioState), Ph.D., (Madras) for providing the opportunities to conduct the study.

Her sincere thanks to Dr.(Tmt) LAKSHMI SANTA RAJAGOPAL, M.Sc., (Tennessee), Ph.D., (Madras), Dean of Faculty of Home science, for her constant encouragement given during the study.

Her grateful thanks are to Dr.(Tmt).VIJALAYALKSHMI, M.Sc., Ph.d., (Madras), Head of the Department of Family and Community Sciences for her critical criticism and able guidance throughout the study.

Her heartfelt thanks to her beloved advisor Mrs.K.MUTHULAKSHMI, M.Sc.,(Madras) M.Phil (Bharathiar) Department of Family and Community Science, Avinashilingam Institute for Home Science and Higher Education for Women (Deemed University), Coimbatore, for her critical discussions, stimulating suggestions and valuable guidance throughout the study.

The author is deeply grateful to Mr.T.M.K.VARMA, Knitting Technologist, South India Textiles Research Association, Coimbatore, for critical criticism and able guidance throughout the study.

Her profound sense of faithfulness, sincere thank and compassionate gratitude to her parents, brothers, sisters, friends and respondents for their untiring help, lavish, sumptuous and bountiful favour catered for her during the period of investigation.

# Contents

## LIST OF CONTENTS

	Page
LIST OF TABLES	
LIST OF PLATES	
LIST OF FIGURES	
LIST OF APPENDICES	
I. INTRODUCTION	1
II. REVIEW OF LITERATURE	6
A. Meaning, history and origin of knitting	6
B. Methods of knitting	8
C. Manufacturing process of knitwear and their production cost	12
D. Properties and characteristics of knitwear	14
E. Type of garments and their finishes	15
F. Marketing of knitted goods	16
G. Innovations and improvements in knitting industry	19
H. Problems encountered by knitting	21
I. Present scenario of the knitwear industry at Tirupur	21
III. EXPERIMENTAL PROCEDURE	25
1. Selection of the Area	25
2. Selection of the Sample	26
3. Selection of the Method	27
4. Framing the Schedule	27
5. Pre-testing	28
6. Conducting the study	29
7. Consolidation and analysis of data	29

	Page
IV.RESULTS AND DISCUSSION	30
1. Background information	31
2. Details regarding employees	36
3. Details regarding Production	37
4. Storing,Packing and Packaging materials used	46
5. Marketing of the products	47
6. Details on occurrence of defects	51
7. Problems encountered in the total process	52
8. Future plans of knitting units	53
V.SUMMARY AND CONCLUSION	55
BIBLIOGRAPHY	
APPENDICES	

## LIST OF TABLES

Table	Page
I YEAR OF ESTABLISHMENT AND TYPE OF ORGANISATION	32
II TYPE OF MACHINE AND NUMBER OF POWER TABLES OWNED BY THE UNITS	33
III TYPE AND NUMBER OF SEWING MACHINES	34
IV TRADE NAMES	35
V NUMBER OF EMPLOYEES	36
VI RAW MATERIAL USED AND TYPE OF FABRICS PRODUCED	38
VII QUANTITY, TYPE OF GARMENTS AND THE COUNTRIES TO WHICH EXPORTED	39
VIII PRODUCTION OF GARMENTS FOR PAST 3 YEARS	42
IX PRODUCTION OF GARMENTS AND GARMENTS SPECIFICATION	43
X PRODUCTS MANUFACTURED AND FANCY EFFECTS ON KNITWEAR GARMENTS	44
XI DOMESTIC AND EXPORT MARKET	47
XII AVERAGE SALES TURNOVER FOR PAST THREE YEARS	48
XIII MEASURES TAKEN TO MEET THE DEMAND	49
XIV OCCURENCE OF DEFECTS	51
XV PERCENTAGE OF REJECTIONS	52
XVI PROBLEMS ENCOUNTERED	53
XVII FUTURE PLANS OF KNITTING UNITS	54

## LIST OF PLATES

Plates		Page
I	TYPES OF MACHINES	33a
II	TYPE OF SEWING MACHINES	34a
III	NUMBER OF EMPLOYEES	36a
IV	PRODUCTS MANUFACTURED AND FANCY EFFECTS ON KNITWEAR GARMENTS	45a
V	STORING, PACKING AND PACKAGING MATERIALS	46a

## LIST OF FIGURES

Figure		Page
1a	YEAR OF ESTABLISHMENT	32a
1b	TYPE OF ORGANISATION	32b
2a	RAW MATERIALS USED	38a
b	TYPES OF FABRIC PRODUCED	38b
3	FANCY EFFECTS	45b
4	FUTURE PLANS	54a

LIST OF APPENDICES

PAGE

Appendix

I	DETAILS ON THE TOOL SELECTED	70
II	LIST OF KNITTING UNITS	80
III	THE INTERNATIONAL CODE SYMBOLS	82
IV	TYPE OF FABRICS	89

# Introduction

## I. INTRODUCTION

Of the three basic necessities to mankind viz. food, clothing and shelter, clothing forms part of the most distinguished trait that divides us from the other side of the universe and even beyond. Since ages, the very idea of drapery is the first and foremost step towards a scientific thinking, imagination and planning such that civilizations could be indentified and making the end product rose to zoom into a wide and complex textile industry of this day. In India, textile industry dates back to time immemorial and now has emerged into a multi-dimensional avocation-both in terms of quality and quantity, with the application of a wide range of improved raw materials, and highly advanced electronic, automatic gadgets, in the operational lines of spinning, weaving, knitting, dyeing and printing. Sivakumar and Ratnam (1985).

The term knitting is used to describe the technique of constructing lengths of yarn into vertically interloops has evolved from the saxon word "CNYTTAN" which in turn was derived from the ancient sanskrit word "NAHYATI" Spencer D.J. (1983).

Knitting is the process of making cloth with single yarn or set of yarns moving in one direction. The single knitting yarn is looped through itself to make a chain of

stitches. These chains connected side by side are called the knitted fabric Ishida,(1979).

Knit by hand came into being from about 1553 A.D. and was developed from experience gained by knotting and twisting yarns. In hand crossed loop stitches were formed by using two hand needles. Baker (1948).

Machine knitting consists of forming loops of yarn with aid of thin, pointed needless or shafts. As new loops are formed they are drawn through those previously shaped. This interlooping and the continued formation of new loops produces knit fabrics. Spencer (1991).

The first Indian knitting unit was established in 1893 at Khedderpore, Calcutta by Shri Ananda Mukarjee. In South India, the knitting had its start at Tirupur about sixty years ago with just five to six knitting units in the country having mostly circular weft knitting machines employing about two lakh people directly ot undirectly . Ashck Chugh. (1992).

The knitting industry may be divided into four branches, knitted outerwear, knitted yeard goods, knitted hosiery and knitted innerwear. Knitted yard goods mills produce a wide variety of fabrics in either flat or circular form that can be cut and sewn into apparel. The mills that produce knitted outerwear, innerwear and hosiery may knit the item directly or may knit section of a garment such as

sleeves, body and like, that are sewn or cut and sewn together. These mills complete the garment from knitting stage to construction stage in the same unit says, Tortora (1982).

The fabric is formed by the interlocking loops of yarns, tend to strength and confirm to the shape of the wearer, which make them very suitable for next-to-skin wear material. The goods prepared out of knitted fabric are readily accepted because of various other reasons such as low cost, comfort, durability and more of hygeinic value.

In the developed countries knitted fabrics have a large share of total textile extent of 30 to 40 percentage. In India with the introduction of synthetic filaments and fibres knitting has assumed a place of pride in the area of fabric production says, Varma and Ramaswamy (1990).

The Indian apparel industry has grown enormously and until about a decade ago the cotton knitting industries were producing only inner wear out of grey and blended fabrics made out of coarse yarns. In recent years, it has added a new star performer, knitted garments particularly cotton knit wear to its production. Jain(1992).

Cotton forms over 75 percent of the raw material not only because of its easy availability but also because of the climatic conditions in the domestic market and in most developing countries dictate the need for cotton based wear. The complexion of the hosiery industry has undergone a sea-

change over the last two decades. This radical transformation is mainly due to production flexibility caused by the availability of improved varieties of Indian cotton.

In the balanced growth of the textile industry in India the production of knitted goods for apparels and industrial needs has kept pace with the rising trends in application and the favourable changes in consumer preferences. Now the knitted garment industry is racing ahead to achieve a distinction as garment has emerged foremost among the commodities and goods exported from India. Rapid modernisation and upgradation of the technology and the increased demand at home and abroad have also been contributory factors.

It is now poised for a modern and aggressive era, one where this industry will continue to strive and achieve excellence. The knitting units are spread throughout the country. and cotton knitted units are in Calcutta, in West Bengal and in Tirupur, Tamil Nadu. Tirupur is one of India's Premier Cotton Hosiery Manufacturing Centre. Nearly 35 percent of cotton knit wear production for domestic consumption and one quarter of the country's knitted garment exports emanate from here. Business India Report (1984).

The export from Tirupur has reached to Rupees 1800 crores and this centre is fast emerging as a major foreign exchange earner of the country. The spectacular and remarkable

growth of garment trade is due to the high potentialities in domestic and international markets for the designs, patterns in tune with the western trend and for fashion oriented dresses. The investigator wants to spread the light among the buyers so as to make them aware of the existing value of the knitted garments. Hence an attempt was made to study about the "Various knitted garments produced in the selected units at Tirupur. The specific objectives of the present study are :

1. To evolve a quantitative analysis of goods produced by the various knitting units.
2. To study the types of fabrics used for making garments.
3. To study about the varieties of knitted goods produced.
4. To study about the percentage of goods produced for domestic and export market.
5. To study about the average sales turnover for past three years.

# Review of Literature

## II. REVIEW OF LITERATURE

The literature collected for the study are reviewed under the following.

- A. Meaning, History and Origin of knitting
  - B. Methods of knitting
  - C. Process of knitwear and their production cost
  - D. Properties and characteristics of knitwear
  - E. Type of garments and their finishes
  - F. Marketing of knitted goods.
  - G. Innovation and improvements in knitting industry
  - H. Problems encountered by knitting
  - I. Present scenario of the knitwear industry at Tirupur
  - J. Studies conducted
- A. History and origin of knitting

The actual origin of the knitting like many textile operation is unknown. According to Archaeological discoveries hand knitting was started around 250A.D and was concentrated in and around Syria and Egypt. The credit of discovery goes to the scottish peasants. Mention was made of knitted bonnets, base, petticoats, gloves and sleeves made of knitting during 1530, but in 1552 certain records revealed the use of these items. By the middle of 16th century hand knitting mostly woollen knitted garments were extensively made Baker (1948).

The hosiery industry in India is a small scale industry in the field of textiles engaged in the manufacture of both vest, brief and outerwear. The industry has expanded substantially after the second world war Jain (1984). The hosiery industry in India offers a wide range of business opportunities for the potential entrepreneur. Now the Indian industry has carved a niche for itself in world markets for its knit wear exports Arun Roongta (1992). During the last decade, knitwear exports from India have come a long way in terms of quality, Sakthivel (1992).

#### B. Methods of knitting

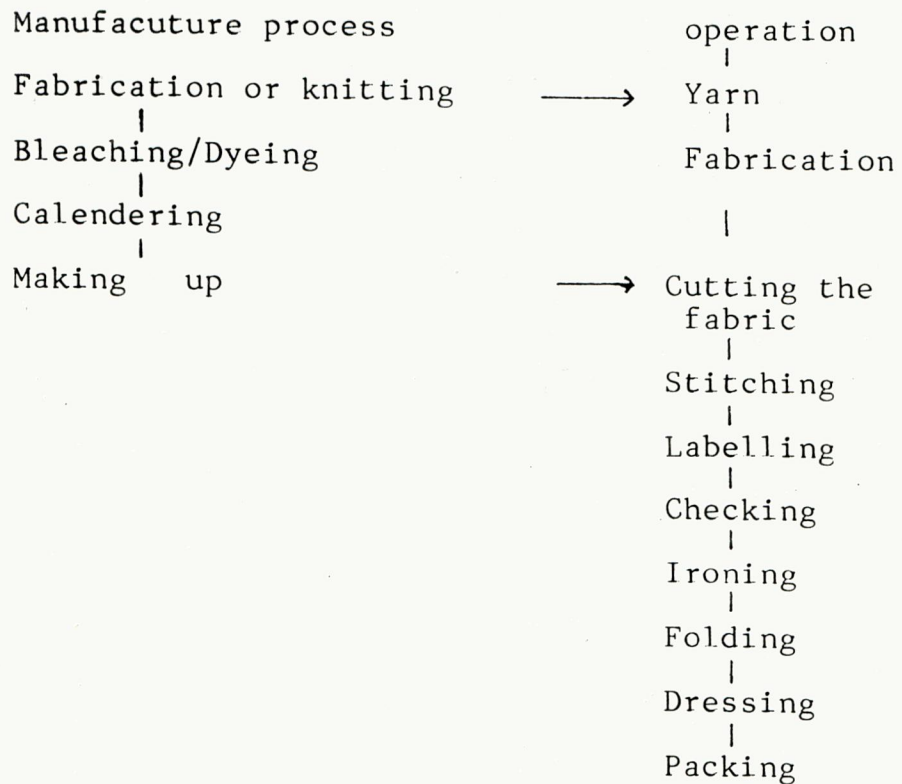
1. Weft knitting
2. Warp knitting
3. Type of yarns used
4. Types of needles used.

According to Joseph (1981) two general methods are used in knitting as or weft knitting and warp knitting.

##### 1. Weft knitting

Weft knitting is a construction process in which the fabric is made by a yarn forming loops across the width or around a circle that is each yarn is fed at more or less a right angle to the direction in which the fabric is formed. Most weft knitting is done on machines that have needles arranged in a circle and thus form a flat fabric or it can be used as a tube, expresses Joseph (1981).

### C. Process involved in the manufacture of knitwear



The process involved in the manufacture of a knitwear is fabrication or knitting of the yarn, bleaching or dyeing, calendering and making up.

