

## Analysis of Cost Effectiveness of Lac Processing in Purulia District

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### Abstract

*In this paper various aspects of lac manufacturing is discussed in a length keeping in view to judge its profitability. We have also tried to get a comparative analysis of hand-made manufactures and machine-made manufactures. When seedlac is prepared from sticklac, further processing is carried out which converts it into shellac (machine-made process) or button lac (hand-made process). In the case of handmade shellac, heat process is applied and the solvent process where pure shellac is extracted from seedlac by suitable solvents is applied in the case of machine-made process. These processes require 9 -10 days to manufacture of different types of shellac containing varying percentage of shellac wax. We have prepared cost and profit of producing buttonlac/machine made shellac from 1kg. of sticklac for the year 2012-13. In the study period price of sticklac is Rs360/kg on Chowri-Parta basis. Seedlac obtained from per kg of sticklac 700-750gm, whereas buttonlac obtained from per kg of sticklac is 650gm to 700gm. Net profit is Rs120-130 from processing of one-kg of sticklac. Ultimate we come to the conclusion that profit earned by buttonlac is greater than machine made shellac in all measures such as absolute profit, profit/capital, and profit/sale.*

**Key-words:** Lac Manufacturing; Hand-made and Machine-made; Shellac and Buttonlac; Cost and Profit of Manufacturing; Profit/Capital and Profit/Sale

### 1. Introduction

Lac industry is the oldest and most visible industrial sector in Purulia district and occupies a place of importance in its economy since time immemorial. Lac industry includes within its fold lac agriculture (producing sticklac), lac processing (manufacturing shellac and seedlac from sticklac) and lac trade (both internal trade and foreign trade). In this paper we are going to analyse various aspects of the second one, i.e. lac processing from different angles. The principal objective of the paper is to judge whether lac processing is a profit earning activity or not. For this purpose we have to know the cost of raw material for lac processing and side-by-side revenue earned in different phases of processing. Ultimately we show that lac

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processing is very much cost effective by including the bye-products in the processing procedures. In the present study we are concerned with the lac industry of Purulia district with special emphasis on Balarampur center.

This paper is divided into following sections. Section 2 gives a brief review of literature. Section 3 examines the processing procedure which is followed by different categories of manufacturer in this district. Section 4 depicts a vivid picture of cost of raw materials and cost of processing of sticklac.

## 2. Review of Literature

**S.C Sengupta (1972)** in his article “Twenty Five years of Research in Lac”, published in *Indian Farming* Vol. 22 No. 7 summarises the studies on various aspects of lac industry viz. cultivation, processing, production, selling and market operations and utilizations. **K.N. Kabra (1983)** in his book “Dependence and Dominance” focuses attention on historical perspective of lac economy, socio-economic profile of lac growers, lac production, (trends & problems) and lac trade and industry. **Saha S.K. (1976)** in his article “Lac Industry in India” published in *Indian Farming* Vol. 26 No. 6 made an attempt to discuss about shellac industry in different centres, Mirzapur, Jhalda, Balarampur, Tulin, Ranchi, Palamau, Pakur, Madhyapradesh and Umaria.

Report on Problems and Difficulties of Manufactures & Consumers of Lac in India, Published by I.L.R.I (Ranchi), 1985, analyses different aspects related to lac industry. **Agarwal S.C, Jaiswal A.K & Krishna Sharma K (1998)** in their article, “Problems and Prospects of Lac Culture in India” in *Journal of Non Timber Forest Products*. Vol.5 No. (1&2) have made an attempt to highlight the various problems and prospects of lac culture and suggest the ways and means to overcome the problems. The thesis “Economics of Lac Industry in India” by **Ratna Mukherjee (2002)** has attempted a detailed analysis of important economic variables related with lac industry with the help of empirical data. In the course of study and analysis, certain glaring problems are visualised.

