CHAPTER - 2

REVIEW OF LITERATURE
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REVIEW OF LITERATURE

Various aspects of the ready made garment industry were reviewed and are presented under the following sub-topics:

2.1) Foundation of garment industry.
2.2) History and development: Men's wear, women's wear and children's wear.
2.3) Present position of ready made garment industry in India.
2.4) Future of ready made garment industry in India.
2.5) Form, size and type of business.
2.6) Location
2.7) Raw material
2.8) Machine and equipment
2.9) Garment making process
2.10) Pricing
2.11) Market for garments
2.1 **FOUNDATION OF GARMENT INDUSTRY**

Ready made clothing has its beginning in the United states. The first manufacturing establishment was founded in 1831 in New York by George Opdyke, a former mayor. By 1835 there were several manufactures of medium grade ready-to-wear clothes for men in New York; however, the quantities produced were small, and everything was done by hand. At about the same time a firm was started in New Bedford, Massachusetts, which specialized in supplying the needs of sailors.

According to Tate, the South became an early market for ready-made clothes. Before 1840, the slaves on the plantations made their own clothes. But as the cotton boom got underway, it became more profitable to keep the Negroes employed in the cultivation of cotton. A market for cheap clothes for labourers developed. About 1850, the emigration to the goldfields of California gave a great stimulus to the ready-made clothing industry. The 1850 census listed 14,278 manufacturers of man's clothing.

This so-called manufactured clothing was provided by dealers who purchased fabrics. Cut them up and then arranged for women to do the sewing at home. All garments were sewed by hand until the development of the sewing machines, which was first introduced in the early 1850's.
2.2 HISTORY AND DEVELOPMENT

2.2.1 MEN'S WEAR:

The United States Apparel Industry started with ready made clothing for men. It was born in the early 1800's (14).

As reported by Jarnow (14) during the Civil War, in port cities New Bedford, New York, Boston, Philadelphia and Baltimore a few enterprising tailoring shops conceived the idea of producing and selling cheap ready-to-wear trousers, jackets and shirts for sailors who needed to replenish their wardrobes inexpensively and immediately during their brief stops in ports.

Fortunately for the factory system, a major change in men's fashions took place about this time. The term "store clothes" still carried the connotation of being cheap and lacking in style. Improvement in ready-made apparel came about as a result of the depression of 1873. By 1885, most American men wore factory-made clothes (30).

American introduced colour experimentation in design and casualness in men's clothes. World war gave great impetus to this new trend. After 1918, a man was no longer considered queer if he appeared on the street hatless, in shirt sleeves, or in short trousers. Coloured sweaters began to replace the waist coat and vest, while placesfours or knickers developed for golf and similar sports (31).
Opposition to the use of bright colours in men's wear persisted until after World War II, when the "American Bold look" introduced printed shirts with open collars and long or short sleeves to be worn either inside or outside the trousers. The jean or blue jean adopted from the cowboy and pioneer of the west has become a favourite for boys and young men in both United States and in Europe. Beach and country wear achieved even greater freedom.

As observed by Gupta in India also, suddenly a new revolution is sweeping men's wear. Ready-to-wear men's garments have become available in an exciting array of designs and ranges. Men are no longer going abroad for to exclusive boutiques tucked away in five star hotels to fill their wardrobes.

Heading the new revolution are a lot of mill Raymonds, Mafatlal, Bombay Dyeing, Grasim, Reliance, Modern and XXL. Manufacturer-retailer stores such as Charagh Din, Double Bull, Bombay's Akbarally's, Benzer and Sheetal or Delhi's Snowhite and Jaisons or Ahmedabad's Jee Hazoor, Mark Apparel, Glamers Garment. Thus the fashion wheel for men has made a full circle in the last 100 years or more. Today's mode for men once again gives scope to individual taste. Men are taking a new interest in clothing as an expression of their creative needs.

Growth of readymade men's wear from the last five years can be clearly seen by the following table.
TABLE 1 Growth of readymade men's wear from the last five years.

<table>
<thead>
<tr>
<th>MEN'S WEAR</th>
<th>1985</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of readymade Market</td>
<td>35%</td>
<td>65%</td>
</tr>
<tr>
<td>Number of National Brand</td>
<td>30%</td>
<td>100%</td>
</tr>
<tr>
<td>Turnover (Rs. Crores)</td>
<td>250%</td>
<td>600%</td>
</tr>
</tbody>
</table>

2.2.2) WOMEN'S WEAR

The U.S. census of 1860 mentions 96 manufacturers engaged in producing hoop shirts, cloaks and mantillas. Once started, the industry grew rapidly. From 1860 to 1880, the wholesale volume of production increased from $2 million to $32 million; the number of manufacturers from 96 to 562; and the number of employees from 5739 to 25,192 (14).