Fabrication and knitting is the process of converting the hosiery yarn into a fabric. Bleaching in a layman's language, is whitening the fabric with use of caustic soda. Dyeing is colouring the fabric with chemical dye stuffs. Calendering is the process of ironing the fabrics with steam heated roller to width size required, making up, the final process in the manufacture of knitwear, involves tailoring work, cutting the fabric to the desired size

stitching, checking for defects, labelling, ironing folding and packing. Jacob Solinger (1980). If all the processes, except bleaching and dyeing are done in a unit, that unit is known as a composite unit.

#### Making up procedures

The garment manufacturing process generally starts by laying the fabric backward and forward to super-impose the required number of layers one upon another in a lay. In most of the units the operation is carried out manually without any edge control. Patterns or templates indicating the size and the shape of the panels to be cut out are placed on top of the lay. Markings are then made around these templates and fabric panels are cut out by hand operated scissors.

Sewing process include selection of seam and type of stitch. The basic purpose of a seam is to join two or more pieces of fabrics together. In the production of knitted garments stitches commonly employed are double locked chain stitch, overlock, flat lock and lock stitch. Venkatapathy (1991).

#### Cost of production

The success of the knitting unit depends upon the ability of the owners to buy good quality yarn at reasonable price. The units which are far from centers of yarn and bleaching should stock as much as possible of two months and naturally the cost of production increases. Table indicates

the various components and their individual contribution to the cost of production of finished cotton knit goods.

#### Cost of production

Items	% of cost
Raw material	66.0
Wages	7.0
Packing	3.0
Neck lables	1.0
Stores	5.0
Bleaching and	2.5
Making up	2.5
Power, Depreciation, interest and administration	5.5
Profits	7.5
Total	100.0

#### D. Characteristics of knitted goods

All knitted fabrics and garments have certain things in common. Knitted goods are capable of stretching in one or both directions. It recovers easily from creasing. Furthermore, because of the cloth constructions, these fabrics are porous, the size of the loop or openers of knits contributes to their warmth or coolness. In addition the porousness of construction in connection with suitable fibre make knits easily washed or cleaned. Cowan and Jungerman (1980).

Knitted goods are porous and permit free circulation of air, they offer comfort and elasticity and allow freedom of movement Joseph (1981). The increase in air travel has resulted in need for light weight, comfortable clothes, light ironing which can be smoothed by hand to restores their appearance Kothari industrial directory of India (1990).

Woolman (1943) states that there are numerous reasons for the popularity of knitgoods such as low cost, due to speed and simplicity of manufacture, hygienic value for under garments, due to warmth, porosity, ventilation, ease of laundry comforts, smoother fit, resiliency and elasticity and durability. The elasticity of knit garments is a factor in durability, since they give under strain, rather than break.

#### E.Types of garments and their finishes

Jerseys, pullover, cardigans, waist coats poloshirts, sweat shirts are cover garments intended to cover the upper part of the body, with or without sleeves, collars, pockets, any type of neckline. These garments generally have welts or ribbing at the bottom, around the opening, the sleeve ends or the armholes. They are made for any type of knitted garments with many form of decoration including lace or embroidery garments are made of light weight material.

Skirts and divided skirts are outer garments covering the body below the waistline and extend from waist to nearly any length depending upon the fashion of the day.

The garments have side closures, the lower end of the skirt must enclose both legs in a single tube with no fabric construction surrounding either leg separately. Garment may be printed, embroided stitched with fancy buttons.

Shirt and shirt blouses for women and girls are garments intended to cover the upper part of the body. The opening is situated at the front and they have partial opening overlapping right over lefts, the sleeves may be longer shirt sleeves, with or without pockets, generally a collar. Blouses have a loose fitting cut or other means of fastening being permitted only in the case of a very low cut garment, with or without decorative such as laces, embroidery floral printing.

T-shirt, collar shirts, polo shirts, sweat shirts are light weight knitted garments, with or without pockets, long or short sleeve. These garments may have decoration, other than lace, in the form of advertising pictures or an inscription in words obtained by printing, knitting. The bottom of these garments are usually hemmed and is never made with any other accessories, Goyal (1989).

#### F. Marketing of knitted goods

Consumption of knitwear goods within India is at minimum, so reliable statistics are not available. From the data on the export of knit goods indicates that Indian share of the world market of all textile amounts to 2.9%, Sivakumar

and Ratnam (1985). Cotton knitwear made upto 94.1 percent besides synthetic and woollen Ashok Chugh (1992). Knitting entrepreneurs has recognised the importance of employing marketing survey to enhance their status on their knitwear garment sense, for too long they had concentrated their energies and talents on traditional technology without realizing the necessity of being equally aggressive in researching new markets, application and customers. Now the entrepreneurs involved both in domestic and export market have started to display their garments in exhibitions conducted within and outside our country. This enhances the number if orders which in turn facilities mass usage of garments and meets the vital needs of the knitting units, Sampangi (1983).

The products are exported to quota and new quota countries, with standard counts of yarn from standard mills to ensure quality end product that confirm to international standards. In quota countries only quota items of knitted apparel are exported whereas in non-quota countries different products are exported. The following are the projection of knitwear exports from Tirupur Region.

Year	Direct exports Rs. in crore	Indirect exports Rs. in crore	Total exports Rs. in crore
1991	406.25	725.00	1,131.25
1992	740.00	511.25	1,251.25
1993	825.00	640.00	1,465.00
1994	1,000.00	800.00	1,800.00
1995	1,250.00	1,000.00	2,250.00*

\* In addition to this figure of Rs.2,250 crores woollen knitwear exports will fetch around Rs.400 crores by the end of the calendar year 1995, Sakthivel (1992).

Hosiery in Tirupur, have been insignificant in past, but in recent years, there has been a very large and consistent increase and is all set to explore new avenues in domestic and in international markets, Mohanlal Pirwal (1990).

Export is a sign of progress in a country, the advantages in export marketing are the exporter will be contributing to the great national endeavour for economic development of this country by earning much needed foreign exchange export means much under areas of sales and goods exchange be sent to any part of the world. Nagar (1985).

The apparel export promotion council plays an important role in export of readymade garments from India. The apparel export promotion council, a council sponsored by the ministry of commerce was incorporated on 22nd February 1978.

AEPC (1958) the activities undertaken are exploring markets and offering export potential, conducting market surveys, establishing contacts with prospective buyers to generate interest in Indian products providing library facilities.

#### G. Improvements and innovations in knitted goods

The most unique property of knitted fabric is stitch which is due to the inherent intermeshed loop arrangement. Because of its looped structure, the knitwear is expected to possess a good elasticity, elastic recovery and permeability, Banerjee (1989).

Innovations are done in items such as bullet proof vests, antiradio active vests, thermal wear to be brought on to commercial level on mass scale, Jain (1985). Knitted fabric in surgical use is fast picking up. Knitted fabric is also used as lining material in the making of slippers, booties and sport shoes, Sampangi (1985).

#### Innovation in design.

Type of innovation brought out by entrepreneurs are of products in the form of new designs. Colour, texture, pattern and stretch are the magic winds that move knits at retail for summer fall and holiday. Lighter weight sweaters are becoming popular because of global warming and a general tendency to overheat buildings in winter. The children's market has been growing mainly because of the mini baby boom that is going around, Eric Hertz (1991).

Embroidery on knit wear/knitted goods has become a standard fashionable element, studio technique is being handled to change the stitch length according to need and unlimited patterning is possible Premi (1992). Large designed embroidery are instantly done on sleeves, furnished pockets and tabular finished garments by tabular training system developed by Jajima American Corp., Lindalongo (1990).

In the ares of processing.

Innovation included introducing modern steam calendering to avoid shrinkages testing for quality control and mercerising of the knitted fabric, the latter was the first of its knit in South East Asia when introduced at Tirupur, Vijayakumar (1986).

Cotton blended with synthetic yarn it appears, takes on something of a dual nature in the apparel market. In women's and girls and uses the apparel made from synthetically blended yarns are not purchased as much as their percent cotton counterparts. However men's and boys knitted apparel the use of cotton blended yarns had been an increase, Rosenthal (1989).

Bodner (1990) states that the computer to produce knitting machine pattern which can be transmitted by telephone to a receiver, where pattern is rapidly translated into a sample garment. Processing techniques, design systems, pattern grading/are instantly displayed by Shimatronic design system Shima Sieki (1992).

Falke sport sock of high quality, high performance with good look is implemented by West Germany company for walking, riding, skying and other activities. Sampangi (1990).

With this improvement, developments and innovations the day is not far when India will be in a position to export its knitting technology and compete international market to a greater extent expresses. Parikh (1985).

#### H. Problems encountered by the knitting industry

The major problems inhibiting the growth of knitting industry in India are lack of formal educational facilities in knitting, smallness of the individual units, high cost of synthetic, blended yarns, lack of proper finishing facilities, high import duty on machines, lack of financial assistance and acute shortage of trained man power for running and maintenance of knitting machines.

#### I. Present Scenario of knitwear industry at Tirupur

Earlier the entire knitwear industry was mostly cottage industry and thereafter graduated to the small scale sector. Now the apparel export promotion council being the main co-ordinator has developed an exclusive industrial estate at Mudalipalayam has engaged in the manufacture of export of knitwear garments. The manufacture of export amounted initially for 157 crores at the end of 1992 in this calendar year it ranges from Rs.450 crores and more.

Diversification into sophisticated woollen knitwear is also on the move and in this year Mr.Venkataswamy inaugurated a woollen knitwear industrial complex at Mudalipalayam, The Hindu (1993). With infrastructural facilities made available by AEPC and SITRA would exporters to catch up with requirements in international market. The export of woollen knitwear will be Rs.100 crores by the end of the year 1993.

Further for sophisticated processing for higher unit value added products for which "processing is the key" the dynamic exporting community of Tirupur instead of the conventional which dyieng and bleaching process will go in shortly for ECOSOFT JET DYIENG MACHINES from GERMANY and SWITZERLAND which will contain the shrinkage of knitwear of 3% which will be on par with inventional standards and process house of this nature would cost around Rs.3.00-4.50 crores going to form an exclusive processing complex at Dharapuram situated a hour's drive from Tirupur, Sakthivel (1992).

To obviate the random increase of yarn prices by the spinning mills, a spinning complex will be set up in about 500 acres of land for captive consumption by the knitwear industry at stable prices to locate about 75 modern spinning mills each spinning mill of 3000-6000 spindles with certain common facilities by which the project cost also will be lowered of each mill. This will lead to the stability of yarn prices by

which we can beat the challenge of our neighbouring countries in the international scenario. This entire complex will be commissioned at Gobichettipalayam by the end of the calendar year 1993. Shankaralingam (1992).

There is an active proposal to have an internal container depot right at Tirupur and also have an Air Cargo complex at Coimbatore Airport to further facilitate exports of knitwear out of Tirupur by end of calendar year 1993 and 1995 respectively, Sakthivel (1992).

#### J. Studies conducted

Varma and Ramaswamy 1990 studied on the dimensional properties of interlock fabrics. Interlock fabrics which are used for manufacture of outerwear garments trend to have high shrinkage in lengthwise direction, so they concluded that consumer prefers mainly depends on their dimensional and stability.

Sreenivasan and Indra Doraiswamy (1973) tried to study the organisation, economic and technological aspects of the hosiery industry. They included that hosiery industry in India promises a very good growth potential in India.

Varma (1985) attempted to study the common defects that occur weft knitted fabric. He pointed out that defects can creep up into the production in any stage of processing due to three factors such as raw material, machines and men. Defects due to raw material are visible on the fabric in the

horizontal direction and defects due to machinery in vertical direction.

Studies have been conducted to modernise the knitting units by analysing the present functioning of the units and type of financial assistance needed. The State Bank of India is ready to assist all viable ventures and tender assistance for the manufacture of synthetic knitwear by acquiring necessary machineries. Sankara Narayanamurthy (1985).

Venkatapathy 1985 studied on the modern development in knitwear manufacture, he concluded that requirement of the knitwear units can be satisfied by the installation of sophisticated sewing machine, high performance needles and introduction of mini computers making up process.

Vijayakumar (1986) conducted a study of the hosiery entrepreneurs at Tirupur, Tamil Nadu. Attempts have been made by South India Textile Research Association and Human relations division, Coimbatore the concluded that potential entrepreneur were better than average entrepreneurs.

## Experimental Procedure

### III. EXPERIMENTAL PROCEDURE

This experimental procedure for this study involves the following steps.

1. Selection of the area
2. Selection of the sample
3. Selection of the method
4. Framing the schedule
5. Pre-testing
6. Conducting the study
7. Consolidation and analysis of data

#### 1. Selection of Area

Tirupur, located at Coimbatore district in Tamil Nadu is the biggest centre, engaged in the production of knitwear products both for domestic and exports, Varma (1990). According to Shah (1986), Tirupur has quite a number of traditional knitwear industries where they also have the tendency to put more capital in improving the technology. the increase in production cost, quick despatch capacity, reasonable price, wide varieties of apparel has made Tirupur's knitwear industry gear up to meet the global demand both in domestic and international markets, Brian Parker (1992). According to the official sources, about 90 percent of the country's knitwear production is meant for domestic consumption. Knitwear has come to occupy a place of pride in

India's burgeoning apparel exports in the last decade. A wide variety of garments are produced both for domestic and export purposes and in the overall gamut the small town of Tirupur has played a stellar role, Rajivkathuria (1992). Hence, the investigator selected Tirupur as an area for her study.

## 2. Selection of the Sample.

To collect the data, random sampling method was chosen. According to Sidhu (1984), random sampling means that every member of the sample is selected from total population in such a manner that all the members of the population have essentially the same probability of being selected. Gupta (1985) opines, simple random sampling means a selection where each and every item of the population has an equal chance of being selected in the sample. Singleton (1988) state that simple random sampling is that every possible combination of cases has an equal chance of being included in the sample.

The random sampling method is more representative since in this method each unit has equal chance to be selected. There is no scope for bias and prejudices. This method is very simple to use and it is easy to find out the errors expresses Ghosh (1985). Hence, the invetigator, selected thirty knitting units by random sampling method for this study.

