CHAPTER No-VII

MANUFACTURING PROCESS

AND

ECONOMICS OF CHADDAR MANUFACTURING

SECTION I : MANUFACTURING PROCESS
7.1 YARN PROCESSING
7.2 WEAVING PREPARATORY
7.3 WEAVING
7.4 PACKAGING
7.5 LABOUR FORCE REQUIRED

SECTION - II
7.6 COST ELEMENTS

7.7 UNIT/SIZE WISE COST OF PRODUCTION

7.8 SIZE WISE PROFIT MARGIN
CHAPTER NO-VII
MANUFACTURING PROCESS AND ECONOMICS OF CHADDAR MANUFACTURING

In this chapter an idea about the manufacturing process, elements of cost of Chaddar manufacturing, its cost of sales and profit margin leading to identification of most feasible and viable unit is given:

Section I) Manufacturing Process:

1) Yarn Processing:

Yarn $\rightarrow$ Wet processing

Dyeing without bleaching $\rightarrow$ Dyeing

Hank + Water in tank + Wetting agent $\rightarrow$ Water drained out

Bleaching (10-15 minutes) $\rightarrow$ Dyeing

Direct Dyeing $\rightarrow$ Napthol Dyeing $\rightarrow$ Vat Dyeing $\rightarrow$ Reactive Dyeing

Base $\rightarrow$ Napthol

Washing $\rightarrow$ Soaping $\rightarrow$ Drying
The yarn in the form of cone or hank under goes a number of processes till it is covert into a Chaddar. Following are the various processes which are carried out on the cotton yarn:

2) Weaving preparatory:

Warp preparation

Bleached/Dyed Hank yarn

Bhingeri winding

Sectional warping

Knotting on loom(Beaming)

Drawing in-

Weaving

Weaving preparation

Dyed Hank yarn

Cone winding

Pirn winding

Shuttle on loom

Drawing in of beam ends through healds + reed

Weaving (Chaddar)

Cutting of running length required

Mending

Packing → Labeling

Bailing
7.1 Yarn Processing:

The warp is processed while there is no processing treatment required for weft. It is used in grey form. However, in some cases where the chaddars are for export or against special orders, the weft yarn is also bleached.

Dyeing:

The yarn in the hank form is bleached and dyed by hand process i.e. by dipping the hanks in the respective liquors and rotating it on the bamboo sticks. Ground beam yarn in hank form is soaked and agitated in the wetting agent. This wetting agent usually contains soap and caustic soda. The main aim of wetting is to make the yarn more absorbent to take the dye on yarn. The wetting is done for about one hour and the yarn is taken out and kept on wooden stands for dripping. Afterwards that yarn is bleached and tinopal/Blue is applied.

The high priced chaddar require over night wetting and next day it is bleached. The extra yarn is directly dyed without wetting and bleaching as a dark colour is applied to it. All the power loom factories do not soap the material after dyeing. Factories catering to the export market give kier boil before bleaching. Usually the problem of uneven dyeing, colour brightness, whiteness in bleaching etc. is faced. Testing facilities like analysis of dyes, colour matching, colour fastness is very essential.
**Wet processing sequence:**

Hank + Water in tank + Wetting agent

(12 hours)

Water drained out

Bleaching (10 - 15 minutes)

Antichlor Treatment

Squeezing - Dyeing (Vat or Napthol)

Soaping - drying in sunlight

**The Types of Dyes Used:**

1) Vat  
2) Napthol  
3) Procion  
4) Sulphur

**Colour Mixing:**

The Various colours in different types of dyeing methods used are as follows:

**Vat:**

In the vat dye, colours like Green, Violet, Blue, Bottle green are mixed up so that the colour goes along with the dye during the dyeing process.

**Napthol:**

With the Napthol dye, colour like Red, Blue, Shaukutal (Green), Bottle green, orange and yellow are mixed up.
Sulphur:
Only black colour is mixed up with the sulphur dye.

Procion:
The procion dyes are those kind of dyes which are recently put into and are not extensively used.

7.2 Weaving Preparatory:
A) Warp Preparation:

The yarn is received from the mill in the form of either single or double yarn. If the yarn is received as double yarn, the first two stages of doubling and reeling are eliminated.

A1) Bhingari Winding:

The yarn in the form of Bleached/Dyed hank form is converted into the Bhingari suitable for sectional warping.

The yarn is taken from hanks and through the guides wound on Bhingari winding. It is just a physical transformation of hank yarn into Bhingari yarn.