The first shop to manufacture women's skirt was established in New York in 1891. By 1900 there were over 400 manufacturers. Around 1912 the demand for skirtwaists started to decline, and most of the factories began making women's dresses which resulted in contract system, whereby the dress manufacturer really became a jobber and the contractor became the real manufacturer.

The factory made women's ready to wear business, in the United states is indeed young and its early beginning was anything but fashion inspired. In all areas of women's ready-made clothing today, the latest style may be found in a very wide price range (30).
2.2.3) **CHILDREN’S WEAR**

The manufacturer of boy’s apparel, probably before 1870 and that of girls somewhat later, but children’s wear did not become an important industry until after 1914. Since then however, the industry has experienced tremendous growth.

Change in the American way of life since the end of World War II has brought about changes in American children. Gone is the child who accepted home made clothing or clothes bought by parents to suit their tastes. As reported by Tate by 1958, annual retail sales of children’s wear totaled more than 430 million dollars.

Today’s children are customers in their own right. They are in the store at the time of purchase, know what they want and do not hesitate to express their wishes. They live, more than their predecessors, in the adult world.

The international community is suddenly turning to India to meet their requirements of children’s wear. In India today it is a haphazard growth. The vitality needed to boost this industry is totally missing. This must change. The earlier the change the better for the industry.

### 2.3 **PRESENT POSITION OF READY MADE GARMENT INDUSTRY IN INDIA**

India is a fast growing nation with a highly diversified industrial base. Industry is expanding rapidly at a growth rate of 7% is envisaged in the 7th five year plan (1985-90). India is the 10th most industrialised nation in the world and third
largest technological man-power reserve in the world after the U.S. and U.S.S.R. (21) India has a reputation for producing fabrics with fine aesthetic appeal and a heritage in the art of ornamenting garments. India should naturally aspire for a major market share (16).

**TABLE 2:**

**INDIAN GARMENT INDUSTRY AT A GLANCE**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Garment Units</td>
<td>15,000</td>
</tr>
<tr>
<td>2</td>
<td>Persons Employed</td>
<td>1.2 million</td>
</tr>
<tr>
<td>3</td>
<td>Average annual growth rate</td>
<td>30 %</td>
</tr>
<tr>
<td>4</td>
<td>Export of Garments (1987-88)</td>
<td>US $1,500 million</td>
</tr>
<tr>
<td>5</td>
<td>Total Export</td>
<td>15 %</td>
</tr>
<tr>
<td>6</td>
<td>Total production capacity</td>
<td>260 crore pieces</td>
</tr>
<tr>
<td>7</td>
<td>Investment in plant machinery</td>
<td>US $200 million</td>
</tr>
<tr>
<td>8</td>
<td>Proposed investment in the immediate future</td>
<td>US $150 million</td>
</tr>
<tr>
<td>9</td>
<td>Annual imports of trimmings and establishments</td>
<td>US $190 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Outfit,-Page.)

The government of India, convinced for the need to modernise the industry, continues to follow its liberal import policy large number of items of garment manufacturing, machinery and allied
equipment have been brought on the open general license list (OGL) (2).

The Government holds periodic consultations with the export promotion council and industry and trade. A new quarter distribution policy for 1980 was announced in advance in August 1979. This policy was welcomed with some reservations by the industry trade. From 1980 onwards the growth of exports has been continuous as seen from graph 1 and table 3.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>GARMENT EXPORTS (RUPEES IN CRORES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>524.00</td>
</tr>
<tr>
<td>1981</td>
<td>650.00</td>
</tr>
<tr>
<td>1982</td>
<td>632.00</td>
</tr>
<tr>
<td>1983</td>
<td>640.13</td>
</tr>
<tr>
<td>1984</td>
<td>850.00</td>
</tr>
<tr>
<td>1985</td>
<td>1067.65</td>
</tr>
<tr>
<td>1986</td>
<td>1323.12</td>
</tr>
<tr>
<td>1987</td>
<td>1857.35</td>
</tr>
<tr>
<td>1988</td>
<td>2148.64</td>
</tr>
</tbody>
</table>

Source: Clothes line April 1991

According to the available data (27), garment export from India during 1988-90 to various countries is given below in Table 4. Export to some major countries has been plotted in Graph 2.
The Growth of Garment Exports (Rs. in Crores) from 1980–1988
Table 4 Garment Export during 1989-90 to various countries.