### 3. Selection of the Tool.

Interview method was selected to conduct the study by considering the following aspects such as the scope of the study, the type of information needed and the degree of accuracy required.

According to Gupta (1986), in interview method the investigator obtains the information in person from the informant and is considered a first hand information. This procedure of data collection is adopted, when the field of enquiry is small and there is a desire for greater accuracy.

Goode and Hatt (1981), quote that "Interviewing is fundamentally a process of social interaction. It is a method of data collection, namely through the verbal interaction between the respondent and interviewers.

Interview probably results in the highest quality data obtainable in survey research. It offers a high response rate, allows more data to be collected and permits probing the follow-up questions for more in-depth information, Bausell (1986). For these reasons, interview method was selected for conducting the study.

### 4. Framing the Schedule

The interview schedule is a framed schedule used during the interview. This makes it possible to obtain the data required to meet the specific objectives of the study, and to standardise the situation to some degree. The questions

are usually asked exactly as they appear on the schedule. Whenever possible the schedule should be structured to require a minimum of writing by the interviewers, (Borg 1983).

The interview schedule thus prepared include the name and the address of the knitting units, raw materials used, percentage of products manufactured for domestic and export purposes, varieties of products manufactured, details on type of fabrics used, details regarding knitted goods exported to other countries, quantity exported, average sales turnover, production per day, details on fancy effects on garments, tag information, international code symbols, packing procedure, wages, future plans and problems. A copy of the interview schedule is given in appendix I.

### 5. Pre-Testing

It is always worthwhile to get the schedule pretested before the interview schedule is finalised. A trial survey is necessary to gain specific knowledge and to get an idea of the various problems likely to be faced in the course of the study. A small sample from the relevant universe may be picked up and the interview schedule tested on it, expresses Elhance (1984).

Through pre-testing, the investigator can find out the drawback of the schedule, the type of the response from the respondents and the greater co-operation of the informant can be secured, Gupta (1989). The pre-testing was done in

five units in Tirupur. The literature pertaining to the tools was studied and scrutinised by the experts in this field and the schedules were finally altered for use in data collection.

#### 6. Conducting the Survey

According to Kothari (1978), conducting the survey is very important which will proceed on correct tones and at the same time the data collected are dependable. Using the finalised interview schedule the study was conducted in 30 composite units in Tirupur.

#### 7. Consolidation and Analysis of Data

Agarwal (1975), states that analysis is an important step in problem solving and its procedure is by resolving the gross total into its elements. Sidhu (1984) states that analysis of the data means studying the tabulated values in order to determine inherent facts or meanings. It involves breaking down existing complex factors into simpler parts in new arrangements for interpretation. Keeping this in mind, the collected data was systematically consolidated and analysed.

## Results and Discussion

#### IV. RESULTS AND DISCUSSION

The findings of the study are discussed under the following headings.

1. Background information of the knitting units surveyed
  - a. Name of the knitting units
  - b. Year of establishment and type of organisation.
  - c. Type of machines and number of powerlooms owned by the units
  - d. Type and number of sewing machine
  - e. Trade name
  - f. Label information and ISI certification
2. Details regarding employees.
  - a. Number of employees
  - b. Nature, mode of training and payment of the employees
3. Details regarding production
  - a. Raw material used and type of fabrics produced
  - b. Quantity, type of knitwear products and the countries to which exported.
  - c. Average production of garments in dozens for past 3 years
  - d. Average production of garments per day and their specification.
  - e. Varieties of products manufactured and fancy effects on knitwear products

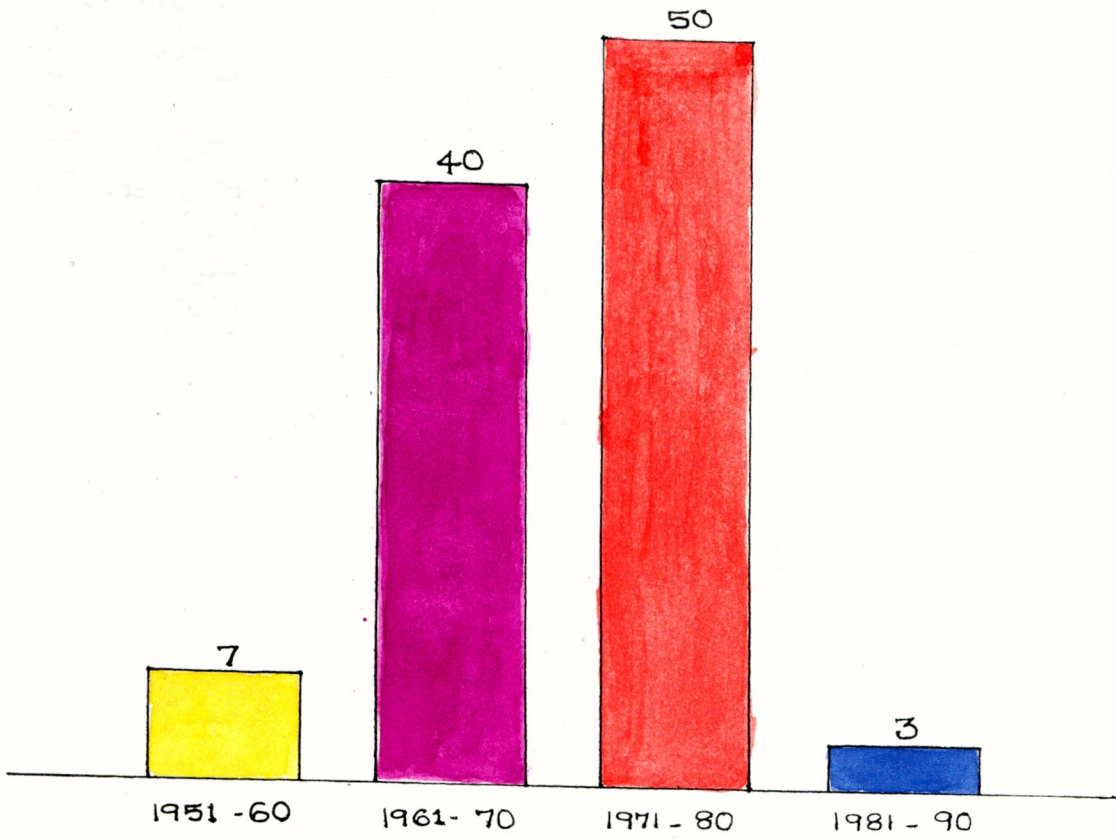


FIGURE 1a

YEAR OF ESTABLISHMENT IN PERCENT

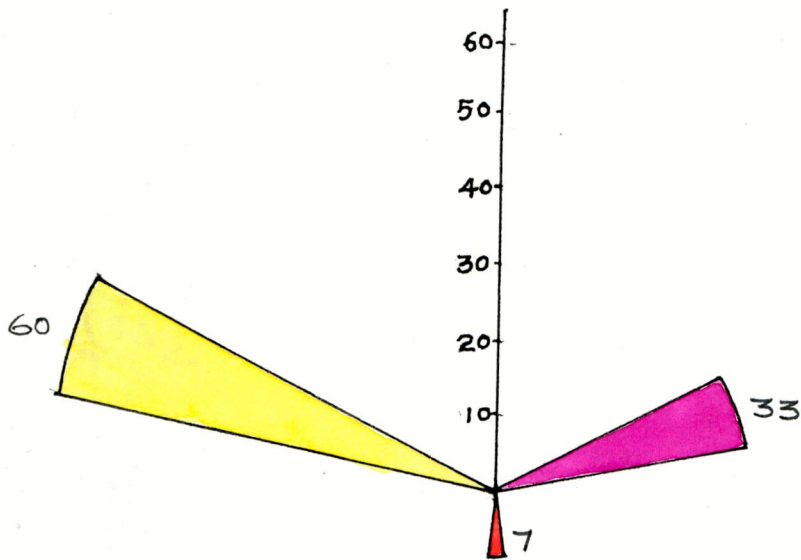





FIGURE 1b

TYPE OF ORGANISATION  
IN PERCENT

-  - PARTNERSHIP FIRM
-  - SINGLE OWNER
-  - PRIVATE FIRM

Regarding the type of organisation 60 percent of the units are partnership concerns, ownership by a single individual accounts for about 33 percent and rest of units accounts for private owners.

c. Type of machines and number of power tables owned by the unit

Information on type of machines and number of power tables owned by the units are given in Table II and plate I.

TABLE II

TYPE OF MACHINES AND NUMBER OF POWER TABLES OWNED BY THE UNITS

Details on Machines	Number	Percentage
Type of machines		
Imported	18	60
Indigenous	12	40
Number of power tables		
1 to 5	13	43
6 to 10	11	37
11to 15	5	17
16to 20	1	3

There is a host of machinery available for knitwear industry and plays a vital role in modernising them. Nearly 5 to 8 different machines are fixed on the power tables are which driven from a common shaft and are automatically operated and this enhances the production rate.

33a

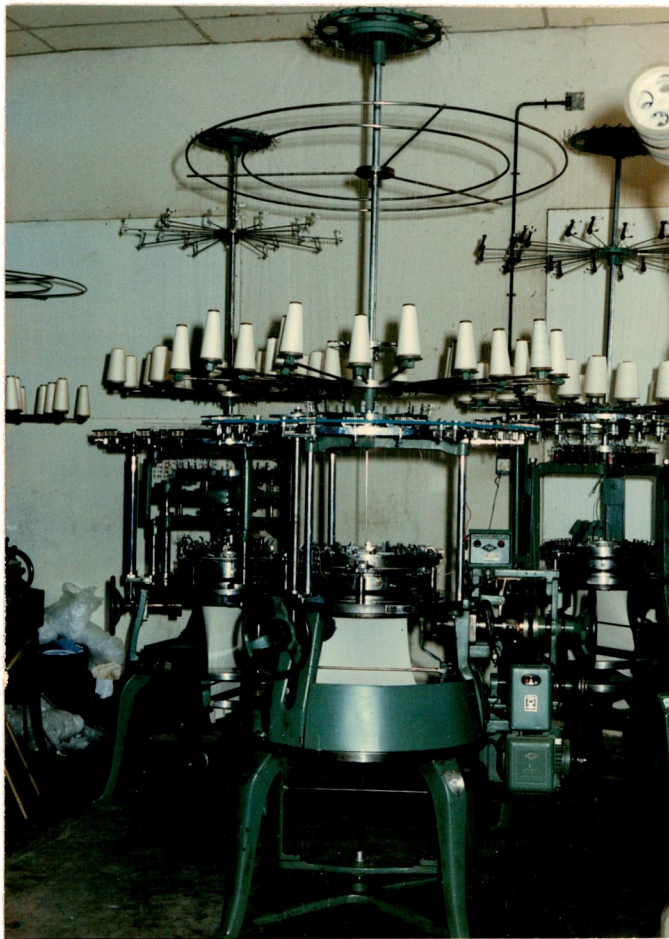


PLATE I  
CIRCULAR KNITTING MACHINE  
(INDIGENOUS)

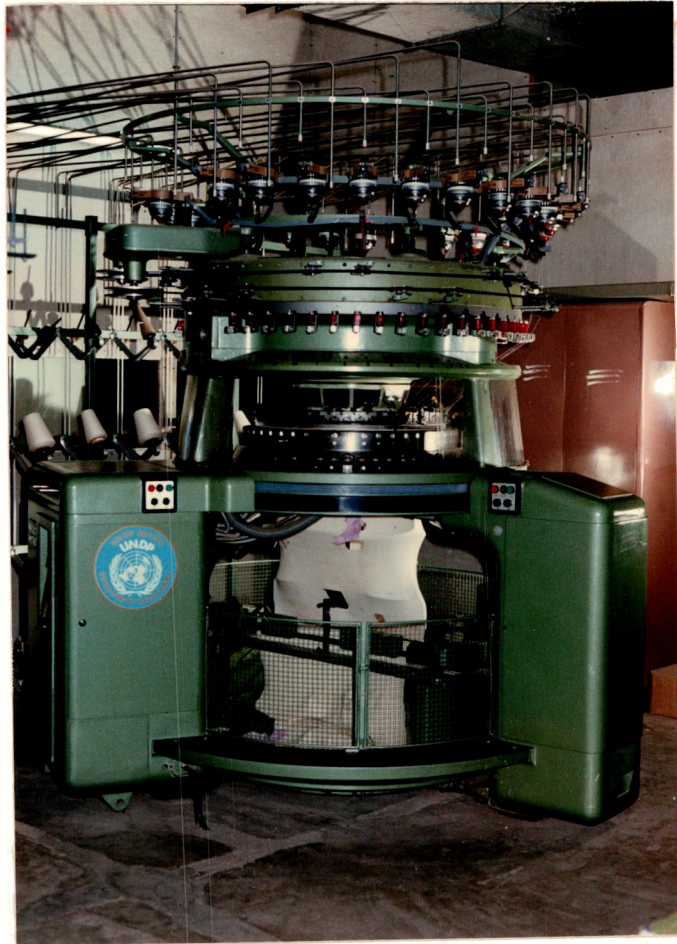


PLATE I  
CIRCULAR KNITTING MACHINE

(IMPORTED)

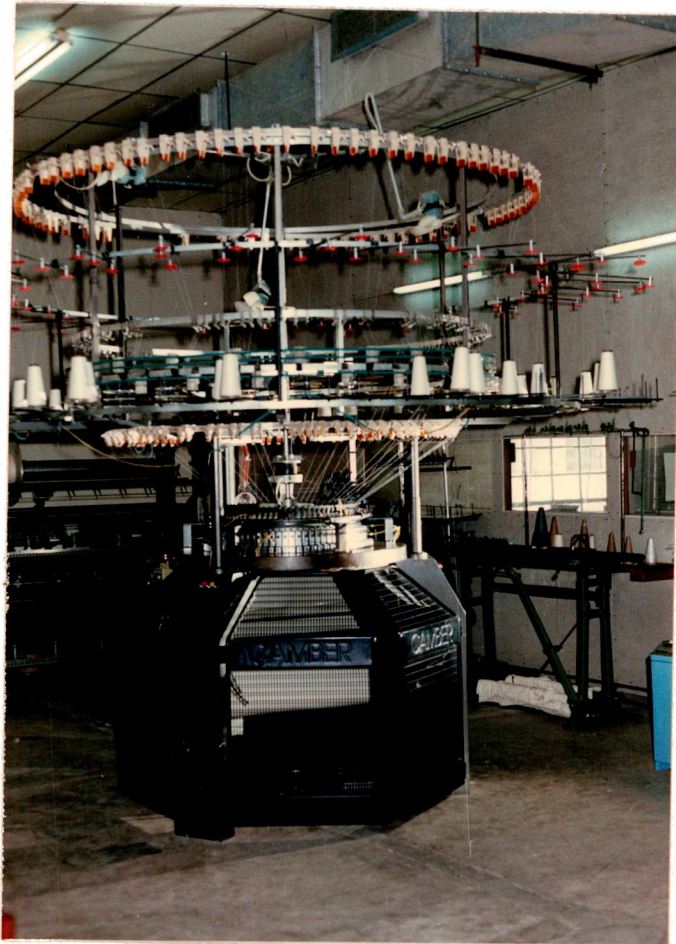


PLATE I

SINGLE JERSEY KNITTING  
MACHINE (IMPORTED)

The above table reveals that 60 percent of the units are using imported machines, where as only 40 percent of the units are using indigenious machines for producing knitwear products.