Sectional warping: Transformation of single ends from Bhingari into a sheet form on sectional warping machine.

A2) Weaver’s beam is prepared on sectional warping - cum-beaming machine from parallel wound double flanged warper’s bobbin in the creel. In usual machines it has a capacity to hold about 400 bobbins. These machines do not have brake motion & full length stop motion. It warps at about 75 yards per minute and the production of the machine varies from 2000-3000 yards per shift depending on the need. The ground beam extra
beam are of about 1200 yards length. One warper along with a creel boy manages one machine. The side view of the machine is as given in fig. 2 at the end of this chapter.

B) Weft Preparation:

Mostly 36 spindle circular vertical spindle pirn winder is used to prepare the pirns. The pirns are rotated by surface contact of the revolving wheel. When the pirn is full, it automatically comes out of contact of the wheel. The supply package has to be cone only. Therefore, if bleached weft is required, it is first converted into cone from bleached hank on drum winding machine and then used to make pirn on the machine. The drum winding used is very crude and does not have any stop motion. The side view of vertical pirn winding machine along with yarn path is shown in fig. 3 at the end of this chapter.

The J/Q chuddars contain large no of colours. In J/Q chuddars the ground beam yarn is either bleached or dyed. The repeat size of the motif varies from 5" to 15" in length. Some percentage of chuddars are produced in full figures. The J/Q chuddars are classified on the basis of colour as well as weight as follows.

<table>
<thead>
<tr>
<th>Type</th>
<th>Weight (gms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janta</td>
<td>700 to 900 gms</td>
</tr>
<tr>
<td>Deluxe</td>
<td>1000 to 1100 gms</td>
</tr>
<tr>
<td>Mayurpankh</td>
<td>1100 to 1400 gms</td>
</tr>
</tbody>
</table>

Most of the factories use 2/20s hank yarn for ground as well as extra warp. 10s OE yarn does not find much favour because a chaddar made from it has harsh feeling. It faces difficulty in processing and therefore
realises less selling price compared to the chaddar from 2/20s ring yarn. However the cost of production of a chaddar made from OE yarn is less.

The details of construction of chaddar are as follows:

- **Count of ground warp**: 20/2
- **Count of extra warp**: 14/2
- **Count of weft**: 4/1, 6/1, 10/1, 14/1
- **Reed**: It varies from 4/22s to 4/30s, 4/26s is most commonly used.
- **Picks/weight**: 24 to 36 are common.
- **Size**: Various sizes of chaddar are being produced depending on the end use. The most common sizes used are 54-90 and 60-90.

**Weaving Preparatory cond.**:

a) 1) **Winding**: In this process yarn from hanks are wound on bobbins and then wound bobbins are loaded on crrel.

2) **Warping**: Cotton yarn wound on beem.

7.3 **Drawing** - in-of beam ends through healds and reed.

- **Weaving chaddar**: It is at this stage the weaving of chaddar takes place.
- **Cutting of running length**: Here the chaddar is cut in to required length.
- **Mending**: i.e. trimming to extra floating yarns.
- **Labeling**: i.e. packing as per standard and lastly bailing

7.4 **Labour force Required**:

Any chaddar manufacturing unit is a complex set-up where different people work together, some under one roof and some at servicing industry. No. of workers required for processing of yarn: (for a unit of 12 looms).
(a) *Skilled* -

2 dyers for weighing the dyes, chemicals and fixing the recrepe and controlling the process and flow of the yarn from wetting to drying.

These workers are required for processing of grey yarn and converting the same into dyed reels and drying.

Workers for conversion of dyed reels into chaddars: (for 12 looms)

(a) *Skilled* :-

(1) Jobber for doubling and warping and reeling

Doubling m/c siders -7
Reeling operators - 1
Reels to bhangri winders - 4
Warpers - 1
Weavers - 12
Jobber for looms - 1
Mending and checking workers - 2

(b) *Unskilled* :-

(1) Begaris required for transportation of cones, hank, warper bobbins, weaver beams,
Cloth rollers etc. - 2

(2) Oilers cum cleaners - 1

(3) Pirn winders - 4

Administration: Supervisor/Manager - 1 Clerk/Accountant - 1
The service industry includes the skilled people who work for the preparation of the design papers (designers), card cutting, card lacing (lacers), harness dressing and building, drawers and for knotting of beams (knotters). Such skilled persons work on contract basis.