This study was actually made in order to get up-to-date cost and revenue figures of producing one kg. of shellac. We then come to conclusion regarding whether lac-manufacturing activity is profit earning or not. We have also tried to get a comparative analysis of hand-made manufactures and machine-made manufactures.

## 3. Processing of Lac

The lac encrustation which is collected as a result of lac cultivation is known as sticklac. Processing of sticklac means sticklac is converted to commercial grades of seedlac and shellac. The best lac is said to be obtained from twigs of the *kusum* tree. Apart from lac resin, sticklac also contains 6-7% of lac wax, 3-5% of water moisture, colouring matter (lac dye), and impurities like insect debris, wood pieces, sand etc.

**i) Sticklac into Seedlac:** The process of making seedlac, the semi processed material, from sticklac involves five major unit operations viz. crushing, washing, drying, winnowing and grading. Sticklac is at first crushed and then sieved to remove sand and dust. Crushed lac is then sieved again to clean it of wood particles and dirt. In small factories, sieving is carried out manually but in big or medium sized factories, it is carried out with the help of power operated vibrating screens. After crushing and sieving, the first phase of refining is done by washing with water whereby water soluble colouring matter, vegetable glue and loose foreign

substance as well as most of the dead insects are separated from the resin. Washing can be done manually or mechanically. In manual labouring process, lac is washed in a large vat repeatedly and at the same time rubbing the lac against the rough wall of the vat to break open the insect bodies and dissolving the colouring matter in water. The lac thus cleaned is spread on large, clean, open air floor to dry. After drying; it is winnowed and sieved to get the commercial variety of seedlac.

**ii) Manufacture of Hand-Made Shellac:** When seedlac is prepared from sticklac, it contains 3-7% of foreign matter in the resin. To remove these impurities, further processing is carried out which converts it into shellac or *button lac*. There are two methods for manufacturing of shellac: one is hand-made and the other is machine-made. Hand-made process requires considerable manual skill and long experience.

In hand made process, the furnaces used for the melting operations is called the *bhatta* (Charcoal oven). General capacity per *bhatta* per day of 8hrs is 40 kg. The staff pattern is the same at every *bhatta* viz a *Karigar*, a *Pheriwaya* and a *Bhilwaya*. Refining every ton of sticklac involves on an average 92.1 man-days which indicate the need to modernize/improve the efficiency of processing units. Another variety of handmade shellac is *buttonlac*, which is manufactured by the molten lac on to a piece of galvanized iron sheet to form circular discs or buttons 2-3 inches in diameter and 1/4<sup>th</sup> inches thick.

Seedlac after proper blending is filled into a long narrow cloth bag. One end of the bag is held in front of a wood charcoal fire burning in a *bhatta*, and the other end attached to a windlass, is gradually turned. Seedlac is then melted by the heat of the oven and is forced out through the cloth, pressed by the windlass and at the same time, the impurities are left inside the bag. The molten lac scraped out by one workman. Then he mixes it thoroughly to ensure uniformity, and transfers it to a block of molten lac on the surface of a smooth porcelain cylinder, filled with hot water. Another workman, with the help of a strip of palm leaf spreads the molten mass on the cylinder and pulled off as a sheet of about 1/8<sup>th</sup> inch thickness. The man who spreads the molten lac on the porcelain cylinder, and stretches it into thin sheets is called *Bhilwaya*. Standing in front of the fire, another workman manipulates the sheet as heat is given to the sheet uniformly and then he stretches it with his hand and knees. Finally taking a grip with his hands, legs and mouths he pulls it in all directions to produce very thick sheet of about 5'x4' and varying thickness from 1/16<sup>th</sup> at edges to about 1/10<sup>th</sup> in the center. The sheet is removed from the heat, which quickly cools and hardens. The thicker edges are broken off and remelted while the rest is crushed into small pieces and sold in the market as hand-made shellac.