It is also clear from the table that 39to43 percent of the units are using upto 10 power tables and only 3 percent of the units are using nearly 20 power tables.

d. Type and Number of sewing machines

Details regarding the type and number of sewing machines is given in table III and plate II

TABLE III  
TYPE AND NUMBER OF SEWING MACHINES

Numbers Ranging	Over lock		Flat lock		Chain lock		Buttoning & Button holing		Feed of the	
	N	%	N	%	N	%	N	%	N	%
1 to 5	2	7	10	33	15	50	15	50	15	50
6 to 10	21	70	15	50	11	37	7	33	7	23
11to 15	6	20	4	13	4	13	3	10	3	10
16to above	1	3	1	3	nil	nil	nil	nil	nil	nil

The number of flat lock and over lock machines are common because most of the machines are of imported variety and is capable of producing more garments in one shift.



PLATE II  
FLAT LOCK SEWING MACHINE



PLATE II

LOCK STITCH SEWING  
MACHINE

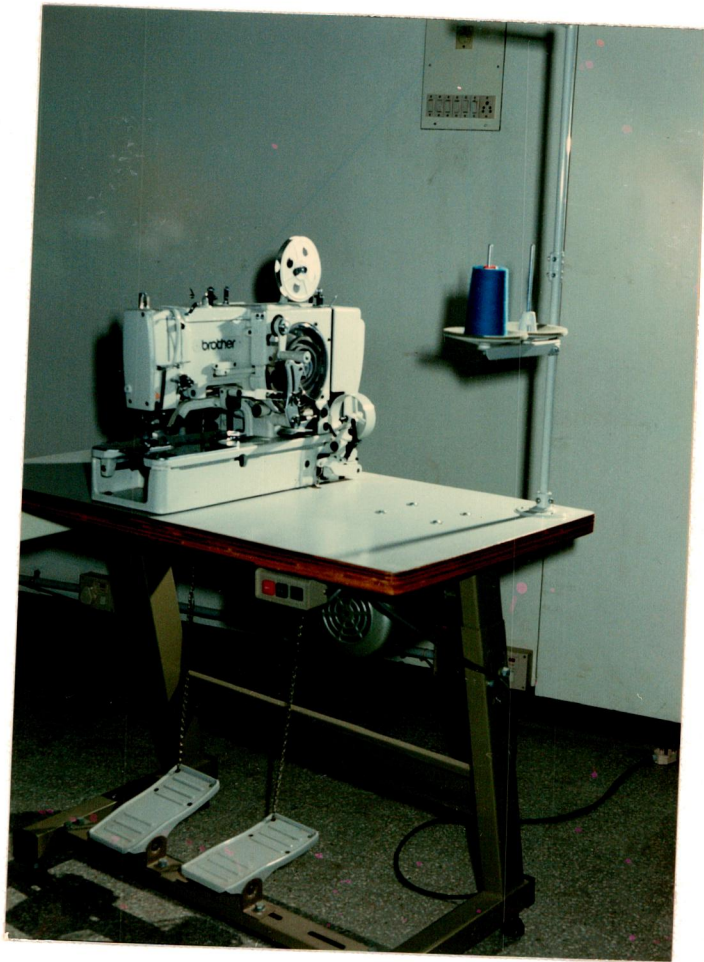


PLATE II  
BUTTONING MACHINE

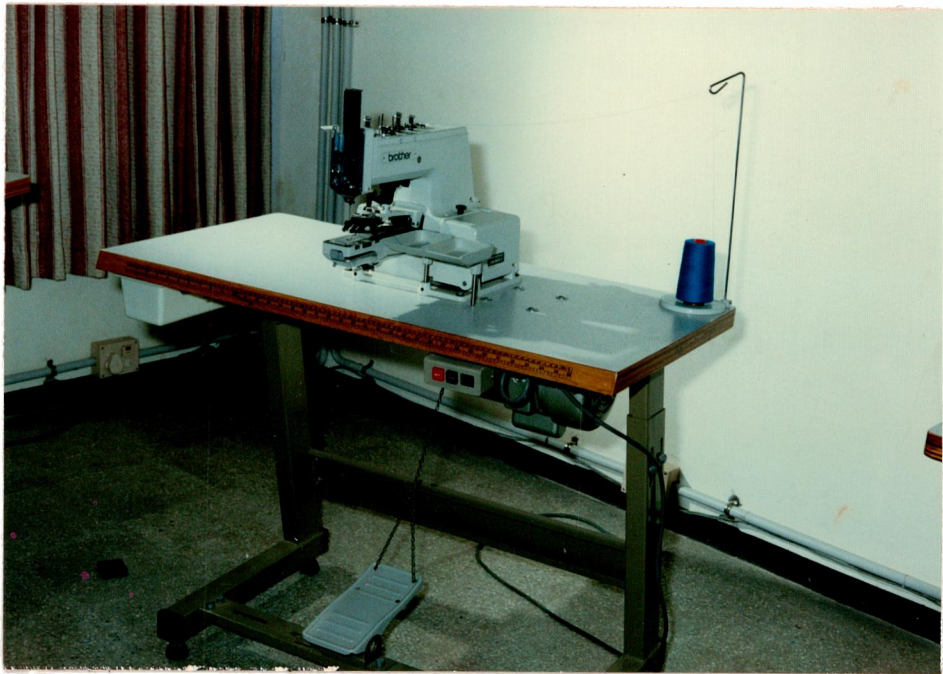


PLATE II  
BUTTON HOLING MACHINE

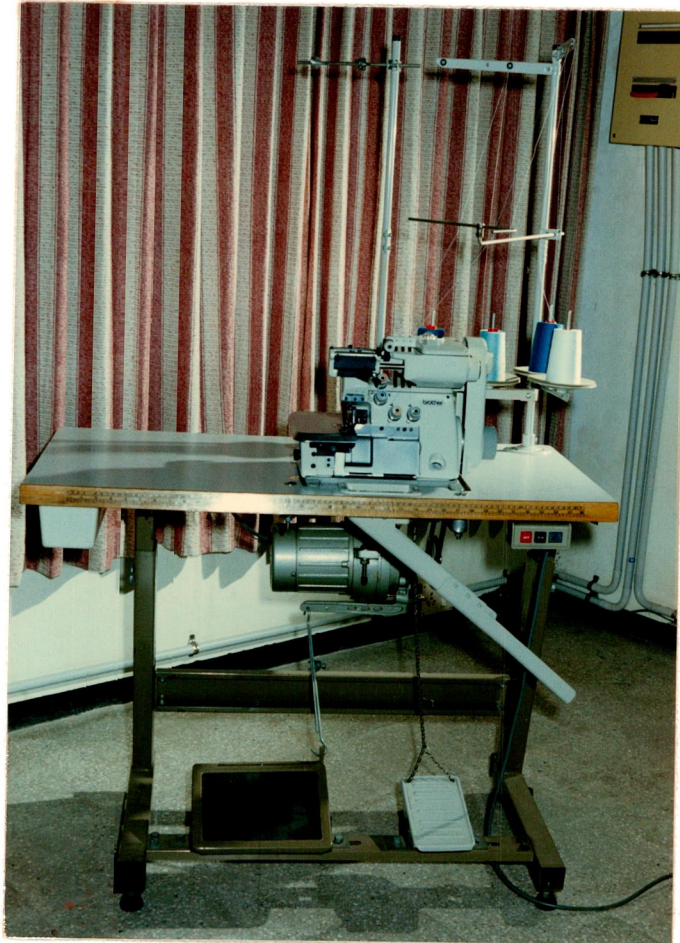


PLATE II

OVERLOCK SEWING MACHINE

The above table reveals that above 50-70 percent of the units have around 5-10 overlock and flatlock machines for stitching purpose. 50 percent of the units have around 1 to 5 number of chain lock, buttoning and button-holing and feed of the arm.

e. Trade names

Information on number of trade names used by the units is given in the table IV

TABLE IV  
TRADE NAMES

Number Trade names	Number of Units	Percentage
1	8	27
2	14	47
3	4	13
4	4	13

The units have different trade names both in domestic and international market. The above table shows that more than 47 percent of the units have two different trade names and 27 percent of the units have only one. Rest of the units have more than three different trade names.

f. Label information and ISI certification on finished garments

It is a routine practice to finish the knitwear with international code symbols such as trade names, size washing

and ironing instruction. The knitting units are strictly following the codes and almost all the units have got ISI certification for their knitwear products. The international code symbols and neck labels is given in Appendix III.

## 2. Details regarding employees

a. Number of employees children, details on number of employees men and women is given in Table V and Plate III.

TABLE V  
NUMBER OF EMPLOYEES

Number of Employees	Male		Female	
	No	%	No	%
10 - 15	Nil	Nil	17	57
16 - 30	2	7	13	43
31 - 45	17	57	Nil	Nil
46 - 60	5	17	Nil	Nil
61 - 75	1	3	Nil	Nil
76 - 90	Nil	Nil	Nil	Nil
91 - 105	1	3	Nil	Nil
Above 105	4	13	Nil	Nil

The child labourers accounts for a small number from the surveyed data it is evident that 70 and 63 percent of the units have less than 10 male and female children for doing simpler work.

36a



PLATE III

MEN AT WORK

The above table depicts the number of employees working in the knitting unit. More than 57 percent of the units have more than 30 to 45 male workers. 57 percent of the units have about 10 to 15 female workers. The male workers are involved in complete fabrication and making up procedures. The lighter side of the work like stitching, checking, labelling are done by female workers. Few male workers are also engaged in the above sections.

b. Nature, Mode of training and payment of the employees.

Regarding employees of the surveyed knitting units 60 percent of the units have both trained and untrained workers, whereas 40 units have only trained employees.

For the untrained employees inplant training is given during the course of work. The incentives are given in the form of piece rate on weekly basis, both for trained and untrained employees.

3. Details regarding production includes raw materials used and type of fabrics produced, quantity, type of knitwear products and the countries to which exported. Average production of garments per day and their specification, varieties of products manufactured and their fancy effects on knitwear products are discussed below.

a. Raw material used and type of fabrics produced

The raw materials used and type of fabrics produced by knitting units in Table VI and Appendix IV. and figure 2a,b

TABLE VI  
RAW MATERIAL USED AND TYPE OF FABRICS PRODUCED

Type	N - 30	Percentage
<b>Raw material used*</b>		
Cotton yarn	30	100
Acrylic	6	20
Cotton / Viscose	1	3
<b>Type of fabrics produced</b>		
Rib	30	100
Single jersey	28	93
Inter lock	25	83
Stripped fabrics	22	73
Honey comb	14	47
Thick pick	13	43
Wrapped	10	33
Raised fabric	3	10

\* The total percent exceeds 100 due to multiple response

Cotton knitwear has become an important component of the countries overall clothing. Because of the unique properties it has taken a place of pride in the manufacture of knitwear garments.

The above table shows that almost all the units have cotton yarn as the chief raw material for producing knitwear,

38 a

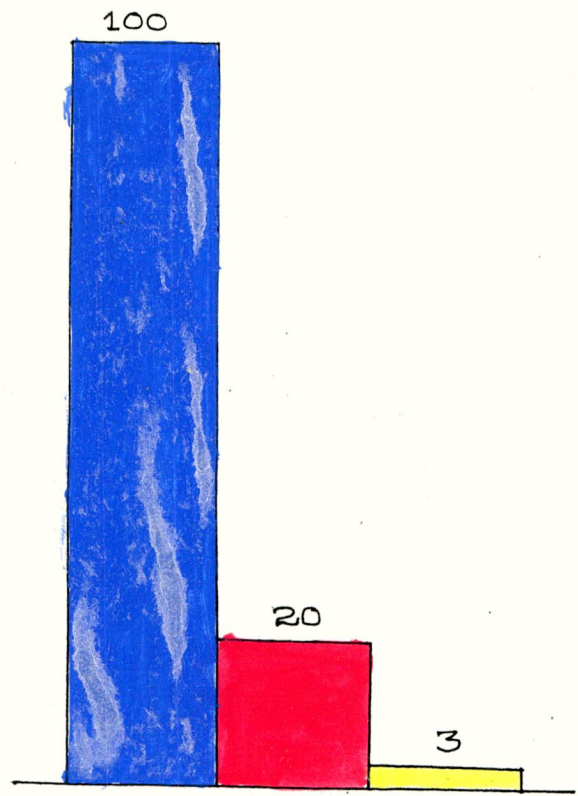
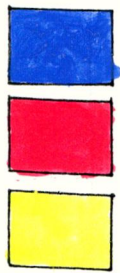


FIGURE 2a

RAW MATERIAL USED. IN PERCENT



COTTON YARNS .