**Wage Structure:**

1. **Piece work basis**
   - Bleaching & Dyeing: Rs. 150 to Rs. 250/100 Kg
   - Warping: Rs 100 beam of 900 yards
   - Weaving: Rs. 3 to Rs. 6.50 per chaddar
   - Bhinagari Winding: Rs. 3 to 4 for 5 Kg.

2. **Monthly basis**
   - Jobber: Rs. 1500 to 2000
   - Fitter: Rs. 1500
   - Lacing boy: Rs. 800
   - Pirm Winders: Rs. 450
   - Packing boy: Rs. 500
   - Watchman: Rs. 800

*(Source: Personnel interviews of the powerloom owners)*
SECTION II
ECONOMICS OF CHADDAR MANUFACTURING

An attempt has been made in this section.

1. To find out the major production carried out in the powerloom industry in Solapur.

2. To know the cost of production of chaddar manufactured in different sizes of units.

3. To find out ideal size (feasible and viable) (with number of looms to be owned) of the unit on the basis of cost of production and profit margin.

Chaddar Industry in Solapur has its unique feature called Jacquard chaddar. Its technique is old, technology is traditional but its market potential has been ever increasing. Chaddar is a major product manufactured by the powerloom industry in Solapur. Following table makes this point Clear:

Table No. 7.1

Number of looms engaged by variety of product (in 1991)

<table>
<thead>
<tr>
<th>Variety</th>
<th>No. of looms engaged</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaddar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jananta</td>
<td>225</td>
<td>14.99</td>
</tr>
<tr>
<td>Deluxe</td>
<td>443</td>
<td>29.04</td>
</tr>
<tr>
<td>Mayurpankh</td>
<td>527</td>
<td>34.55</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>78.52</td>
</tr>
<tr>
<td>Towels &amp; Others</td>
<td>330</td>
<td>21.63</td>
</tr>
<tr>
<td>Total</td>
<td>1525</td>
<td>100.00</td>
</tr>
</tbody>
</table>
It is quite evident from the above table that 78.22% (out of the total looms owned by 84 manufacturers surveyed) of the powerlooms in Solapur are engaged in the manufacturing of world famous Jacquard Chaddar. As stated in Chapter 3 the Chaddar industry plays vital role in providing direct and indirect employment to large numbers of people in Solapur. However no agency or organisation or expert in the field in Solapur can give exact number of looms one should own to make it feasible or viable. Moreover no one was much bothered about scientific management of this industry.

Through this research it was found that majority of the chaddar manufacturers belong to sali community who have created their monopoly in powerloom, and handloom industry of Solapur. Most of them were found to be illiterate, thus not keeping any record of cost of production and profitability of their firm. There are certain other reasons which prevents
them from keeping proper record of their actual cost of production as given below:

1. This industry belongs to decentralised and unorganised sector of powerlooms.
2. Existence of large no. of unregistered looms
3. To evade incometax and excise duty
4. No knowledge of accounting or administration
5. Illiteracy
6. Govt. policy regarding sales tax and excise duty.
7. No access to the information

It was therefore a very difficult task to calculate the cost of production and the profit earned by these units. No manufacturer was ready to give the factual information about the costing as they were scared to be caught by the Govt. officials. It is only after they were convinced that, this information will be used for academic purpose, they provided the necessary information.

As stated in Chapter No. 4 a sample population of ‘84’ manufacturers had total number of 1525 powerlooms. For the sake of analysis these respondents have been classified as small, medium and large units as follows:
1. After having discussed and consulted the experts in the field and the manufacturers a structured schedule was prepared for survey. (appendix no. 1) and through the technique of personal interview the required data was collected:

I) The survey was conducted between July and Dec. 91. The market price of different counts of yarn and chaddars, collected from Daily Sakal for that period is given below:

Table No. 7.3

<table>
<thead>
<tr>
<th>Variety of Chaddar</th>
<th>Weight</th>
<th>Market price of chaddar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayurpankh</td>
<td>1350 gm</td>
<td>Rs. 75.00</td>
</tr>
<tr>
<td>Deluxe</td>
<td>1000 gm</td>
<td>Rs. 60.00</td>
</tr>
<tr>
<td>Janata</td>
<td>800 gm</td>
<td>Rs. 45.00</td>
</tr>
</tbody>
</table>

Average yarn price of Rs. 165 per 5 Kg i.e. Rs. 33 per Kg. (average price of different counts Viz. 20/2, 14/2, 4/1, 14/1, 10/2, 6/1 etc. manufactured by different companies).
There are numerous varieties in the chaddars manufactured in Solapur. However, for this study the researcher has selected the following three main varieties which are manufactured by almost all the manufacturers in Solapur.