<table>
<thead>
<tr>
<th>COUNTRIES</th>
<th>1989</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALUE RS. IN LAKHS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.S.R.</td>
<td>20132</td>
<td>26626</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>74973</td>
<td>85531</td>
</tr>
<tr>
<td>JAPAN</td>
<td>7995</td>
<td>10630</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>3790</td>
<td>44105</td>
</tr>
<tr>
<td>SWISS</td>
<td>6062</td>
<td>9249</td>
</tr>
<tr>
<td>U.A.E.</td>
<td>4478</td>
<td>13914</td>
</tr>
<tr>
<td>W. GERMANY</td>
<td>32575</td>
<td>47650</td>
</tr>
<tr>
<td>FRANCE</td>
<td>13737</td>
<td>20604</td>
</tr>
<tr>
<td>BENELUX</td>
<td>9706</td>
<td>14464</td>
</tr>
<tr>
<td>U.K.</td>
<td>24030</td>
<td>36918</td>
</tr>
<tr>
<td>CANADA</td>
<td>6352</td>
<td>9277</td>
</tr>
<tr>
<td>OTHERS</td>
<td>27561</td>
<td>45552</td>
</tr>
<tr>
<td>TOTAL</td>
<td>231391</td>
<td>324518</td>
</tr>
</tbody>
</table>

2.4 FUTURE OF READYMADE GARMENT INDUSTRY IN INDIA

2.4.1 Facts and figures Relating to the Export potential of Indian Garment Industry.

The country's share account for only 2% of the world total. By 1995 the country could achieve a target of 5%, thereby mapping up an Export earning of Rs. 10,000 crores. The government's aim is to have 25,000 government units as against 15,000 at present. (9).

Future project target as fixed by Apparel Export promotion Council (15) is as follows:
Garment Export During 1989–1990 to Various Countries (Rs. in Lakhs)

<table>
<thead>
<tr>
<th>Countries</th>
<th>1989</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>27561</td>
<td>45552</td>
</tr>
<tr>
<td>Canada</td>
<td>6352</td>
<td>9277</td>
</tr>
<tr>
<td>U.K.</td>
<td>20604</td>
<td>36918</td>
</tr>
<tr>
<td>Benelue</td>
<td>13737</td>
<td>14464</td>
</tr>
<tr>
<td>France</td>
<td>9706</td>
<td>20604</td>
</tr>
<tr>
<td>W. Germany</td>
<td>32575</td>
<td>47650</td>
</tr>
<tr>
<td>U.A.E.</td>
<td>13914</td>
<td>4478</td>
</tr>
<tr>
<td>Swiss</td>
<td>6062</td>
<td>9249</td>
</tr>
<tr>
<td>Australia</td>
<td>3790</td>
<td>4105</td>
</tr>
<tr>
<td>Japan</td>
<td>7995</td>
<td>10630</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>74973</td>
<td>85531</td>
</tr>
<tr>
<td>U.S.S.R.</td>
<td>20132</td>
<td>26626</td>
</tr>
</tbody>
</table>
TABLE 5: FUTURE PROJECT TARGETS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TARGET</th>
<th>RUPEES IN CRORES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 - 91</td>
<td>3900</td>
<td></td>
</tr>
<tr>
<td>1991 - 92</td>
<td>4690</td>
<td></td>
</tr>
<tr>
<td>1992 - 93</td>
<td>5769</td>
<td></td>
</tr>
<tr>
<td>1993 - 94</td>
<td>7097</td>
<td></td>
</tr>
<tr>
<td>1994 - 95</td>
<td>8728</td>
<td></td>
</tr>
</tbody>
</table>

2.4.2 Bright future of Industry:

The Indian readymade garment industry is a sunrise industry and has a bright future changing consumer life styles is seen as the most important factor affecting apparel product design in the future. If the industry responds creatively the cloudy forecast cited above could brighten, as predicted by salmon (14). New development in garment performance care and manufacturing technology will have less impact upon product changes in the immediate future, although respondents thought that changes in manufacturing technology (i.e. moulding, stitchless joining) might near more by 2000.
2.5 FORM SIZE, AND TYPE OF BUSINESS

In the field of garment manufacturing there are various types of ownership of business firms. The forms of ownership are single person ownership, partnership are limited company and cooperative society. Under single person ownership, the owner is the boss of the whole set-up. This is most convenient and effective form of management, if want to have a small unit. The partnership may comprise from two to twenty persons part owners can pool their resources and divide the work of management amongstthemselves. A partnership deed has to be drawn and the firm must be registered.

The limited company is of two types-private and public. A public company can be formed by seven or more persons offering shares to the public. A private company can be formed by 2 to 60 persons here shares are not offered to the public. The cooperative firm of ownership, which gets several facilities from the government, can be formed with the help of the Registrar of cooperative societies of that area (39). Gupta (7) has proposed to make a co-operative zone at Gandhinagar.