The infusible material left within the cloth bag during shellac manufacture is collected and formed into circular discs of about 2.5 cm thick and 15-20 cm in diameter. This is known as *kiri*. Garnet lac is prepared from this material, which is dark coloured but pure. This kind of lac is used in such lac consuming industries where colour of the resin is immaterial. A part of residue left inside the cloth bag is extracted by boiling with *saji* and made into cakes called *pashewa* which sell at somewhat less than half the rates obtainable for shellac.

Waste water containing fine lac-dusts, after crushed *stick lac* is washed in the factories, flows through artificial reservoir or pool is created by barriers of stone boulders and small earthen barrages to preserve the coloured waste water of lac. Waste coloured water of the reservoir being filtered through fine linen- the filtrate dust of lac is known as *kuni*. *Kuni* and *pashewa* are used as raw material mainly in the local manufacturers of lac ornaments, bangles, toys, common sealing wax and also by cabinet makers for covering up cracks in wood.

### iii) *Manufacture of Machine Made Shellac:*

Machine-made shellac is produced in two different ways- one is heat process where the same principle as in the case of handmade shellac is applied and the second is solvent process where pure shellac is extracted from seedlac by suitable solvents.

In the heat process the separation of pure lac is achieved by melting seedlac by steam heat and squeezing the soft molten lac through filter by means of hydraulic process. The molten lac is then stretched by means of rollers into long and continuous sheets which are broken into pieces to form the machine made shellac under heat process. In the solvent process the separation of insoluble impurities is achieved by dissolving the lac in a suitable solvent, usually industrial alcohol. The solution is then filtered through fine cloth and the alcohol is recovered by boiling the solution. The molten shellac is then stretched to the required thickness on a roller followed by stretching machines. The process lends itself to manufacture of different types of shellac containing varying percentage of shellac wax.

[For Process Flow Chart for Seed Lac / Handmade Shellac / Button Lac see Annexure]

## 4. Cost of raw materials and processing

At the very outset of the discussion on the cost of production it should be pointed out that the accurate cost of production is not very easy to work out. The principal impediment, that deters one, is the fact that majority of the manufacturers do not keep account of cost of production month by month. In this analysis we first find out total cost of production and then subtract value of bye-product, which is obtained at the time of processing. The study covers the year 2012-13.

- **Cost of Transport:** The raw material required for the production, sticklac, is available in local *arhat*. The manufacturing unit has to spend some amount for carrying sticklac from *arhat* to his factory, as cost of transport for the raw materials.
- **Rent for Workshop:** The manufacturer works generally in his own factory. But, they have some recurring expenses, such as tax imposed by panchayet and cost of annual repair. Here again the manufacturers cannot give actual amount of these recurring expenses.
- **Wages:** The manufacturers employ different types of labour on the basis of daily payment. The wages of a group of Bhatta labours (consist of three labour) Rs 500/- and wages of *munish* (male worker) is Rs 160/- and Rs 150/- for female labour or *Kamin*. The wages of other types of labours are fixed at this rate.
- **Payment for Processing:** For Bhatta processing charcoal, filter cloth, chemicals are used. Again in press machine operation coal, electricity, fuel, oxalic acid, filter cloth are required.
- **Interest on Loans:** Arhatiyas give loan in terms of sticklac and internal buyer of shellac gives them advance on the basis of forward buying. If the manufacturer fails to obey contract then the advance payment is treated as loan. On the other hand the artisans pay interest to private persons at a rate, varying from 36per cent to 48per cent per annum. The rate of interest raises the cost of production and the price of shellac rises consequently.
- **Depreciation Charges:** It is the general practice to calculate depreciation-charge of a particular unit at a rate varying from 10per cent to 30 per cent per annum.

The price after processing of seedlac is determined by following the rules

Price per kg. of sticklac+ Washing charges . Washing charge is Rs 2.50 per kg. of sticklac

Yield of seedlac

We have prepared cost and profit of producing Buttonlac/ Hand made shellac from 1kg. of sticklac.