1. Janata - 800 gm
2. Deluxe - 1000 gm
3. Mayurpankh - 1350 gm

Table No. 7.4
The Varietywise Classification Of The Selected '84' Manufacturers Is Stated As Follows:

<table>
<thead>
<tr>
<th>Size Of Unit</th>
<th>No. of owners</th>
<th>No. of owners/ Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janata</td>
<td>Deluxe</td>
<td>Mayurpankh</td>
</tr>
<tr>
<td>Small</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Medium</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Large</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>36</td>
</tr>
</tbody>
</table>

It may be seen from the above table that 16 out of '84' respondents manufacture Janata. '36' owners manufacture Deluxe and '32' manufacture Mayurpankh variety of chaddar. No large size of units manufacture Janata Variety. Of the '37' small manufacturers, '17' manufacture Deluxe as their major production. As regards medium size manufacturers it is Deluxe and Mayurpankh (15 each) as their major production and as far as large manufacturers are concerned Mayurpankh is their major production.
The yarn content of a chaddar is very important and it differs from variety to variety. By and large the popular variety selected for this case study has the following yarn content defined as warp and weft.

**Table No. 7.5**

**Variety Wise Warp & Weft Content Of The Chaddar**

<table>
<thead>
<tr>
<th>Type of chaddar</th>
<th>Size of unit</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small weft/warp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Janata 800 gms</td>
<td>400/400</td>
<td>400/400</td>
<td>do not manufacture</td>
</tr>
<tr>
<td>Deluxe 1000 gms</td>
<td>500/500</td>
<td>500/500</td>
<td>500/500</td>
</tr>
<tr>
<td>Mayurpankh1350gms</td>
<td>682/668</td>
<td>690/660</td>
<td>675/675</td>
</tr>
</tbody>
</table>
7.6.1 Cost elements

The manufacturing process of Jacquard chaddar, consists of many technical, nontechnical, manual and even seasonal processes. This has already been separately discussed in the first section of this chapter. For studying the economics of chaddar manufacturing the researcher has indentificed the following cost components.

1. Yarn
2. Chemicals
3. Direct and indirect labour
4. Back processing
5. Winding and warping
6. Weaving changes
7. Other labour
8. Design & punching
9. Electricity
10. Administration
11. Folding & packing
12. Selling and distribution etc.

7.6.3 Unit wise cost of production

Following Table no. 7.6 throws light on the costing of figures of various varieties by size of the unit. Variety of the product (Janata, Deluxe, Mayurpankh) and size of the unit (small, medium, large) constitute the main ascepts of costing of Jacquard chaddar manufacturing activity.
Table No. 7.6

Components of average cost by size of the unit:

<table>
<thead>
<tr>
<th>Component (1350)</th>
<th>Variety-Janata (800gms)</th>
<th>Variety - Deluxe (1000gms)</th>
<th>Variety Mayurpankh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
<td>Medium</td>
<td>Large</td>
</tr>
<tr>
<td></td>
<td>1-12</td>
<td>16-28</td>
<td>32 onwards</td>
</tr>
<tr>
<td>Yarn Qty per Kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weft</td>
<td>400</td>
<td>400</td>
<td>-</td>
</tr>
<tr>
<td>Warp</td>
<td>400</td>
<td>400</td>
<td>-</td>
</tr>
<tr>
<td>Material:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yarn Qty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyeing Charges</td>
<td>27.40</td>
<td>27.00</td>
<td>-</td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Processing</td>
<td>2.18</td>
<td>2.37</td>
<td>-</td>
</tr>
<tr>
<td>Winding &amp; Wrapping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weaving Charges</td>
<td>3.00</td>
<td>3.00</td>
<td>-</td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Labour charges</td>
<td>1.08</td>
<td>1.15</td>
<td>-</td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design &amp; Punching</td>
<td>0.40</td>
<td>0.40</td>
<td>-</td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>1.51</td>
<td>0.75</td>
<td>-</td>
</tr>
<tr>
<td>Rs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACTORY COST Add</td>
<td>38.77</td>
<td>37.64</td>
<td>-</td>
</tr>
<tr>
<td>Administration Expenses</td>
<td>1.10</td>
<td>0.26</td>
<td>-</td>
</tr>
<tr>
<td>Cost Of Production Add</td>
<td>39.87</td>
<td>37.90</td>
<td>-</td>
</tr>
<tr>
<td>Add selling &amp; distribution expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Folding &amp; packing</td>
<td>1.60</td>
<td>1.40</td>
<td>-</td>
</tr>
<tr>
<td>2) Selling &amp; Distribution</td>
<td>1.00</td>
<td>1.00</td>
<td>-</td>
</tr>
<tr>
<td>COST OF SALES</td>
<td>42.47</td>
<td>40.30</td>
<td>-</td>
</tr>
</tbody>
</table>