ACRYLIC

COTTON VISCOSE

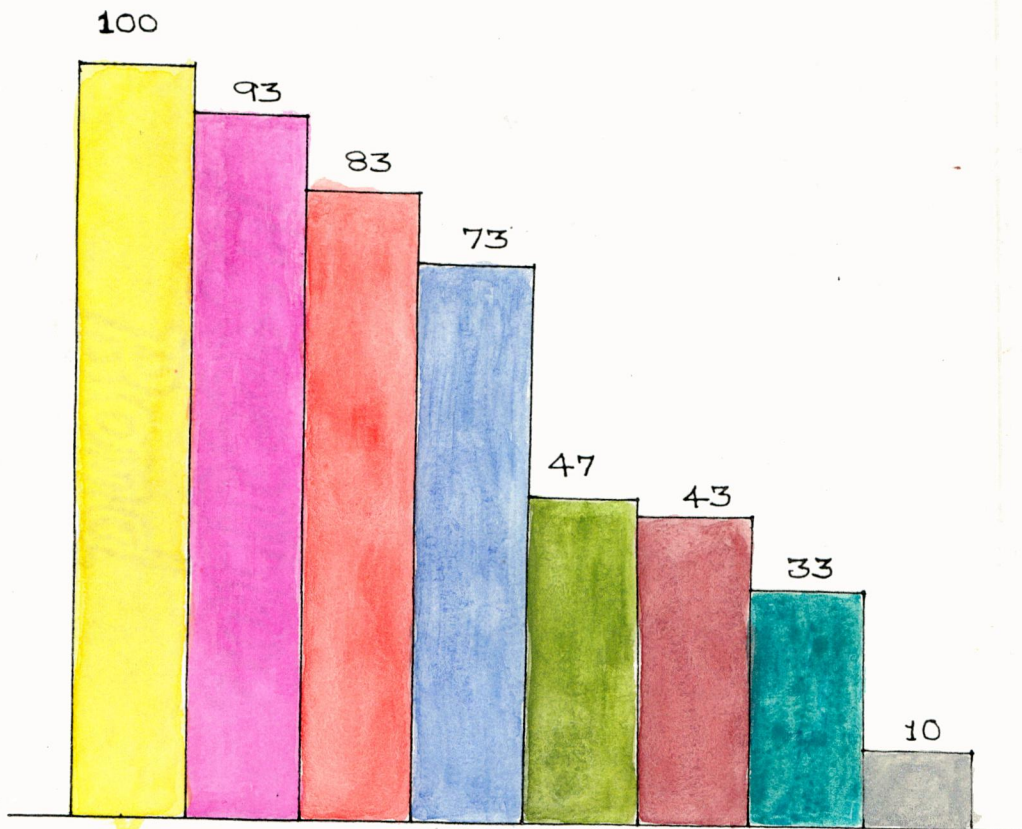


FIGURE 2b

TYPE OF FABRIC PRODUCED IN PERCENT

-  RIB
-  SINGLE JERSEY
-  INTERLOCK
-  STRIPPED FABRICS
-  HONEY COMB
-  THICK PICK
-  WRAPPED
-  RAISED FABRIC.

and acrylic constitute 20 percent. Only 3 percent of cotton/viscose blend was in minimum use.

It was clearly shown that almost all the units produce rib fabrics as a first priority. 93 percent of the units produces single jersey as a second priority following stripped fabrics by 73 percent.

b. Quantity, type of knitwear products and the countries to which exported

Details regarding the quantity, the type of knitwear products and the countries to which exported is given in Table VII.

TABLE VII

QUANTITY, TYPE OF GARMENTS AND THE COUNTRIES TO WHICH EXPORTED

Piece	Number	Percentage
a) Quantity		
Below 20,000	21	70
20,000 - 40,000	5	17
40,000 - 60,000	Nil	Nil
60,000 - 80,000	Nil	Nil
80,000 - 1 lakh	Nil	Nil
above 1 lakh	4	13
b) Types of garments exported		
T - Shirts	15	50
Baba Suit	15	50
Collar Shirts/Poloshirts	12	40
Sweat shirts	12	40

Piece	Number	Percentage
Midis	12	40
Breeches bib & brace	11	37
c) Countries to which exported Quota markets		
United kingdom	8	27
West Germany	8	27
Benelux	7	23
Canada	6	20
U.S.A	6	20
France	6	17
Italy	4	13
Australia	3	10
Non Quota markets		
U.S.S.R.	13	43
U.A.E	9	30
Saudi Arabia	8	27
Switzerland	7	23
Japan	6	20
Kuwait	6	20
Canary Island	6	20
Yugoslavia	3	10
Bulgaria	3	10
Czechoslovakia	3	10
Hungary	2	7

The knitting industry is concentrating on fashion trade which is highly volatile and unpredictable. New styles, designs and novelties capture fascination of the consumers, where the competition is intense. The knitting industry caters to spring and summer garments in overseas market and are exported to different countries. The thrust for capturing overseas by rendering all effort which is directed towards reduction in input costs and adoption of new measures to explore new markets and products.

Table VII depicts that nearly 13 percent of the units are exporting more than one lakh pieces, whereas 70 percent of units are exporting less than 20,000 pieces for a period of 4 months time.

Regarding countries exported 20to25 percent of units are exporting knitwear products to quota countries and 20to43 percent of units are exporting products to non-quota countries.

It is also evident from the above table that 50to50 percent of units are exporting T-shirts, Baba Suits, sportwear panties and 30to40 percent of the units are exporting breeches, bib and brace

c. Average production of garment in dozens for the past three years.

The details regarding average production of garments in dozens for a period of three years is given in Table VIII.

TABLE VIII  
 PRODUCTION OF GARMENTS FOR A PERIOD OF 3 YEARS

Years	Below 1 Lakh		1 Lakh - 5 Lakh		5 Lakh - Above	
	N	%	N	%	N	%
1989-90	14	47	12	40	4	13
1990-91	7	23	19	63	4	13
1991-92	Nil	Nil	26	87	4	13

The production in dozen has increases taking into consideration the present consumer trend in the world, the adoption of innovative techniques, installation of high tech machines, knowledge and skills in the operation of the machines due to proper training.

The above table shows the production rate for the past 3 years. It was obvious from the above table during 1990-91 upto 5 lakh dozens production was met by more than 75 percent of the units. Within a year, cent percent of the units met the same level of production.

d. Average production of garments per day and their specifications.

The average production of garments per day and the details on the production of garments based on specification is given in the Table IX.

TABLE IX  
 PRODUCTION OF GARMENTS AND GARMENT SPECIFICATION

Pieces	Number	Percentage
100 - 200	3	10
201 - 300	4	13
301 - 400	5	17
401 - 500	6	20
501 - 600	7	23
601 and above	5	17
Garment specification		
Producers specification	9	30
Buyer's specification	12	40
Both	9	30

The garment production mainly depends upon the sophisticated machines that are being used. In the present stage the production of garments per day has increases to huge amounts because of the use of these machines.

The Table IX reveals that the average production of garments in one day. It was clearly shown from the table that nearly 20to23 percent of the units on an average produces 500to600 pieces per day. More than 600 pieces of garments in one day are produced by 15 percent of the units.

It was clearly specified that most of the units produces their garments based on Buyer's specification.

e. Products manufactured and fancy effects on knit wear garments.

The information regarding products manufactured and the fancy effects produced on knitwear garments is given in the Table X and plate IV. and figure 3

TABLE X

PRODUCTS MANUFACTURED AND FANCY EFFECTS ON KNITWEAR GARMENTS.

Details on Products	Number	Percentage
a) Products		
Manufactured*		
Briefs	26	87
Vests a) Colour	24	80
b) White	24	80
Fancy Products		
T - Shirts	29	97
Midis	24	80
Panties	23	77
Baba Suits	23	77
Polo Shirts/ Collar Shirts	22	73
Sweatshirts	22	73
Sports Garments	20	67
Breeches Bib&Brace	13	43

Details on products	Number	Percentage
Shirt Blouses	13	43
Pullovers	13	43
Trousers/Shorts	12	40
Nighties	11	37
Jerscys	11	37
Parkas	9	30
Long coats	9	30
Wind cheater	6	20
Tights	6	20
Underpants	5	17
Anoraks	4	13
Waister jackets	3	10

b. Fancy effects on the knitwear

Elastic bands	30	100
Fancy buttons	27	90
Hand embroidery	17	57
Printing	16	53
Laces	16	53
Chamikis/mirror bead works	16	53
Machine embroidery	15	50

Exceeds 100 due to multiple response

A wide variety of products with different shapes and styles to meet the up-to-date fashions of today are



PLATE IV

FANCY EFFECTS ON T-SHIRTS

CHAMKI AND FANCY STONE WORK



PLATE IV

ENSEMBLE



PLATE IV

KNITTED GARMENTS-DIVIDED SKIRT

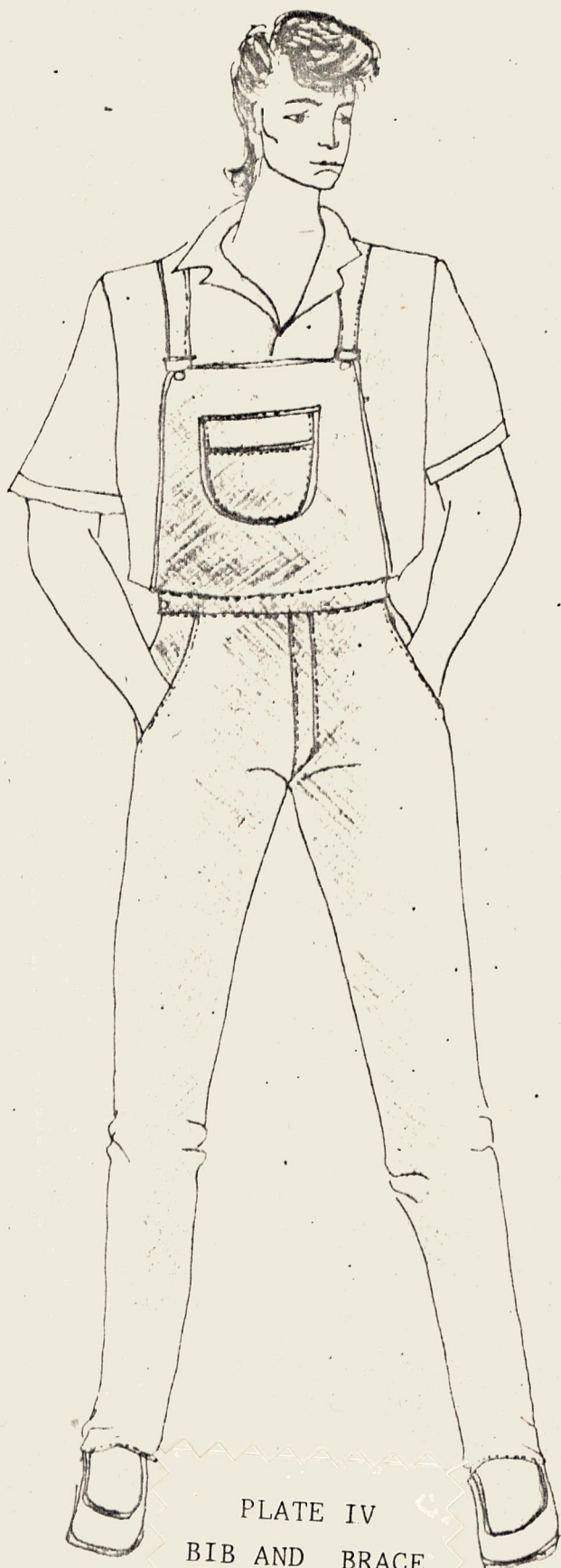


PLATE IV  
BIB AND BRACE



PLATE IV  
GIRL'S SKIRT



PLATE IV  
WOMEN'S DRESS

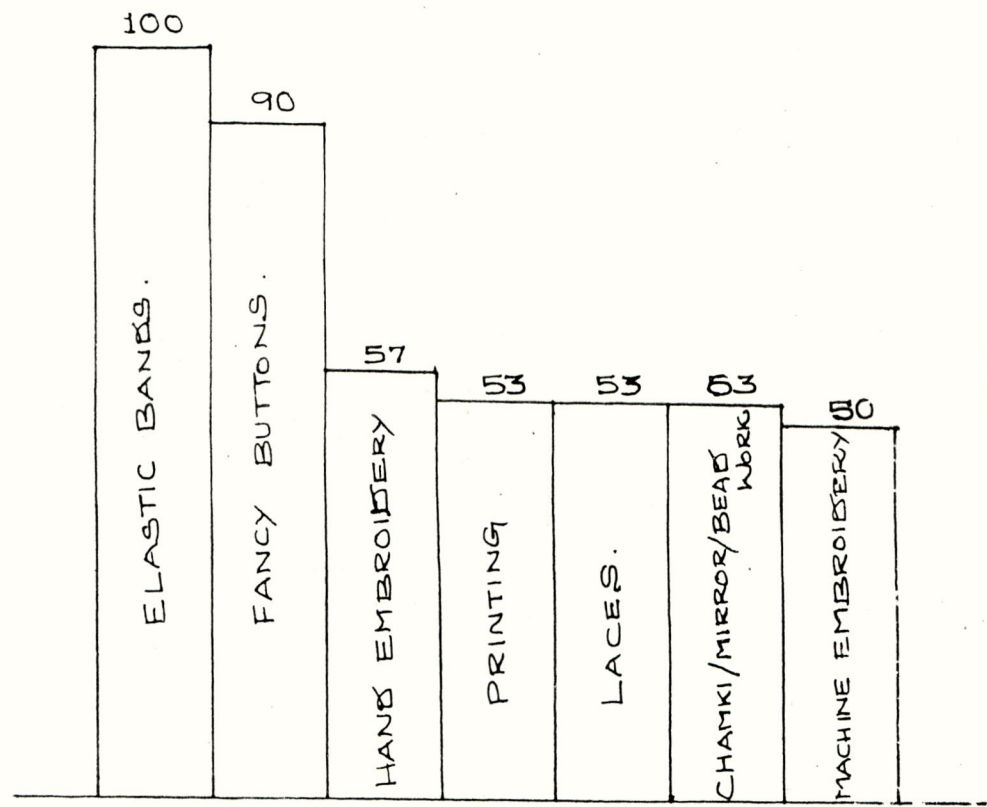


FIGURE 3

FANCY EFFECTS IN PERCENT

manufactured by the units. Fancy effect is required to finish a garment and is done by skilled workers. Computerised multihead embroidery machines are installed for quick embroidery work. The sophisticated printing machines render good and effective fancy effects on garments.