There are various methods for selling readymade garments, they are local marketing and abroad. For local retailing, many different types of retail stores sell garments. These are small independently owned and operated stores. Others are part of large operations that have many stores (32).

G.D. Sharma has referred to various methods for export of garments. One of the most widely used method is to
establish contact with an importer in a foreign country for the sale of garments. The goods are dispatched to him and payment is received from him directly. If the export is on a large scale then a foreign agent is needed. The agent procures orders and dispatches the goods directly to the buyer. Sometimes a distributor is appointed in the foreign country. He buys garments on his own account and will make his own arrangements for their sale.

The second method is to sale garments through various types of merchant houses or export houses who basically act as middlemen in an export transaction. They operate in several ways. Some buy garments on their own account and sell on behalf of the manufacturer and get their commission. In both cases they provide very useful service to the small garment manufacturers / exporters who has no competent staff for this specialized work. (29).

Garments can also be exported through some autonomous organisations. These are: State trading co-operations, state export corporation of the state concerned, and Handicrafts and handloom Export corporation. Trade Development authority provides assistance to individual exporters in implementing their export orders (29). The domestic market for readymade garments, however, is limited ranging from 15% to 20%, only of the total production, whereas 80% of the production is estimated to be exported (24).

The garment industry of India can boast of a number of units which are comparable to those in the west, in terms of
size and methods of operation. Numerically, India no doubt has a very high percentage of small decentralised units (21).

There are in all about 15000 units - registered factories and cottage units engaged in the manufacture of various types of ready made garments, according to the estimates made by the clothing manufacturers associations of India (7)
The garment industry in India is mostly composed of small to very small units. Hardly 15% units can be termed as medium units. These small units are run with ordinary sewing machines and untrained or illtrained man power. The result is that their cost of operation is high and they can not produce items for sophisticated buyers. On the other hand, some businessmen do not have their own factory but get the garments made at small tailoring units (29).

Thirty industrial sewing machines for the approximate production capacity of 8000 pieces of skirts, blouses, shirts, trousers etc. per month on one-shift working is considered as viable for setting up a unit in small scale sector. The total investment for different project size with latest sophisticated machineries are estimated as under (24):
TABLE No. 6. Total Investment for different project size.

<table>
<thead>
<tr>
<th></th>
<th>30 machines</th>
<th>60 machines</th>
<th>100 machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D machines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8000 pieces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rs. in lakhs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant and Machinery</td>
<td>6.0</td>
<td>10.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Margin Money</td>
<td>3.0</td>
<td>6.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

2.6 LOCATION

The garment fabricating units in India have found the metropolitan and urban areas more suitable because of the facilities available there. In the initial stage, Bombay was the most favoured location for this industry. But now Delhi has emerged as the leading garment exporting centre in the country, relegating Bombay to the second place. Today this city accounts for some sixty percent of the total export of garments from India. Other important cities and towns involved in this business are Thana, Bangalore, Calcutta, Parganas (district), Poona, Kolhapur, Madras, Madurai, Shahjahanpur, Ahmedabad, Gandhidham. Some states like Gujarat, Rajasthan and Uttar Pradesh have set up garment complexes where many facilities for setting up a unit and helping the manufacturer in export are freely available.
In Gujarat it is estimated that approximately 500 small and medium size units are operating and are concentrated at Ahmedabad, Surat, Vapi, Gandhidham (Kutch) and Nadiad.

The factors to be taken into consideration for the location of a garment trade unit are availability of cheap labour, trained personal and raw materials, facilities of air cargo complex where facilities of custom, Pre-shipment inspection and warehousing under one roof are available and easy contacts with foreign buyers.

In Gujarat, the ready made garment units may be set up near Ahmedabad/Surat from where the cotton and synthetic blended cloth of varied design is easily available in large quantities and the garments so prepared can be marketed easily. The locations like GIDC estate Kerala- Ahmedabad, Kimmangrol taluka of Surat, Chhatral and Kadi of Mehsana district may be considered suitable for the purpose.

2.7 RAW MATERIAL

Verma has emphasized that raw material for a garment unit is the right type and properly finished fabric for the specified products. When selecting the fabric for a garment two major factors have to be considered. They are:

1) Consumers view point namely appearance, feeling, wearing comfort, durability, style, value and cost.

2) The garment manufacturers view point mainly confined to the production rate, working characteristics of the fabrics, cost of production, waste percentage etc.
As estimated by Panthaki (22) the value of production of the industry was estimated to be around Rs. 1400 crores annually in 1985.