**Table- 1: Cost and Profit of Producing Buttonlac/ Hand made Shellac from 1kg. of Sticklac.**

|   | Material yield from 1 Kg of Sticklac(Kg.) | Cost per Kg. Of Sticklac Processing (Rs.) | Price of Product /Kg (Rs.) |
|---|---|---|----------------------------|
| <b>Sticklac</b>   |   |   |                            |
| Chouri Parta Price = Rs. 360/kg   |   |   |                            |
| Chouri Golden Content = 27.25 Kg.   |   |   |                            |
| <b>Price of per kg Sticklac (= Rs. 27.25/40*360)</b>                        |   | <b>245.25</b>                             |                            |
| <b>Transport</b>  |   |   |                            |
| Transport Cost is Rs. 8 to 10 per bag of 60 kg. according to the distance.  |   |   |                            |
| Rs. 9 per 60 kg. bag is taken into consideration.                           |   |   |                            |
| Transport Cost of per Kg. Stick Lac = Rs. 5/60                              |   | <b>0.15</b>                               |                            |
| <b>Price of per kg Sticklac after transportation</b>                        |   |   | <b>245.40</b>              |
| <b>Sticklac to Seedlac</b>  |   |   |                            |
| Capacity of washer = 8 Maund (320 Kg.)                                      |   |   |                            |
| Motor of 10 H.P.  |   |   |                            |
| In normal practice, 6 bhora (bag), i.e., 60 X 6 = 360 kg. is fed at a time. |   |   |                            |
| In a day of 8 hrs. washer can be run twice.                                 |   |   |                            |
| Cost for washing 360*2 = 720 kg. of sticklac are as follows:                |   |   |                            |
| <b>Sieving, Crushing, Washing</b>   |   |   |                            |
| Labour 4 no. @ Rs. 80 =   | 320                                       |   |                            |
| Electricity charges =   | 250                                       |   |                            |
| Caustic Soda 1.5 Kg @ Rs. 42/Kg =   | 63  |   |                            |
| Basket (L.S.)   | 30  |   |                            |
| <b>Drying</b>   |   |   |                            |
| Labour 2 no. @ Rs. 80 =   | 160                                       |   |                            |
| <b>Sieving, Unwonning</b>   |   |   |                            |
| Labour 12 no. @ Rs. 80 =  | 960                                       |   |                            |
| <b>Total =</b>  | <b>1783</b>                               |   |                            |
| Processing Cost per Kg(Total /720). =                                       |   | <b>2.50</b>                               |                            |
| <b>By-product received</b> from processing of per Kg of Sticklac            |   |   |                            |
| <b>1. Chankpati</b> - 0.0167 kg (reintroduced in the process )              | <b>0.0167</b>                             |   |                            |
| <b>2. Mollamma Lac</b> - 0.033 Kg. (sold to market @ Rs. 150/Kg.)           | <b>0.033</b>                              |   |                            |
| <b>Seedlac obtained</b> from per Kg. Sticklac =                             | <b>0.732013</b>                           |   |                            |
| 27.25/40*1.05+0.0167(Chankpati)= <b>0.732013 Kg.</b>                        |   |   |                            |

**Cost per Kg of Seedlac** = Rs. **247.9** **338.66**  
 (245.25+.15+2.5)/0.732

**Seedlac to Buttonlac**

**Material yield from 1 Kg of Sticklac(Kg.)** **Cost per Kg. Of Sticklac Processing (Rs.)** **Price of Product /Kg (Rs.)**

Capacity of a Bhatta is 40 kg/day/8hrs.