Trimmings and embellishments, elastic tapes is being imported products.

From the above table, it was clear that 87 percent of the units manufacturing briefs and 80 percent of the units produces white and coloured vests. Regarding fancy products (it is a local term used in Tirupur) more than 95 percent of the units produces T-shirts and 73to77 percent of the units produces polo shirts, collar shirts, baba suits and panties. Above all, 80 percent of the units produce midis. Regarding the sizes concerned small, medium, large and extra large are available for fancy garments. The size ranges in centimeters for vests, briefs and panties.

As far as the fancy effects are concerned, elastic band effect was common in all the units. 90 percent of the units are using fancy buttons as the main decoration applied for knitted goods. More than 50 percent of the units are using hand and machine embroidery, printing, laces and other decoration for the knitwears.

4. Storing, Packing and Packaging materials used.

Storing, packing and packaging materials used are given in plate V.



PLATE V  
PRODUCTS PACKED IN  
CARDBOARD BOXES &  
STORED IN ROOMS



PLATE V

METHODS OF PACKING  
 SINGLE & HALF DOZEN  
 PIECES PACKING

For storing knitwear goods, godowns and empty rooms are used by all the units, single piece, half-a-dozen in dozen packing and unit\* amount using polythene covers and cardboard boxes are in use by all the units. For exporting purpose packing is done in bulk depending upon the capacity of the containers.

\* Unit amount denotes 10 pieces in one box.

#### 5. Marketing of the products

Marketing of the products include mode of marketing, domestic and export market, average sales turnover for past three years, slackness in sales and heavy demand, sales promotion and overall satisfaction.

##### a. Mode of marketing.

Regarding marketing of the product 13 percent of the units have their own show rooms as well as agents. All the units market their products through agents.

##### b. Domestic and Export market.

The details on domestic and export market is given in Table XI.

TABLE XI  
DOMESTIC AND EXPORT MARKET

Goods produced in percentage		
	Below 50 %	Above 50%
Domestic	14	16
Export	12	18

Many products are manufactured for domestic as well as export purpose. These products have an overwhelming share both in domestic and export markets.

It is evident from the above table that more than 50 percent of the goods are produced for domestic purpose by 16 units and 18 units for export market only, they contribute more to the knitting industry.

C. Average sales turnover for past three years.

The information regarding average sales turnover per year is given in Table XII.

TABLE XII  
AVERAGE SALES TURNOVER FOR PAST THREE YEARS

Years	Below 50 lakh		50 lakh-1 crore		1 crore - above	
	No	%	No	%	No	%
1989-90	20	67	7	23	3	10
1990-91	12	40	15	50	3	10
1991-92	4	11	20	67	6	20

Turnover is increasing at an accelerating pace in our country, The spectacular growth of the trade in Tirupur can be attributed to the initiative and hardwork of the knitters in this centre. Moreover installation of sophisticated imported and indigenous machines have helped the industrialist to boost up the yearly sales turnover.

The above table clearly indicates the average sales

turnover for the past three years, Nearly 50 lakhs-one crore rupees sales turnover was met by 55to70 percent of the units during 1991-92 period. It was obvious from the table that around 20 percent of the units crossed more than one crore sales turnover.

d. Details on slackness in sales and heavy demand.

The slackness in sales is identified only when there is minimum number of orders, both in local and export markets. there is lack of overseas demand mainly due to seasonal variations. There is no fluctuation in home market.

The knitting units face heavy orders when the overseas demand is especially during summer and spring.

e. Measures taken to meet the demand.

Details about the measures taken to meet the demand is given in the Table XIII.

TABLE XIII

MEASURES TAKEN TO MEET THE DEMAND

Measures taken*	Number	Percentage
Overtime work by Regular workers	29	97
Betting ready well in advance	23	77
Employing more workers only at that time	6	20

\* It exceeds 100 due to multiple responses

When orders are more the unit functions at full swing by lengthening the hours of work. Overtime work is done by regular workers because they are paid more for their hours of work.

From the above table it is evident that 97 percent of the units by doing overtime work by the regular workers and 77 percent of the units met their demand by getting ready well in advance and only 20 percent of units have specified that they would employ more workers only when there is demand.

f. Sales promotion and overall satisfaction.

The knitting industrialists are trying their level best to boost up their sales to a remarkable level by following the latest trend of organising exhibitions both in our country and abroad.

From the details collected, almost all the units have taken steps to promote their sales by effective advertisement and through agents. They all have expressed that they are satisfied with sales and promotion.

## 6. Details on Occurrence of defects

Details on Occurrence of defects and percentage of rejection is discussed below.

### Details on Occurrence of defects.

Details regarding the possible defects that occur in a garment is given in table XIV

TABLE XIV  
OCCURENCE OF DEFECTS

Defects*	Number	Percentage
Laying and cutting errors	25	83
Stitching	19	43
Flaw in the raw material	7	23

\* Percentage exceeds 100 due to multiple response

Most of the defects occurs due to manual errors that are committed while laying, cutting and in the final finish of the garment . The defects occur also due to improper stitching in the use of poor quality threads. Defects also occur when the quality of raw material is below standard level and is highly noticeable when the garment is subjected to final finishing procedures.

The above table shows that the reason for getting defects in the knitwear goods, Most of the defects are due to laying, cutting and stitching are expressed by 83 and 63 percent of the units respectively.

a. Percentage of rejections

Details on the percentage of rejection is given in the table XV.

TABLE XV  
PERCENTAGE OF REJECTIONS

Rejections Percentage	Number
1 to 5	4
6 to 10	22
11 to 15	4

The percentage of rejections is mainly due to minor errors committed while stitching and finishing a garment. Minor errors outlisted are poor quality raw material, printing errors, defects in trimmings and embellishments.

The above table shows that 22 units have about 5 to 10 percent rejection.

7. Problems encountered in the total process

The information regarding the common problems encountered during the process of knitwear is given in Table XVI.

TABLE XVI  
PROBLEMS ENCOUNTERED

Problems*	Number	Percentage
Labourers	28	93
Raw Material	11	37
Marketing	7	23

\*Percentage exceeds 100 due to multiple response

Problems are encountered mainly due to shortage of labourer in units and also due to high level of absentism. More over the labours demand higher wages at times of work. Regarding raw material the quality of yarn and dyeing is not up to the expected level. Marketing problems are due to the high level of competitions prevailing among the units.

It is evident from the table that the common problems faced by 93 percent of the units is labour. 20to40 percent of the units face problems regarding raw material and marketing.

#### 8.Future plans of knitting units

Details regarding the future plans of knitting units is given in the table XVII and figure 4

TABLE XVII  
FUTURE PLANS OF KNITTING UNITS

Details*	Number	Percentage
1, Expansion		
a. New varieties of products	30	100
b. Machinery	21	83
c. Setting up new units	2	7
2. Diversification	2	7

\*Percentage exceeds 100 due to multiple response

Future plans of the entrepreneurs included expansion of units and markets expansion of units included starting units in backward district when concessions are offered by government and modernisation of existing units. Plans for expansions of market included opening many new showroom at important cities, increasing new varieties of products. The diversification plans included starting dyeing, printing, bleaching and elastic tape manufacture.

The above table shows that almost all the units have expressed that they want to introduce new varieties as well as latest machineries.

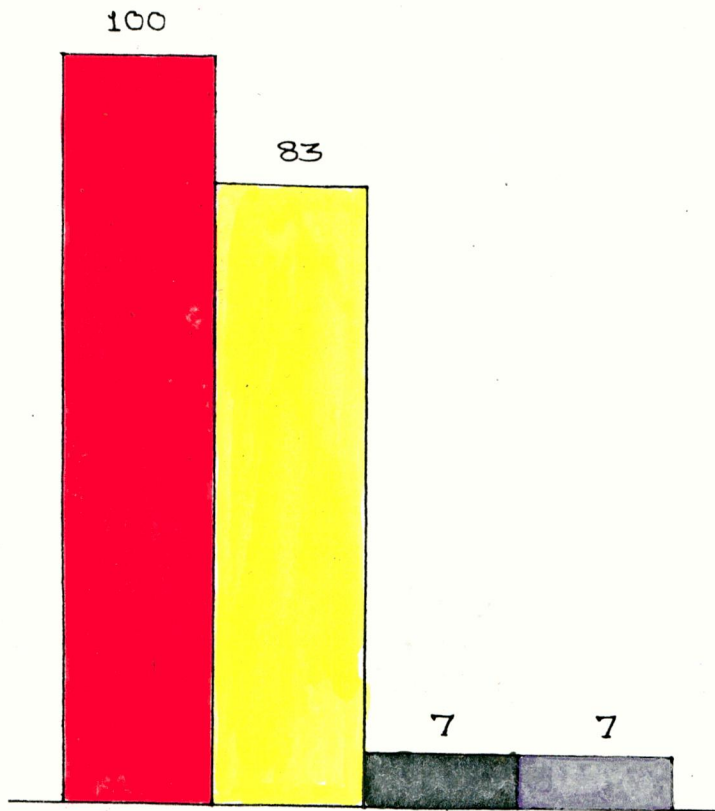


FIGURE 4

FUTURE PLANS. IN PERCENT



NEW VARIETIES OF PRODUCTS.



MACHINERY.



SETTING UP NEW UNIT.



DIVERSIFICATION.

# Summary and Conclusion

## V. Summary and Conclusion

The phenomenal growth of knitting Industry in India as a mean of producing textile materials is no doubt due to the continued development of the knitting technology. The knitting industry in India is enjoying a good status due to the fillip given to it and also due to the export of garments to other parts of the world. It also occupies an important place in the basket of our home market.

Though the knitted fabric has a long history since two centuries, it came to mass usage only in 1970 's termed as an "era of anti-establishment ". The younger generation who are in changing life style want to break from stiffness of conventionalism found out T-shirts sweat shirts and casual wears which has a massive popularity among consumers world wide.

The area selected for the study is Tirupur, in the south it has emerged as a pioneering centre in cotton knit wear production. A wide varieties of products are manufactured to meet the global demand. In this context an attempt is made to study about the various garments that are being produced in this centre. The study proceeds with following objective.

1. To evolve a quantitative analysis of goods produced by various knitting units.
2. To study the types of fabrics used for garment making

3. To study about the varieties of knitted goods produced
4. The percentage of goods produced for domestic and export market
5. To study about the average sales turnover for past 3 years

Thirty composite knitting units which were involved in fabrication and making up processes was selected. Interviews schedule was prepared to elicit information from these units. The data was systematically consolidated and analysed. The conclusion drawn from the discussion in the previous chapter are as follows.

From the background information we come to know from the thirty units in Tirupur which were covered in the study 50 percent of the units has been started between the year 1971-1980

About 60 percentage of the units have installed imported machines, this is due to the ample availability of infra-structure, high working efficiency of machines and availability of spare parts. Power-tables are installed to increase the working efficiency and production rate.

There are various type of sewing machines about 70 percentage of the units have 5 to 10 overlock and flat lock machines and 50 percentage of the units have 1 to 5 number of chain lock, button , button holing and feed of the arm. Trade names, international code symbols, ISI certification is

possessed by all the units which help in the identification of the products sets standard specification of the quality and in establishment of the brand names.

Regarding employees women workers are less in number when compared to men workers. The workers are involved in all the fabrication and making-up process. Most of the units have both trained and untrained workers and are paid at piece rate weekly.

The details regarding production is as follows. Indian being a tropical country and mainly south India being very hot, dry and humid throughout the year, the prime importance is given to cotton knit wear and cotton year production is cent percent. As trends in fashion are changing more of acrylic yarn production will be seen in near future. Ribbed fabrics are used commonly since it gives neat neckline, sleeve finish and good stretching quality. Single jersey and interlock fabrics were second in the list. The pile or raised fabric has minimum use but it is coming up for upholstery use.

Among the selected units 21 units export below 20,000 pieces to different countries and there are 4 units which export more than 1 lakh piece to foreign markets. Many type of garments like T-Shirts, Baba suits, Collar shirts, Polo shirts, sweat shirts and midis which are common and popular in international market are manufactured.

It is clear that 27 percentage of units export mainly to quota countries and 43 percent of units export their garments to non-quota markets.

The yearly production of garments seems to be constant over a period of three years from about 5 lakhs and above. As foreign policies have been changed in the recent past, there is likelihood of garments export reaching new heights.

More than 600 pieces per day seems to be the maximum production in 17 percentage of units and most of them are produced on buyers specification.

A wide variety of products are manufactured for domestic and export purpose among these briefs and vests are manufactured by 87 percentage of the units, which are mostly supplied to the domestic markets. The fancy products accounts for many varieties and variations among these are T-Shirts accounting for 97 percentage. All the units concentrate on elastic bands which is a prime fancy effect on knitwear. Due to the availability of latest machineries such as multi-head embroidering machines, button and button holing machines, embroidery and fancy buttons is used as trimmings and decorations on knitwear.

Regarding storing, packing and packaging methods the knitwear goods are stored in godowns and empty rooms. Unit packing and half unit packing is done which contains 10 and 5

pieces of garments in card board boxes using individual polythene or covers.

The marketing of the products are done through agents and some units have their own showroom. In the domestic front, majority of the products are marketed to Bombay and overseas marketing is done by direct visits to foreign countries, indirect exports through agents and active participation in trade fair and exhibitions.

The knitwear products have carved a niche in both domestic and international market, 18 units are exporting more than 50 percent of the products to other countries and 16 units more than 50 percentage for domestic market.