The fabric requirements for domestic and export sectors would well be in the region of 3000 million meters of cotton and viscose fabrics very close to the annual production of the mill sector in 1990 (4).

Almost 60% of the cost of production comprises raw material cost, consisting of fabric (around 60%) and trimmings (around 6%). The industry uses both indigenous fabrics and imported fabric. However almost 80% of the total utilisation of fabrics by the industry is indigenous fabrics particularly from the decentralised cotton handloom industry with its typical Indian motifs and design (22).

The prevalent pattern in the Indian garment industry is for independent units to buy fabric either from the mill directly or from the open market and make the apparel for distribution and sale through agents and retailers. Units which make direct purchases of fabrics have a better choice & control over quality, some discount on bulk purchases, more or less regular supplies, opportunities for liaisons on colour and designs, savings or brokerage, less difficulty in getting rebate on excise duty and the advantage of getting the materials at competitive prices. (21).

Production and marketing of garments by the textile mill are generally being done for them through their wholly owned
subsidiaries. Among such mills are Tatas, Raymond Wollens, Shri Ram Mills, Finlays, Gold Mohor, Calico’s, Gaekwar and Homi Mehta group of mills and Mafatlal group of mills. The subsidiary companies are Coromandel Garments Ltd., J.K. Bombay Ltd., Garments Enterprises Ltd., ILAC Ltd., Babson Co. and Mafatlal Apparel Manufacturing Co. The first four are public limited companies and the last two are partnership (21).

B.D. Sharma has reported that mill made cotton fabrics generally used are poplin, crepes, mulls, dorias, madapalam, hammettas, drills, denims, twills, satins, ducks, printed voiles, lawns, embroidered cambrics in floral prints and plain colours. Besides crepe, seer-sucker and madras checks (60:40 warp/weft) a large variety of handloom fabrics are used. The fashion garments which are mainly of handloom fabrics are made out of hand woven and hand embroidered, hand block printed fabrics, cotton and silk both in stripes and check designs. The made-ups which find a ready market abroad, are made of Indian cotton rayons and synthetics also in a fascinating variety of designs and colours (29).

Verma (16) has summarized the characteristics of the fabrics relevant to a garment manufacturers:

a) Style characteristics — thickness of the fabric, elasticity and elongation, draping quality etc.

b) Utility characteristics — air permeability, thermal conductivity, colour fastness, crease resistance, dimensional stability, moisture absorption etc.
c) Durability characteristics — strength of the fabric, resistant of the fabric to abrasion, mild dew and insects etc.

d) Working characteristics frictional properties, seam strength, sewing distortion etc.

Garments also need certain accessories consisting of various kinds of embellishment and trimmings such as threads, buttons, zips, interlinings, colour stags, lifters, stiffness, hook eyes, pearl head pins, label braids, lace, frillings, fancy ribbons, cartoons and polythene bags for packing. Imports of most of these and other material are permitted for a garment to be exported. Exporting units get them against import entitlements.

As observed by Narayanswamy and Sri Rama difficulties connected with the supply of raw material of right quality at right prices and at right times are considered a more important factor contributing to the current under-utilisation of plant and machinery.

2.8 MACHINE AND EQUIPMENT

The requirement of the garment factory, a few years ago, centered around the sewing room and the single needle lock stitch machine. This concept has changed today. We find quality manufacturers talking about the developments of sophisticated cutting rooms, high quality finishing section and a modern sewing section. The important among them are: pattern making machines, industrial cutting machines, sewing machines, collar-cuff
i) Blue streak electric cloth cutting and drilling machine.
(Courtesy Ablack Industry)

ii) Juki Overlock and Flatlock Machine
(Courtesy Ablack Industry)
turning machines, and buttonhole sewing machines. Other machines required are for stable cutting, pocket making, interlocking, embroidery, zig-zag stitching etc.

Cloth measuring and inspection machines manual, semi-automatic and fully automatic fabric laying machines are available in the market. There are two types of cutting machines used in the industry:

1) Vertical blade (reciprocating) cutting machines and
2) Band knife machines. Others are disc cutters, shears, rotary knives, notchers and drills. The notchers and drills are only ancillary equipment.

Straight knife cutters designed to hold a vertical knife blade operates with an up-and-down cutting motion or stroke, its function is straight cuts, intricate curves and sharp corners. It can cut a variety of fabrics, heavy to light weight, according to the blade capacity. These machines are available with a wheel or belt sharpener and are equipped with a gear reduction unit to slow the blade to half speed preventing fusing while cutting plastic or rubber material.