Cost of processing 40 Kg. Sticklac are as follows :

|                                    |     |
|------------------------------------|-----|
| Bhatta Labour @ Rs. 7.75 per Kg. = | 310 |
| Charcoal 28 Kg. @ Rs. 12 per Kg.=  | 336 |
| Cloth =                            | 172 |
| Cloth stitching=                   | 12  |
| Oxalic acid=                       | 40  |
| Tin Plate=                         | 40  |
| Total =                            | 910 |

Processing Cost per Kg. = **22.75**

**By-product** received from processing of per Kg of Seedlac

**3. Kirilac** - 0.0125 Kg.( **Sold to market @ Rs. 160 per Kg.**) **0.009**

**Waste processing**

By-product received from further processing cloth bag as per Kg of Seedlac processed

Cloth bags of 10 bhatta (40 X 10= 400 Kg) processed at a time and the cost of that process are as follows :

**Waste Process 1**

|                                   |     |
|-----------------------------------|-----|
| Labour 3 no. @ Rs. 80 =           | 240 |
| Caustic Soda 2.5 Kg @ Rs. 30/Kg = | 75  |
| Fuel(L.S.) =                      | 150 |
| Total =                           | 465 |

Processing Cost per Kg. = **1.16**

**By-product** received from per Kg of Seedlac processed:

**4. Dnari Passewa** - 0.0125 per kg (reintroduced in the process ) **0.009**

**Waste Process 2**

|                           |    |
|---------------------------|----|
| Labour 0.5 no. @ Rs. 80 = | 40 |
| Sulphuric Acid=           | 15 |
| Drum (L.S.)=              | 5  |
| Total =                   | 60 |

Processing Cost per Kg (Rs.60/400). = **0.15**

**By-product** received from per Kg of Seedlac processed:

**Rang Passewa**-0.05 per kg. (@ Rs. 70 per kg) **0.04**

|  | <b>Material yield<br/>from 1 Kg of<br/>Sticklac(Kg.)</b> | <b>Cost per<br/>Kg. Of<br/>Sticklac<br/>Processing<br/>(Rs.)</b> | <b>Price of<br/>Product<br/>/Kg (Rs.)</b> |
|--|--|--|---|
| Buttonlac obtained from per Kg.<br>sticklac= $37/40 \times 0.732013 + 0.009(\text{Dnari}$<br>Passewa)=0.686kg<br><b>Cost of Button Lac = Rs.</b><br>(245.25+.15+2.5+22.75+1.16+0.15) |  | <b>271.96</b>  | <b>396.44</b>                             |
| SELLING PRICE (Price of product/ Material yield<br>from 1 kg of sticklac)  |  | <b>377.3</b>   | <b>550.00</b>                             |
| PROFIT:  |  | <b>105.34</b>  |   |
| Selling Price of by-product 2 = Rs. 150 X 0.033  |  | <b>4.95</b>  |   |
| Selling Price of by-product 3= Rs. 160 X 0.009   |  | <b>1.44</b>  |   |
| Selling Price of by-product 5 = Rs. 70 X 0.04  |  | <b>2.80</b>  |   |
| Total Profit =   |  | <b>114.53</b>  |   |
| Total Profit / Sales   |  | <b>30.36%</b>  |   |
| Total Profit / Capital Employed  |  | <b>42.11%</b>  |   |

Source: Personal interview from bhatta operating lac manufacturers

Total profit/capital employed can be obtained by dividing total profit by cost of producing buttonlac. Above calculation is based on price level prevailing during 3<sup>rd</sup> week of October, 2013.

For processing of machine made shellac this calculation is started from 100kg. of sticklac. Total cost of washing is Rs 200. Cost per kg is Rs 2. Seedlac obtained from 100 Kg of sticklac is 75Kg. From processing of shellac from seedlac we obtain 65kg of shellac (conversion rate of seedlac to shellac is about 87%). The yield of shellac from 100kg of sticklac is 55Kg.