The sales turnover as a whole is quite satisfactory. About 20 percentage of the units crossed more than one crore sales turnover during 1991 - 1992 period.

Slackness in sales depends upon the minimum number of orders in overseas markets due to seasonal variations. The demands are met mainly by doing overtime work by regular workers because they are paid more and some units get their work done well in advance.

The sales promotion is done by effective advertisements and all the units are fully satisfied with sales and promotion.

Maximum defects in th garments occur during laying, cutting, stitching and final finishing of a garment and was

60

seen in 83 percentage of the units. Too much wrinkles, incorrect measurements, improper cutting are chief causes for defects and this in turn increases the percentage of rejections.

Problems are encountered mainly due to shortage of labourers in the units and also due to high level of absentism, demand for hike in wages. 93 percentage of the units face their problem, in the case of raw material the quality of yarn and dyeing is not upto the expected level.

The future plans of the units include expansion of units which includes starting units in backward district, modernisation of the unit, opening new showrooms, increasing and introducing new varieties of products, installation of sophisticated and high tech machines is the near future plan of all the units.

#### Recommendations and Suggestions

With the use of available resources, the knitting industry should gear itself up to the manufacture of synthetic and blended knitgoods in a very big way. In order to achieve this the excise and other duties on synthetic and blended yarns used for knitting should be reduced to encourage the use of these yarns by the knitters.

In order to increase the manufacture of varieties of products fashion designing programmes should be implemented to gain good potential in both domestic and export market.

In order to improve the garment quality trimmings and embellishments should ne allowed to be imported duty free. Frequent market research trade fairs and organis<sup>ing</sup> exhibitions can help boost up sales and awareness of consumers.

# Bibliography

## BIBLIOGRAPHY

- Agarwal  
1975 " Educational Research"  
An Introduction  
Arya Book Depot  
New Delhi  
p.264
- Apparel Export Promotion  
Council  
1988 Guidelines on Registration  
and membership, Apparel export  
promotion council.  
New Delhi  
pp 1 to 2
- Ashok chugh  
1992 Apparel Industry - A Sterling  
Performance  
"Source economic time"  
Aug - Hosiery times  
Vol 19. No.43  
pp 10-11
- Ashok chugh  
1992 Changes are welcome  
Clothesline  
Vol.5 No.7  
p - 41
- Arun Roongta  
An integrated view of clothing &  
textiles  
Clothesline  
Vol.6 No.1  
pp 1,2
- Baker F.E  
1948 An Introduction to knitting  
Lowell Textiles  
Masacheusetts  
pp 1-3
- Banerjee P.T  
1989 Influence of yarn properties of  
knitwear quality  
Clothesline  
Vol 2. No.4 p.83
- Bausell B.R  
1986 A practical guide to conducting  
conducting empiucal research.  
Harper and Roa publishers  
New york p.169
- Bodner S.M  
1990 Market opprtunities  
Knitting times  
Vol 59, No.8 August  
p.42

- Borg W.R. and  
Gall M.P  
1983  
Educational Research  
Longman Publishers  
Newyork  
pp.436,441
- Brian Parker  
1992  
Tirupur's Knitwear Industry  
Gearing up to meet the  
Global Demand  
June, Clothesline  
Vol.5 No.6  
pp - 60,61
- Business India Report  
1984  
Report on the Tirupur knitting  
industry "Business India  
(Fortnight)"  
p.17
- Cowan,M.L., and  
Jungerman,M.E  
1980.  
Introduction to textiles,D.B.  
Taraporevalasons and co.,Ltd.,  
Bombay,  
pp.161,171.
- Dorothy Siegert Lyle  
1982  
Knit construction Modern  
Textile published by John  
Wiley and sons  
New York  
pp-276-277
- Elhance.O.N  
1984  
Fundamentals of statistical  
methods  
Vekas Publishing house P.Ltd  
New Delhi  
p.35
- Eric Hertz  
1991  
"Knits stand strong at Retail"  
Knitting times  
Vol.60, No. 6  
pp 32 to 36
- Ghosh B.N  
1985  
Scientific method and social  
Research sterling  
Publishers Private Ltd  
New Delhi  
pp.184,203
- Goods.W.J  
and Hatt.P.K  
1981  
Methods and social research  
Mc graw Hill book company  
London  
pp.184

Gupta S.P  
1989  
An Introduction to statistical Methods  
Vikas Publishing House P.Ltd  
New Delhi  
p.35

Gupta S.P  
1989  
Statistical Methods  
Sultan Chand and sons  
Publishers  
New Delhi  
P.E-4

Gupta  
1985  
Statistical Methods  
Sultan Chand and sons  
Publishers  
New Delhi  
p.A4.2

Hess K.P  
1978  
Textile fibers and their use  
Mohan Primulani and IBH  
Publishing Company oxford  
p.49

Hollen and saddler  
1964  
Knitted stretch Technology  
Published by National Knitted  
outwear association  
p.1,23,5

Ishida  
1979  
'Knitting'  
An introduction to textile  
Technology  
pp.40,41

Jacob Solinger  
1980  
Apparel Manufacturing  
Handbook Principles &  
Practise  
pp. 23, 27, 95, 97, 111

Jain  
1993  
"Delhi is now leading  
Knitwear Centre -  
August Hosiery times  
Vol. 19 No: 43  
pp 27-29

Jain R.C.  
1985  
"Future trends in knitting  
Industry", Internatioal  
knitting congress, XXIX,  
IFKT Congress, New Delhi,  
p. 3, 6.

- Joseph M.L.  
1981  
Introductory Textile Science  
Helt, Runchast and Winston  
Publishers, New York  
pp 230, 232, 239, 249
- Kothari Industrial  
Directory of India  
1990  
Kotahri's Enterprises,  
Madras.  
Pp. 15.8 to 15.9
- Kothari C.R.  
1978  
Quantitative techniques  
Vikas Publishing House  
Pvt. Ltd.  
p. 30.
- LindaLongo  
1990  
"Knit Fashion"  
Knitting times.  
The magazine for Knit apparel  
Management.  
Vol. 59 No:11  
p. 54.
- Lord P.D. and  
Mohammed M.H.  
1973  
Weaving Conversion of yarn  
to fabric, Merron Publishing  
Co., Dushean. p. 29.
- Mohanlal Piramal  
1990  
Availability of Man-Made Fibre  
Fabrics to Garment Exports  
AEPC Times  
Vol. 4 No: 4  
p. 22.
- Nagar G.N.  
1985  
"Export prospects of Knitted  
goods", International knitting  
congress XXIX, IFKT Congress,  
New Delhi, pp. 593, 594, 597.
- New Encyclopaedia  
Britanica  
1978  
Helen Hewing Beuton Publishers  
Chicago.  
p. 181.
- Parikh J.G. and  
Suketu J. Parikh  
1985  
Knitting in India  
"International Knitting Congress"  
XXIX, IFKT Congress. New Delhi.  
p. 336.
- Premi G.D.  
1992  
"Embroidery on Knits"  
Clothesline  
Vol. 5 No: 11  
pp 87 to 91.

- Paling D.F.  
1952  
Warp Knitting Technology  
Harlequior press, London.  
p. 1.
- Raju Kathuria  
1992  
Changing Scenario of  
Knitwear  
July Clothesline  
Vol. 5 No: 7  
pp. 106.
- Roa A.I.S.  
1985  
Status of Hoisery Industry  
Proceedings of the  
International Knitting  
Congress XXIX New Delhi  
International Federation of  
Knitting Technologist
- Rosenthal N.E.  
"Cotton, Cotton blends make  
strong fashion showing".  
Knitting Times  
Vol. 58, No: 12, December.  
p. 20.
- Sakthivel A.  
1992  
Workshop on Development of  
Textile Industry in Kerala  
Trends in the Knitwear  
Industry  
pp. 1, 3, 7, 8, 9.
- Sampangi  
1983  
Significant Relation for  
garments Knitwear in 1984  
export policy  
Textile Magazine  
Vol. 24, No: 1-12,  
pp. 22.
- Sampangi  
1985  
"Great Scope for Knitting  
Industry"  
Vol. 26, No: 9  
pp. 37 to 38.
- Sampangi  
1990  
"Falke Fashion" Knitting  
Times (September)  
(The Magazine for Knit  
Apparel Management)  
Vol. 59, No: 9  
pp. 37.

Sankaranarayanamurthy  
1985  
Role of State Bank of India  
in Modernisation of the  
Knitting Industry  
State Bank of India  
Tirupur  
pp. 14.

Shah S.L.  
1986  
Cotton Knitwear and hosiery  
industrial. "Seminar on Export  
prospects Knitwear and Hosiery  
(Cotton and Woollen) garments  
7th February organised by  
Apparel Export Promotion  
Council Coimbatore  
pp. 2 to 5.

Shankaralingam  
1992  
Workshop on Development of  
Textile industry in Kerala  
pp. 7, 8, 9.

Shima Sieki  
1992  
"Broadening our store of  
Knowledge and Experience  
Manufacture of Knitting  
Machinery"  
Shima Seiki Manufacturing Ltd.  
pp. 16-18.

Sidhu K.S.  
1984  
Methodology of Research  
education. Sterling Publishers  
Pvt. Ltd. Jalandhar.  
pp. 260, 261, 276.

Singleton J.R.  
Royce C. Strati and  
Ronald Mc.Allister  
1988  
Approached to social research  
Oxford University  
p. 140.

Sivakumar V.R. and  
Rathnam T.V.  
1985  
Knitting Industry in India  
The South India Textile  
Research Association  
Vol. 30, No: 2  
pp. 1, 3, 5, 6, 7, 8.

Spencer D.J.  
1983  
"Knitting Technology"  
Permagon Press Oxford  
pp. 2.

Spencer J. David  
Knitting Technology  
Permagon Press Oxford  
Second edition  
pp. 6-2.

- Sreenivasan and  
Indra Doraiswamy  
1973
- Survey of the Knitting  
Industry  
South India Textile Research  
Association Coimbatore-14  
pp. 1, 3, 9, 15, 19.
- The Hindu  
1993
- Textile Export; target exceeded  
Woollen Knitwear Complex  
Sunday April 11  
Vol. 116, No: 15  
pp. 3.
- Trade Council  
1992
- TAI Seminar on highlights of  
ITMA-91 Feb. Clothesline  
Vol. 5, No: 2
- Tertera G. Phyths  
1982
- Understanding Textiles  
Macmillan Publishing Company  
New York  
"Knitted fabrics"  
pp. 237, 238, 239.
- Varma T.M.K.  
1990
- A study on the Quality of  
Knitwear that are being made up  
Knitting industries sponsored by  
Ministry of Textiles  
Govt. of India  
Vol. 35, No: 1  
pp. 2-3.
- Varma and Ramaswamy S.  
1990
- A study on the Dimensional  
properties of interlock fabrics  
Vol. 35, No. 3  
pp. 1-3
- Varma T.M.K.  
1985
- Defects in Weft Knitted fabric  
South India Textile Research  
Association -ITCOT Seminar 1985  
pp. 1,3,6
- Venkatapathy D.  
1991
- Manufacturing Quality Knitwear -  
some guidelines  
Clothesline  
Vol. 4, No. 11  
pp. 105, 106, 107.
- Venkatapathy D.  
1985
- Modern Developments in Knitwear  
Manufacturing Modernisation in  
Knitting Industry  
pp. 12-13.

Vijayakumar  
1986

A study of the Hosiery  
Enterpreneurs at Tirupur.  
Tamilnadu. Human Relation  
Division. The South India  
Textile Research Association  
Coimbatore  
pp. 3, 5, 108, 109.

Wingate  
1949

Textile Fabrics and their  
selection- Prentice Hall  
New York  
pp. 268, 269.

Woolman M.S. and  
Mc Cowan E.B.  
1943

Textiles. The Macmillan Co.,  
New York  
pp. 71-72.

# Appendices

## APPENDIX I

Study of Various knitted garments produced in the selected units at Tirupur

## 1. Background information of the knitting units surveyed

a. Name of the unit

b. Year of establishment and type of organisation

Year	Number	Percentage
------	--------	------------

## Year of establishment

1951 - 1960

1961 - 1970

1971 - 1980

1981 - 1990

1991 - 1992

## Type of organisation

Single owners

Partnership firms

Private firms

c) State the type of machines and number of powertables owned by the units

Details on	Number	Percentage
------------	--------	------------

## Types of Machines

Imported

Indigeneous

Number of powertables

1 to 5

6 to 10

11 to 15

16 to 20

-----  
d) Details regarding the type of sewing machines and their number

Type	Number
Overlock	
Flat lock	
Chainlock	
Buttoning and Button holing	
Feed of the arm	
Any others specify	

-----  
e) How many trade names are there for your products ?

f) State whether the furnished government has labels with international code symbols ?

Yes / No

If Yes, what are all the information provided by the labels.

- a) Trade names
- b) Size number
- c) Washing instruction
- d) Ironing instruction
- e) Any other specify

ii) Do you have ISI marking for your products ?

2) Details regarding employees

a) How many workers are there in your unit ?

b) -----

Number of employees	Adults			
	Male	%	Female	%
10 - 15				
16 - 30				
31 - 45				
46 - 60				
61 - 75				
76 - 90				
91 - 105				
Above 105				

-----

b) i) Do you employ trained or untrained workers ?

ii) If untrained workers what type of training is given to the workers ?

- a) Inplant training
- b) Outside training

iii) How will you pay for the workers ?

3) Details regarding production

a) Details on type of raw material used and type of fabrics produced

Type	Number	Percentage
Raw material used		
Cotton yarn		
Acrylic		
Cotton / Viscose		
Type of fabrics produced		
Rib		
Single Jersey		
Interlock		
Stripped		
Honey comb		
Thick pick		
Wrapped		
Raised		

b) Are your products exported

Yes / No

If yes specify the countries, type of knitwear products and the countries to which exported ?

Quantity	Type of garment	Countries
----------	-----------------	-----------

c) State the average production of garments in dozens for past three years.