Circular knife rotary cutting is an electric cutter designed to hold a circular blade which operates with a rotary cutting motion. It's function is straight cuts and wide or gradual curves. To cut lays fabric, lay-up is limited to one-half the diameter of the blade. It is available in different blade sizes and gear-ratios to give different cutting speeds for each class of fabrics.
The sewing machines which are available now from the foreign market are equipped with self lubricating system and these machines also have facilities for automatic thread trimming, hemming, back tacking, folding, gathering, binding etc. Sewing machines with computer programme for various functions are also available in developed countries (16).

According to a study by Verma and Ramaswami (16) the speed of sewing machines ranges from 6000 to 10000 stitches per minute and these machines are operated by personnel with good aptitude and skill. It results in maximum utilisation, quality products, reduction in waste level and rejection.

A variety of lock stitch industrial sewing machine are also available, they are single needle, needle feed lock stitch with automatic thread trimmer, single needle lock stitcher for ultra heavy materials with automatic thread trimming and double size hook. Computerized sewing machines, single needle three thread overlocker, two needle four thread overlocker, two needle five thread overlocker machine (25). Features are:

1). High speed up to 5500 stitches per minute.

2). Available in different mechanisms - needle feed, compound feed, unison feed, feed dog, walking presser foot etc.

3). Automatic lubrication - ensures smooth running and reduces wear and tear.

4). Wide range of machines both for light and heavy duty garments (16).
Machines are also available for attaching buttons and making button holes. This neatly developed sewing unit is suitable for sewing button holes in large and medium series production on shirts. With 5 to 8 or even 12 button holes. Owing to the equipment with feeding system puller and stacker the operator can pick up the next part immediately after he has loaded the previous one and started the machine. Feature are:

1). Efficient economic production of high quality lock-stitch button holes.
2). Only roughly 10% bobin change frequency compared with conventional automatic button hole sewing machines.
3). Button hole length and stitch density are infinitely adjustable independently of each other.
4). The easily exchanged needle box heads are adjustable for button hole spacings from 75 to 110 mm and can be engaged either individually or in any combination required:

Max Sewing speed : 4500 s.p.m
Max Buttonhole Length : 35 mm.
Max Buttonhole Width : 4.5 mm.
Max Cut length : 26.6 mm. (Plaff 381B-101/12-2/06) (4).

Electronic button sewing with stay button and button neck wrapping machine is the first automatic button sewing machine in the world designed to sew a stay button which has been attached manually. It enables the sewing of stay buttons on coats in the factory without the necessity of sub contracting the process outside (4).
iii) Kannegiesser three sided top fusing machine
(Courtesy Ablack Industry)

iv) Kashyap top Fusing machine
(Courtesy Ablack Industry)
v) Four Needle sewing machine Kansai special
Manufactured by Morimoto manufacturing
Company Ltd., Japan.
(Courtesy Ablack Industry).

vi) Computerise sewing machine
(Source: Clothes line, March 1991.)
Garment Processing Equipments

WASHING MACHINE  DRYING TUMBLER  HYDRO EXTRACTOR  THREAD SUCKING MACHINE

VACUUM IRONING TABLE  AUTO STEAM GENERATOR  STEAM GENERATOR  FABRIC INSPECTION TABLE

Garment Processing Equipments
(Source: Clothesline May 1991)
(Courtesy Haria Engineering Ltd. Bombay)

Shirt folding
Snaps attaching and Many other products
Collar Turning & Pressing

Quality garment equipments.
(Courtesy Ngai Shing Engineering Manufactory.)
(Source: Apparel December 1990)
Higher quality button sewing can be consistently achieved leading to both higher efficiency and higher quality. Microprocessor control enables to easily change the sewing conditions in accordance with the various types, sizes and specific application of the buttons.

Pocket hemming machines are especially designed for hemming sleeves and pocket. It is primarily in work wear garments. It is equipped with a single needle. Two-thread chain stitch seamer, but it can be supplied with a two-needle two thread chain stitch seamer if required. Depending on the material, the hem widths range from 10 to 20 mm. (plaff 3538). Now available are a wide range of garment finishing machines create a completely new standard in function design and machines like top fusing, mini press machines, shirt folding machines, collar turning machines, iron, garments processing equipments like washing machine, drying tumbler, hydro extractor, thread sucking machine, vacuum table, auto steam generator, steam generator.

Popular brands in cutting, sewing and finishing section certainly dominate the preference of garment manufacturers mainly because of quality consistency and an easy accessibility of spare parts. Cutting machines of EASTMAN, sewing machines of JUKI/BROTHER make and finishing machines of NAOMATO/SUSSMAN etc. clearly dominate the industry and are preferences of Indian garment manufacturers. Brand performances are common all over the world and largely depend on consistent performance accessibility of spare parts and after sales service.
The manufacturing process begins with designs and follows with pattern making, grading, marking, fabric purchasing, cutting and finishing. The company then works with sewing contractors to manufacture the many different garment types required for the stores (17).