The 75kg of seedlac is considered as one charge. Now we calculate the cost of processing of one charge seedlac. As we have stated earlier the necessary machines for processing are Boiler, Press machine (which is operated by electricity), Generator (in case of power failure). Steam coal required in Boiler amounting 100kg, cost is Rs.400. The cost of filter cloth is Rs 50 whereas labour cost is Rs. 150. The press machine is run by electricity. So cost of electricity required in this process is Rs 20. Chemical required for one charge is worth Rs 50. Several types of expenses which are required in the process such as generator at the time of power failure, overhead cost of repairing the machines, workers' bonus etc are worth Rs 60. So total cost of processing of one charge of seedlac into shellac Rs 730 from 100kg. of sticklac. That means per kg. cost of processing shellac is Rs. 7.30. The bye-products obtained in this process are Pasewa (1kg) and Kiri (5 kg). Selling these bye-products total value earned is Rs 175 per charge, which is included in profit.

[For Value Chain Analysis for Processing Shellac from One Kg. of Sticklac see Annexure]

In preparing value chain analysis we follow the same calculation procedure which is adopted in calculating profit earned from making buttonlac. We know raw lac is sold on the basis of chouri parta content which is 68%. So sticklac price will be 68% of chouri-parta price. In this way we get cost of raw materials which is Rs245.25. Transport cost is same for small manufacturers and big manufacturers. Cost of processing seedlac is 247.25 including washing

cost (Rs 2/Kg). Since the yield of seedlac is 0.75kg for per kg. of sticklac, the cost of seedlac per kg. is given in the figure as Rs329.87. Total processing charge of producing shellac from one kg sticklac is Rs(2.00+7.30)= Rs9.30. So cost of producing machine made shellac is (245.25+.15+2.00+7.30) = Rs254.70. The yield of shellac in the machine made process is 0.65 per kg. The cost price of machine made shellac is Rs 391.85. It is sold by Rs 520 per kg. Selling price (Price of product/material yield from 1 kg. of sticklac) is 338. Then total profit is 83.30. By selling by-products Rs 175 was earned which must be entered into the profit. The value of by product obtained from one kg. of sticklac is Rs 1.75. So, total profit is Rs 85.05. Total profit/ capital in this way is 33.39%.

**Table-2: Comparison Figure of Producing Buttonlac and Machine Made Shellac(in Rs/Kg)**

|                    | Washing charge | Yield of seedlac | Cost of seedlac | Processing charge | Yield of shellac | Cost of shellac | Selling price of | Total profit | Total profit after selling by-products | Profit/capital | Profit /sale |
|--------------------|----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|--------------|--|----------------|--------------|
| <b>Buttonlac</b>   | 2.50           | 0.73             | 338.6           | 22.75             | 0.69             | 396.44          | 550              | 105.34       | 114.53                                 | 42.1%          | 30.36%       |
| <b>M/M Shellac</b> | 2.00           | 0.75             | 329.8           | 7.30              | 0.65             | 391.85          | 520              | 83.30        | 85.05                                  | 33.4%          | 25.16%       |
| <b>Difference</b>  | +0.5           | -0.2             | +8.8            | -15.40            | +0.04            | +4.59           | +30              | +21.96       | +19.44                                 | 8.7%           | +5.20%       |