Years	Below 1 lakh		1 lakh - 5 lakh		5 lakh & above	
	N	%	N	%	N	%

1989 - 1990  
 1990 - 1991  
 1991 - 1992

d) State the average production of garments per day and their specification

Pieces	Number	Percentage
--------	--------	------------

Production of garments per day

Garment specification

a) Producers  
specification

b) Buyers  
specification

c) Both

-----

e) Details on varieties of products manufactured and their fancy effects on knitwear.

-----

Products	Number	Percentage
Products manufactured		
Briefs		
Vests a) colour b) white		
Fancy products		
T - shirts		
Midis		
Panties		
Baba suits		
Polo shirts / Collar shirts		
Sweat shirt		
Sports garments		
Breeches Bib and Brace		
Shirt - Blouses		
Pullovers		
Trousers / Shorts		

Nighties

Jersey

Parkas

Long coats

Wind cheater

Tights

Products	Number	Percentage
----------	--------	------------

Underpants

Anoraks

Waister jacket

b) Fancy effects on the knitwear

Elastic Bands

Fancy buttons

Hand embroidery

Printing

Products	Number	Percentage
----------	--------	------------

Laces

Chamiki / Mirror

Bead works

Machine Embroidery

4. Storing, packing and packaging materials used

- a. How are garments stored ?
- b. How are garments packed for sale ?
- c. What are the packing materials used for packing garments ?

5. Marketing if the products

- a. How do you market your products ?
  - i) Own show room
  - ii) Through agents
  - iii) Direct supply to particular shop
  - iv) Any other specify
- b. What percentage of the products are manufactured for domestic and export market ?

Goods produced in percentage	
Below 50 %	Above 50%

- i) Domestic market
- ii) Export market

c. What is the average sales turnover for past three years ?

Year	Below 50 lakhs		50 lakhs-1 crore		1 crore - above	
	No	%	No	%	No	%

1989-90

1990-91

1991-92

---

d. Do you face slackness in sales / heavy demand in any particular period

Yes / No

Reasons

e. How will you meet the demand ?

a) getting ready will in advnce

b) employing more workers only at that time

c) overtime work by the regular workers

f. i) What are the steps taken to promote sales ?

a) Through advertisements

b) Through agents

c) Both

ii) Are you satisfied with sales and production ?

6. Details on occurence of defects ?

i) What type of defects occur during the manufacture of garments ?

a) Defects due to laying and cutting

b) Defects due to stitching

c) Flaw in raw materials

ii) What is the percentage of rejection during the production ?

7. Problems encountered in the total process

What are the problems faced by you with regard to growth in the business ?

- a. Labour
- b. Raw material
- c. Marketing

8. Future plans of knitting units

What plans do you have for future in terms of

1. Expansion
  - a) New varieties
  - b) Machinery
  - c) Setting up new units
2. Diversification

## APPENDIX II

## NAME OF THE KNITTING UNITS

1. Anand Hosieries
2. Arvinth Knitting company
3. Best knitting company
4. Centwin knittings
5. Champion knitting company
6. City knitting company
7. Conti garments
8. Crystal knitwear
9. D.S.P. Knittings
10. Emperor knitting
11. Giri tex
12. Jayavarma knitters
13. Karuna knitting works
14. Knit field
15. Kwality knitters
16. Leela Hosieries
17. Miller Hosieries
18. Neptune knitting works
19. Okay knitting
20. Poppy's knitwears
21. Prem knitwear
22. R.A.knitting
23. Ram-Kumar mills

24. R.R.P knittings
25. Swarga Knitting company
26. Titoni knitting company
27. Tom tex knitters
28. Viswas knitting mills
29. V.V.Knitting mills
30. Zebra Hosieries











# WHY HAVE AN INTERNATIONAL TEXTILE CARE LABELLING CODE?

Washing is not as simple as it used to be. The vast number of different fabrics and finishes, the wide selection of washing machines, all kinds of washing powders combine to make washday a real headache.

Furthermore, Mrs. Brown in London, Mme. Brun in Paris and Frau Braun in Bonn may speak different languages but all have to face the same sort of problems on washday. Similar fabrics and appliances are available to each of them. One washing code that everyone can understand is the simple answer.

## What the Code looks like

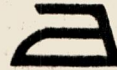
	MACHINE	HAND WASH
	Hand-hot medium wash	Hand-hot
Cold rinse. Short spin or drip-dry		
	DO NOT USE CHLORINE BLEACH	
	WARM	
	DRY CLEANABLE	

			
---	---	---	---

The code basically consists of four symbols :



1. for washing  
(by hand or machine)



3. for ironing



2. for bleaching



4. for dry cleaning

The symbols are always presented in the same sequence. In the UK they are mainly found arranged vertically ; in other European countries they are more usually arranged horizontally.

N. B Care labels may also include symbols recommending a particular drying method — see back cover.

---

## What it all means

---



### WASHING

The number and the temperature shown in the tub symbol indicate a particular washing process.

Each washing process describes the best method of washing and rinsing a particular group of fabrics and recommends :

- maximum wash temperature
- the amount of agitation during the wash
- the method of water extraction










Sorting and washing using the numbered processes of the International Scheme will give you the best results. Where a washing machine shows the wash tub symbols on the control panel the complete process will have been provided for you, and all that is necessary is to match the number on the label to the machine programme. On other machines or when washing by hand apply the label instructions to particular circumstances. To help, details of the processes are printed on all washing powder packs.

When washing in laundrettes, because of the simpler range of settings it may be practical to combine loads and select the safest wash for all the articles in that load.

**WARNING ;** Any attempt to mix loads without selecting the mildest conditions may result in serious colour problems, loss of shape or shrinkage and even permanent damage to the fabric.

continued on page 5

## SUMMARY OF WASHING SYMBOLS

Symbol	Washing Temperature		Agitation	Rinse	Spinning/ Wringing	Fabric	Benefits
	Machine	Hand					
	very hot (95°C) to boil	hand hot 50° C or boil	maximum	normal	normal	White cotton and linen articles without special finishes	Ensures whiteness and stain removal
	hot 60°C	hand hot 50° C	maximum	normal	normal	Cotton, linen or rayon articles without special finishes where colours are fast at 60° C	Maintains colours
	hot 60°C	hand hot 50° C	medium	cold	short spin or drip dry	White nylon; white polyester/cotton mixtures	Prolongs whiteness — minimises creasing
	hand hot 50°C	hand hot 50° C	medium	cold	short spin or drip dry	Coloured nylon; polyester; cotton and rayon articles with special finishes; acrylic/cotton mixtures; coloured polyester/cotton mixtures	Safeguards colour & finish — minimises creasing
	warm 40°C	warm 40° C	medium	normal	normal	Cotton, linen or rayon articles where colours are fast at 40°C, but not at 60°C	Safeguards the colour fastness
	40°C	warm 40° C	minimum	cold	short spin	Acrylics; acetate and triacetate, including mixtures with wool; polyester/wool blends	Preserves colour & shape — minimises creasing
	warm 40°C	warm 40° C	minimum do not rub	normal	normal spin do not hand wring	Wool, including blankets, and wool mixtures with cotton or rayon; silk	Keeps colour, size and handle
	cool 30°C	cool 30° C	minimum	cold	short spin do not hand wring	Silk and printed acetate fabrics with colours not fast at 40°C	Prevents colour loss
	very hot (95°C) to boil	hand hot 50° C or boil	maximum	cold	drip dry	Cotton articles with special finishes capable of being boiled but requiring drip drying	Prolongs whiteness, retains special crease resistant finish



DO NOT MACHINE WASH



DO NOT WASH

### WASHING TEMPERATURES

100° C  
95° C  
60° C

Boil  
Very Hot  
Hot

50° C  
40° C  
30° C

Hand-hot  
Warm  
Cool

Self-explanatory.  
Water heated to near boiling temperature.  
Hotter than the hand can bear. The temperature  
of water coming from many domestic hot taps.  
As hot as the hands can bear.  
Pleasantly warm to the hand.  
Feels cool to the touch.

continued from page 2

**1**  
**95°**

This process is used for white cotton and linen articles without special finishes and provides the most vigorous washing conditions. Wash temperature can be up to boiling (100°C) and agitation and spinning times are maximum. This ensures good whiteness and stain removal.

**2**  
**60°**

Process No. 2 is for cotton, linen or rayon articles without special finishes where colours are fast at 60°C. It provides vigorous wash conditions but at a temperature which maintains fast colours.

**3**  
**60°**

Used for white nylon or white polyester/cotton mixtures, this process is less vigorous than either 1 or 2. The wash temperature (60°C) is high enough to prolong whiteness, and cold rinsing followed by short spinning minimises creases.

**4**  
**50°**

This process is for coloured nylon ; polyester ; cotton and rayon articles with special finishes; acrylic/cotton mixtures; coloured polyester/cotton mixtures. In all respects except for washing temperature it is the same as process 3. The lower temperature hand hot (50°C) safeguards the colour and finish.

**5**  
**40°**

Suitable for cotton, linen or rayon articles where colours are fast at 40°C, but not at 60°C. This process has warm wash (40°C), medium agitation, normal spinning or wringing. The low wash temperature is essential to safeguard colour fastness.

**6**  
**40°**

This is for those articles which require low temperature washing, (40°C) minimum agitation, a cold rinse and a short spin eg. acrylics ; acetate and triacetate, including mixtures with wool ; polyester/wool blends.

These conditions preserve colour and shape and minimise creasing.

**7**  
**40°**

Similar to process 6, this process is for wool, including blankets and wool mixtures with cotton or rayon; silk, which needs low temperature washing (40°C) and minimum agitation but requires normal spinning. Washing in this way preserves colour, size and handle. These fabrics should not be subjected to hand wringing or rubbing.



Unlikely to appear on UK produced goods, this process is for silk and printed acetate fabrics, with colours which are not fast at 40°C, requiring to be washed at a very low temperature (30°C), with minimum agitation and spinning.



Again rarely to be found on UK produced goods, this process is for cotton articles with special finishes which benefit from a high temperature (95°C) wash but require drip drying.



This symbol indicates those articles which must *not* be machine washed.



*Articles which must not be washed at all will bear this sign.*



## BLEACHING



This symbol indicates that household (chlorine) bleach could be used. Care must be taken to follow the manufacturer's instructions



When this symbol appears on a label household bleach must *not* be used.



## IRONING

The number of dots in the ironing symbol indicates the correct temperature setting - the fewer the dots the cooler the iron setting.



cool



warm



hot



do not iron



## DRY CLEANING

The letter in the circle refers to the solvent which may be used in the dry cleaning process, and those using coin operated dry cleaning should check that the cleaning symbol shown on the label is the same as that in the instructions given on the front of the machine.



Goods normal for dry cleaning in all solvents.



Goods normal for dry cleaning in perchloroethylene, white spirit, Solvent 113 and Solvent 11.



May be dry cleaned professionally. Do not 'coin-op' clean.



Goods normal for dry cleaning in white spirit or Solvent 113.



Do not dry clean.



## DRYING

Care labels may also include one or other of the following symbols recommending a particular drying method.



Tumble drying beneficial but not essential.



Line dry.



Drip dry: for best results hang while wet.



Dry flat: do not hang to dry.

APPENDIX IV  
TYPES OF FABRIC

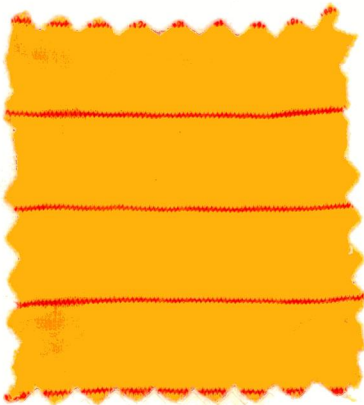
SINGLE JERSEY



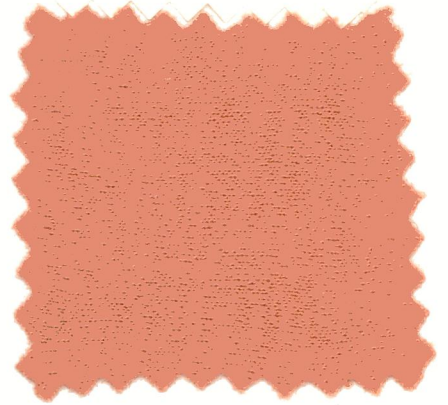
INTERLOCK



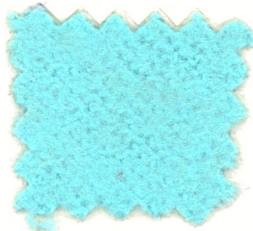
STRIPPED



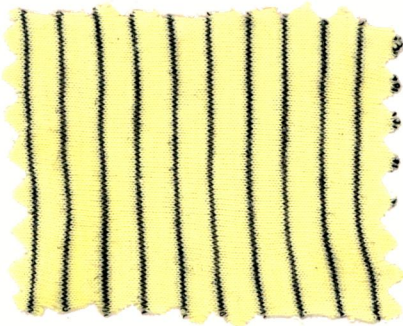
PLAIN INTERLOCK



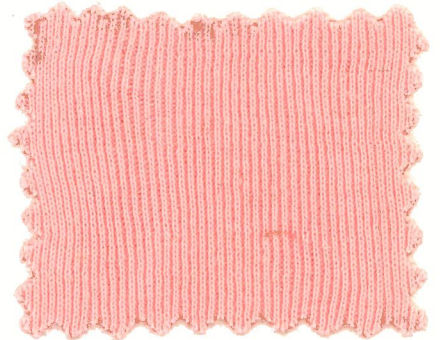
FLEECY



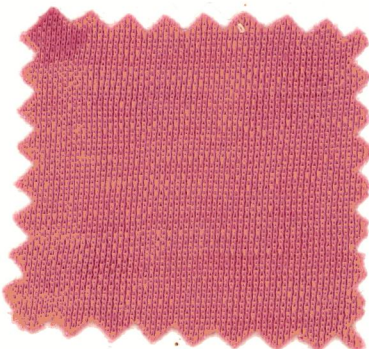
WRAPPED



RIB



THICK PICK



PILE