Garment manufacturing is done by two routes (19).

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<th>Traditional</th>
<th>Garment Processing (G.P)</th>
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The different manufacturing is done by two routes.

1) Designing
2) Patternning
3) Grading
4) Fabric laying and cutting
5) Sewing
6) Inspection, ironing and packing.

The first step in the production of a garment is the creation of design and preparation of patterns. The object of
designing a garment is to make the wearer as attractive as possible and this is achieved by using different techniques like use of additional accessories etc. and thereby create fashion garments. A pattern is a guide for cutting one or more garments. It includes all the pieces needed to make a garment. Patterns are developed through methods of:

1) Draping a garment on a dummy and make the necessary corrections in dimensions.

2) Drafting a pattern on paper with direct measurements or developing the pattern draft with the aid of a sloper.

A sloper is a pattern that approximates either the anatomical perimeter of the individual or the perimeter of a basic style for the individual and these slopers are often called as foundation patterns.

They include the processes of checking for accurate fit and ready to wear manufacturer or commercial pattern interpretation of design, wearing, establishing seam allowances, marking and identification. Style ease, which is part of the design and wearing ease are included in the development of the pattern pieces. A pattern for a garment style is graded by the company to include the size range within a figure type. Patterns confirm to standard measurement but interpretation of the measurements for sizing in the ready to wear market vary with each manufacturer and differ from commercial pattern standards.
Computer Aided Design system - Design for the clothing Industry in developing countries
(Source: Clothesline November, 1990)
This pattern style features the ultimate compilation of the speediest functions in the latest computer graphics and CAD display formation technologies with a high resolution colour display and functions for the simultaneous display of seven colours, fine embroidery stitches can be distinguished and checked at will. With automatic processing functions, stitches can be displayed by simply tracing the main points on the outline of a diagram. The automatic processing function include line stitch (straight lines, or is curves), statin stitch (full satin, half satin), Tatani atitch (parallel tatamai, unparallel tatamai), E stitch Zig Zag stitch and Bead stitch (27).

Once the pattern is finalised, it has to be graded. Pattern grading is the drafting process of enlarging or reducing a style pattern into patterns for other sizes without changing the style or the patterns grading the original model. This grading can be made by using a grading machine which consists of a plotting board and plotting scales. In recent years computerised methods are adopted for grading (16). The R.P. Trading Co. grading and marking system CGM 48 is a new grading & making system providing apparel manufacturers maximum productivity through efficiency. It produces the tightest and efficient markers. This system provides quick pattern grading & making resulting in lower turn around time between fashions. It handles working with plaids and strips, with adequate designing and production flexibility.
The digitzer translates the geometric pattern into a numeric form that the software can use. This grade pattern edit enables the operator to make changes and the patterns and design entirely new pattern by altering the original pattern. Marker making involves arranging of patterns to create layouts. The markers created on screen are then plotted on paper to be laid on fabric for cutting.

Once the designing, patterning and grading are over these patterns will be sent to the cutting room where the fabric is cut accordingly. The major work involved in a cutting room are the spreading, marker marking, cutting positioning, shading, sloping and bundling.

Spreading is a process of piling the fabric on a table in a manner which permits to cut simultaneously the pile of fabrics into the components. Marker making is a process of making the cutting diagram of component on the top layer of fabric piles as a guideline for cutting. Cutting can be made exactly to the patterns, which is known as pattern chopping. There is another way of cutting also and is known as block chopping in which the shape is cut from the spread fabric and again trimmed to the exact shape before it leaves the cutting table.

Positioning is the process of indicating guide marks on the surface of the components for the precise alignment to follow during the assembling of these components. Ticketing is done to indicate the necessary instructions to match the cut
x) Computer Accurate Cutting system
(Source: Clothesline March, 1990)

xi) Colstar Shirt Fusing Equipment
(Source: Clothesline May, 1991)
components to the shades, sequences etc. Bundling is the process of sorting and stocking (with or without ties) of cut components. During spreading of fabrics, the ply alignment, ply tension (stretch, slack or tight edge), grain alignment (bowing), splicing (waste and precision) damage etc; have to be taken into account.

In the cutting room, the optimum efficiency will depend on factors such as product specification, quantity required per unit time by the sewing department, availability of the cutting machines, production time for each job and availability of skilled labour.

The cutting quality is a prerequisite for quality in the finished product. In addition, cut work quality affects the ease and cost with which construction is accomplished. The quality of work leaving the cutting room is determined by:

1) How true the parts are to the pattern.
2) How smooth or rough the cut surface is.
3) Defects in the piece good
4) Ply shading within the bundle.