All the above figures are the averages of '84' respondents manufacturing different varieties of chaddars.
The above table reveals that the Janata variety of Jacquard chaddar is mainly manufactured by small and medium size of manufacturers whereas large manufacturers were found to be mainly concentrating on Deluxe and Mayurpankh varieties.

The value of cost components is expressed here in terms of Rs. per piece of Chaddar with weight 800 gms, 1000 gms and 1350 gms of Janata Deluxe and Mayurpankh respectively.

It may be seen from the above table that smaller the size of the unit greater is the cost incurred on yarn. It may be due to their uneconomical scale of operation or unsound financial position, inadequate working capital preventing them from buying the yarn in bulk while its prices are low or directly from the mill.

As regards the dyeing cost, it is observed that the small unit holders have to pay comparatively higher charges for dyeing. It is due to wastage and uneconomical operation which in turn results into high marginal cost of Chaddar manufactured by the small unit holders.

The Mayurpankh variety of Jacquard Chaddar seems to be unique product manufactured by large units. The dyeing cost of Mayurpankh variety in case of large units is higher. However the product is also superfine. It implies that the large unit holder produce finest variety of Mayurpankh.

The average weaving charges paid by different sizes of manufacturers are more or less similar, however the weaving charges are different for different varieties. For e.g. for Janata it is Rs. 3.00 Deluxe Rs. 4.00 and Mayurpankh Rs. 5.00 per piece.
It is further observed that the administration charges vary from unit to unit depending upon the size of units, which again depends upon infrastructural facilities and manpower available etc.

Profit margin is calculated for the survey period July to December on the basis of market prices and cost of production as found by the study in Table No. 7.3

Table No. 7.7
Cost of sales and profit margin by size of unit

<table>
<thead>
<tr>
<th>Variety of the product</th>
<th>Mkt(1) size 60-90 price per piece</th>
<th>Average Cost(2)</th>
<th>Profit(1-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Small Medium Large</td>
<td>Small Medium Large</td>
</tr>
<tr>
<td>Janata 800gms</td>
<td>45</td>
<td>42.47 40.30 Nil</td>
<td>2.53 4.70 --</td>
</tr>
<tr>
<td>Deluxe 1000gms</td>
<td>60</td>
<td>54.12 51.52 53.52</td>
<td>5.88 8.48 6.48</td>
</tr>
<tr>
<td>Mayurpankh</td>
<td>75</td>
<td>71.37 69.35 70.86</td>
<td>3.63 5.65 4.14</td>
</tr>
<tr>
<td>1350 gms</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following inferences can be drawn from the above Table

1. The cost of production of all the three varieties manufactured in medium size of the unit (i.e. 16 to 28 looms) is lower than large and small units thus leading to high profit margin.

2. Janata variety is manufactured by medium and small sizes of units only. No large units manufacture Janata variety. The cost of production of Janata in medium size is Rs. 40.30 thus earning Rs. 4.70 as profit per piece, whereas the same in small units is 42.47 and 2.53 respectively.

As regards Deluxe variety, the cost of production of the medium size is Rs. 51.52 and profit margin is of Rs. 8.48, whereas the same in large units is 53.52 and 6.48 and small units 54.12 and 5.88 respectively.
In case of Mayurpankh as well it could be seen that like Janata, and Deluxe variety the cost of production in medium size units i.e. 69.35 and profit margin is of Rs. 5.65 which is more than that of large and small units.

On the basis of the above said findings it can be stated that the medium size unit is most feasible, viable and therefore optimum/ideal size (16 to 28 looms) contributing maximum profit with low cost of production.

The reasons of the same are as follows:
1. Low material cost
2. Low administrative cost
3. Less number of idle looms
4. Flexibility in the production etc.

To conclude it can be said that 16 to 28 looms (i.e. 4 to 7 units) would be ideal number for effective and efficient management leading to higher profits with low cost of production.
Fig. 2: Sectional Warping Machine
Fig. 3: Vertical Spindle Circular Pirn Winder