Source- Table-1 & Chart-2

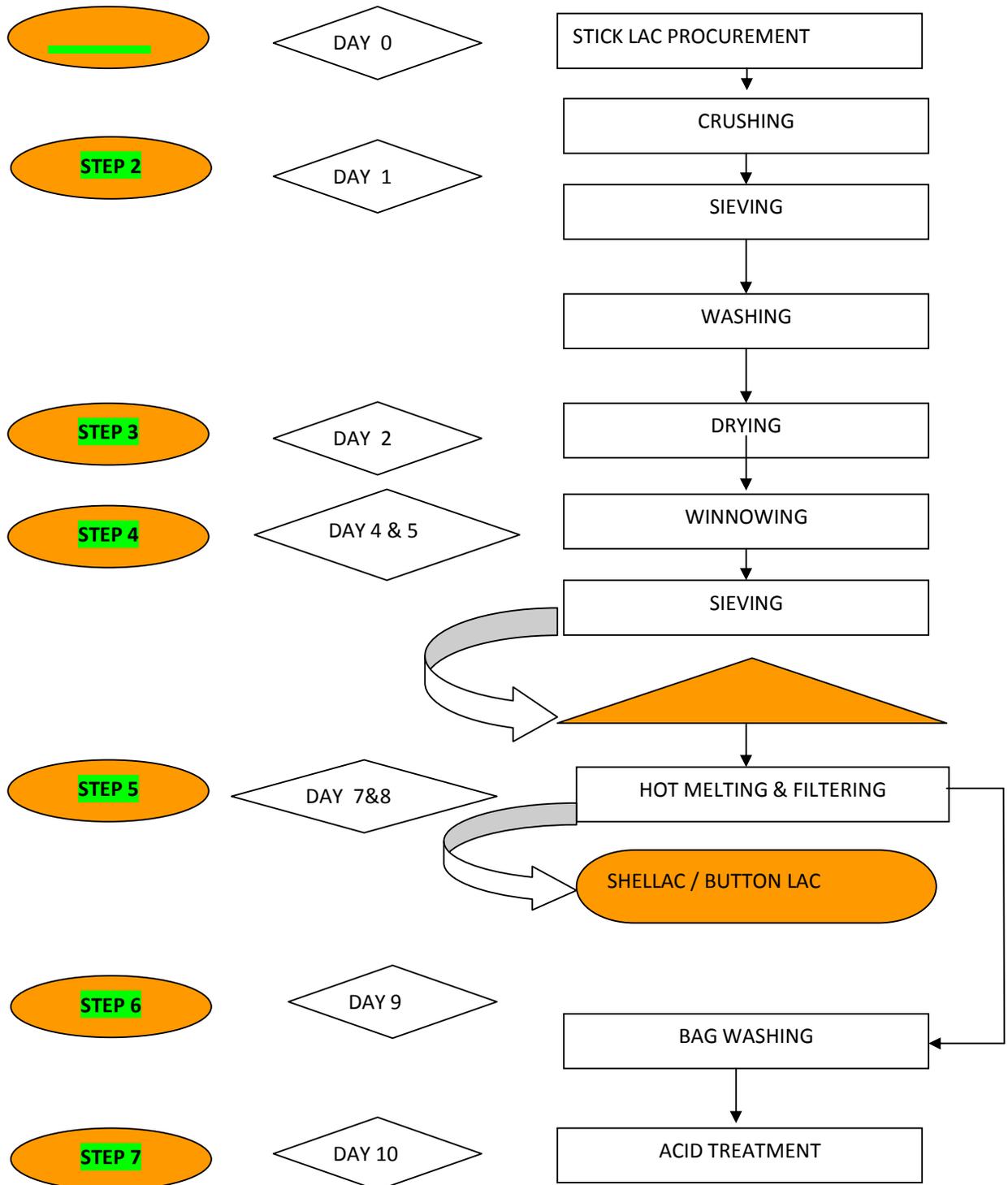
Since selling price of buttonlac is high compared to that of M/M shellac this difference of selling price easily outweighed the difference of processing cost per kg of sticklac. Nevertheless the yield of buttonlac is also higher than that of M/M shellac. Except processing charge the buttonlac enjoyed comparative cost advantage. But machine made shellac manufacturing unit producing shellac in larger scale enjoys processing cost advantage in a big way. They have enough capital to fight against risk and possible losses attached with this industry. The big manufacturers have good network which helps them to take decision regarding whether he sells the finished goods in internal market or foreign market. Small manufacturers are deprived of these facilities.

### References

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**Annexure**

**Chart- 1: Process Flow Chart for Seed Lac / Handmade Shellac / Button Lac**



**Chart 2: Value Chain Analysis for Processing Shellac from One Kg. of Sticklac**