Also various factors in cutting that can affect the subsequent quality should be checked, such as under or over cut: size, placement and sequence, alignment of matches and drill holes, pulled yarns etc.
1. Marker lay made according to cutting ticket. Marker lay checked 100%.

2. Marker and material delivered to spreading operation. Material spread.
3. Machine knife cut

4. Die cutting small parts

5. Cut parts delivered to plant

6. Collar department


7. Cuff Department

Hem cuff, run cuff, shape cuff, top stitch, Button hole, Button sew.

8. Under Fronts


9. Upper fronts


10. Sleeves


11. Backs

Pleat, backs.

12. Yokes

Labels. Sew.

13. Attach Yoke backs

14. Assemble completed bundles of parts, any size, section, ply
15. Join collar seam
16. Join collar to shirt
17. Set sleeve, join side and underarm seams (side fell)
18. Cuff attach, hem shirt, trim threads
20. Pack.
The sewing section has always played the role of most important part in a garment factory. A wellbalanced production line has to consist of special purpose machines for achieving the shirt line without edge trimmer needle feed machine and variety of attachments for every single operation has to be incorporated to enable achieve the objectives. The same concept is applicable for any other, be it a Trouser, Jacket, Blouse, Shirt etc. (15).

In the sewing department several type of stitching machines are used to join the cut components to make the garment of a desired style, shape and dimension. In these machines, a series of stitches are used to join two as more cut components and method of joining the components is called a seam. There are four major types of seams that are commonly used in the garment industry and they are superimposed seams (F.S), Lapped seam 1) Ornamental Stitch : O.S
2) Edge finishing Stitch : E.S.
and these classifications are universally adapted in the garment industry.

According to Verma and Ramaswami (16) the stitching quality of a garment is generally assessed with the factors such as stitch size, stitch tension, stitch sequence, elongation and elasticity, resilience, fabric distortion, strength and abrasion. The seam size has three types of dimension H.Z seam depth (thickness and compressibility), seam length and seam width. The basic type of stitches used in the industry are given below: (16).
The finishing section has also undergone a dramatic change in the past few years. The concept of vacuum table and steam ironing system has become extremely popular in India. The initial resistance to charge from the 14 pound iron has today given way to the efficient and high quality achievable by this ironing method. Various other high potential machines such as finisher, blow press etc, are available for special garment finishing.

The package is the salesman of the product it contains. While an excellent package can sell an indifferent product, a bad package
may mar the sale of an excellent product. Nowhere this is more true than in the case of consumer goods like ready made garments. In the sale of garments, packaging has assumed a significant role today. As the first sales are made through the eyes, the appearance of the package and graphic illustration on it is of vital importance. Generally see-through package is used for ready-to-wear garments, so that the buyer may see over-all appearance, finish, design, fabric and colour of the product.

The purpose of packaging is to protect the garment and also to provide an eye-catching appeal. It should take note of physical handling conditions during transit, conditions of warehousing, transportation, etc. (29).

The functions of production control is to produce required quantity of products with good quality at low cost. The production control is composed of a sequence of activities like analysing, forecasting, planning and supervising. There must be a high-level of co-ordination between the personnel involved in all the production sequences (16).
Price of an article is obtained by adding profit to the cost of production. The cost of production of garment includes:

- Cost of fabric, accessories or embellishments (Buttons, zips, thread, interlocking, collar bone, labels, etc.), stitching charges and other expenditure (ironing, packaging, advertisement and overheads like transport or air-freight, interest, rent and depreciation).

By adding all this expenditure you get the price of garment (¥9).

The cost of fabric is about two-thirds of the total cost, i.e. about 66 percent. The average cost of accessories may be taken as 10 percent, though it goes up to 25 percent in the case of high fashion wear. The stitching charges are roughly 14 percent and other expenditure about 10 percent. The margin of profit varies from 20 percent in the case of daily wear to 40 percent in the case of fashion wear (¥9).
Before making garments on a large scale you must find out the countries or markets which offer the best scope for them. For this you need information about local tastes and customs, fashion trends and dress habits, standard of living, trading conditions, competition from domestic producers and other countries. You also need to know if any tax or import duty can be a barrier to your garments, whether their import is freely allowed or there are quota restrictions or whether they enjoy any preference or suffer from any disadvantages.

Indian garments go to a large number of countries including Western Europe, Eastern Europe, USA, Canada, Australia and New Zealand. No serious effort has so far been directed towards South East Asia, West Asia, Africa and Latin America. Japan also offers considerable scope for daily and casual wear.