

Modern Methods of Tanning Industry and Environmental Problems

By

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ABSTRACT

This paper analyzes Modern Methods of Tanning Industry and Environmental Problems first up all to understand the modern methods of tanning industry and what are the problems create Firstly define the objective of this paper than given the and methodology of article. In this paper used primary secondary data from different sources. This paper also tells us a comparative analysis of modern methods of tanning industry and environmental problems, the purpose of this analysis actual situation of highlight for the future policy planning.

Key words: *Leather, Tanning, Industry, Environmental*

1. Introduction

The first stage is the preparation for tanning. The second stage is the actual tanning and other chemical treatment. The third stage applies finishing to the surface Preparing hides begins by curing them with salt. In wet-salting, the hides are heavily salted, then pressed into packs for about 30 days. In brine-curing the hides are agitated in a salt water bath for about 16 hours. The hides are then soaked in clean water to remove the salt and a lime/water solution to loosen the hair. The majority of hair is then removed using a machine with remaining hair being removed by hand using a dull knife, a process known as scudding. Depending on the end use of the leather, hides may be treated with enzymes to soften them Tanning can be performed with either vegetable or mineral methods.

Before tanning, the skins are unhaired, degreased, desalted and soaked in water over a period of 6 hours to 2 days. To prevent damage of the skin by bacterial growth during the soaking period, biocides, such as pentachlorophenol, Vegetable tanning uses tannin; this is where the name tanning comes from. Tannin occurs nature is usually in bark. The primary barks used in modern times are chestnut, oak, tanoak, hemlock, quebracho, mangrove, wattle and myrobalan. Hides are stretched on frames and immersed for several weeks in vats of increasing concentrations of tannin. Vegetable tanned hide is flexible and is used for luggage and furniture. Mineral tanning usually uses chromium. In the raw state chrome tanned skins are blue and therefore referred to as "wet blue". Chrome tanning is faster than vegetable tanning (less than a day for this part of the process) and produces a stretchable leather which is excellent for use in handbags and garments (Encarta, 2003). Depending on the finish desired, the hide may be waxed, rolled, lubricated, injected with oil, split, shaved and, of course, dyed. Suedes, nubucks, etc. are finished by raising the nap of the leather by rolling with a rough surface.

2. Objective

- To analyzes Status and how to processes of leather industry in Indian.
- To analysis impact of tanning industry on environment.
- To suggest appropriate policy for reduction of the pollution problems.

3. Methodology

This research paper based on primary and secondary data, primary source of data collected and notified from during research in areas of Kanpur and Unnao districts tanning industry in Uttar Pradesh. The Uttar Pradesh third largest tanning industry center in India and secondary data and information collected from different government and originations reports like CPCB, SPCB, CLRI, IFO, UNIDO, UNESCO, CLE and others. In this article also used of different journal, new paper and others source.

4. Modern Methods of Tanning

4.1. Raw hides and skins

The strength of Indian leather industry lies in its vast bovine population. Hides and skins constitute the basic raw material for the leather industry. The pelts of big and full growth animals like cows, buffalos, horses etc. are called hides and that of small animals, sheep, goats and deer etc. are the skins. The difference between hides and skins mark in size, thickness, and weight, the former being larger, thicker and heavier than later. Livestock population in India comprises world's single largest cattle, sheep, and goat's population.

There exists a large raw material base. This is on account of population of 194 million cattle's, 70 million buffaloes, and 95 million goats. According to the latest census, India ranks first among the major livestock holding countries these four species provide the basic raw material for the leather industry. These four species provide the basic raw material for the leather industry in the world. In respect of sheep with 48 million, it claims the sixth position. These four species provide the basic raw material for the leather industry.

The annual availability of 166 million pieces of hide and skins is the main strength of the industry. This is expected to go up to 218 million pieces by the end of year 2000. Some of the goat/calf/sheep skins available in India are regarded as specialty products commanding a good market. Abundance of traditional skills in training, finishing and manufacturing downstream products and relatively low wage rates are the two other factors of comparative advantage for India.

Leather is an intermediate industrial product, with numerous applications in down-stream sectors of the consumer products industry. For the latter, leather is often the major material input, and is cut and assembled into shoes, clothing's, leather goods, furniture and many other items of daily use. Different applications require different types of leather.

The tanning of hides and skins also generate other by products, which find outlets in several industrial sectors. The process of making leather has always been associated with odor and water pollution. As it seemed to be an inevitable consequence of the activity at the time, in some cultures, people engaged in this industry rarely enjoyed a high social status. Most of the basic stages of leather making are still the same, but the tanning industry has undergone important changes. Several major improvements were made for environmental protection.

A considerable potential impact of tanning and associated activities on air, surface and ground water, soil and other natural resources arises from the chemicals applied, the raw materials used, the effluents, wastes and off gases release generated in the process. Therefore, provisions for pollution control, waste generation and disposal, chemical safety, accidents, raw material/ Water/ Energy consumption are essential.

Tanning industry is one of the oldest industries in India and ranks amongst the five top most export-oriented industries of the country. The total value of leather and leather products export and Indian market was estimated around US\$ 8 billion for the year 2008. The main centers of tanning industry are located in States of Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Bihar, Gujarat Maharashtra Karnataka, Punjab Rajasthan and West Bengal. There are about 2000 tanneries spread all over India. The total processing capacity is about seven thousand tons per year. About 75 percent of the tanneries are in cottage and small-scale sector, about 20 percent in the medium and only about 5 percent in the medium/ large sector.

4.2. Leather Manufacturing Process

Animal skin consists of epidermis, a layer of fatty tissue called areolar and inner corium. The semi – soluble protein, called 'collagen' present in corium is converted into highly durable leather through tanning operations. Skin of cows and buffaloes is called hide. Skin of goats and sheep is called skin. In India, 80 percent of the hide available is from animals that die naturally due to ban on cow slaughter in many parts of the country. Goat and sheep skins, however, are by products of meat industry. Hide are 1-3 square meter (m²) in size and weigh about

10-20 kilograms (kg). Skins are smaller in size, 0.4--0.5 m² and lighter in weight around 1-2 kg. Slaughter hides and skins contain 60-70 percent of moisture, and make them liable to bacterial attack which in turn decomposes the hides and skins.

The preservation of hides and skins in a tannery can be split into following four main categories:

1. Preservation of hides and skins storage
2. Beam house operations
3. Tanning operations
4. Post-tanning and finishing operation

Furthermore, tanneries employ abatement techniques for the treatment of wastewater, solid waste and air emissions generated during these processes. Operation carried out in the beam house, tanyard, and post-tanning areas are often referred to as wet processes, as they are performed in processing vessels such as drums. After post-tanning, the leather is subjected to dry finishing operations.

The processes employed in each of the above categories change depending on the raw materials used and the final desired products. Hence, the environmental impacts vary from tannery to tannery and a more detailed assessment is necessary at each unit/ site.

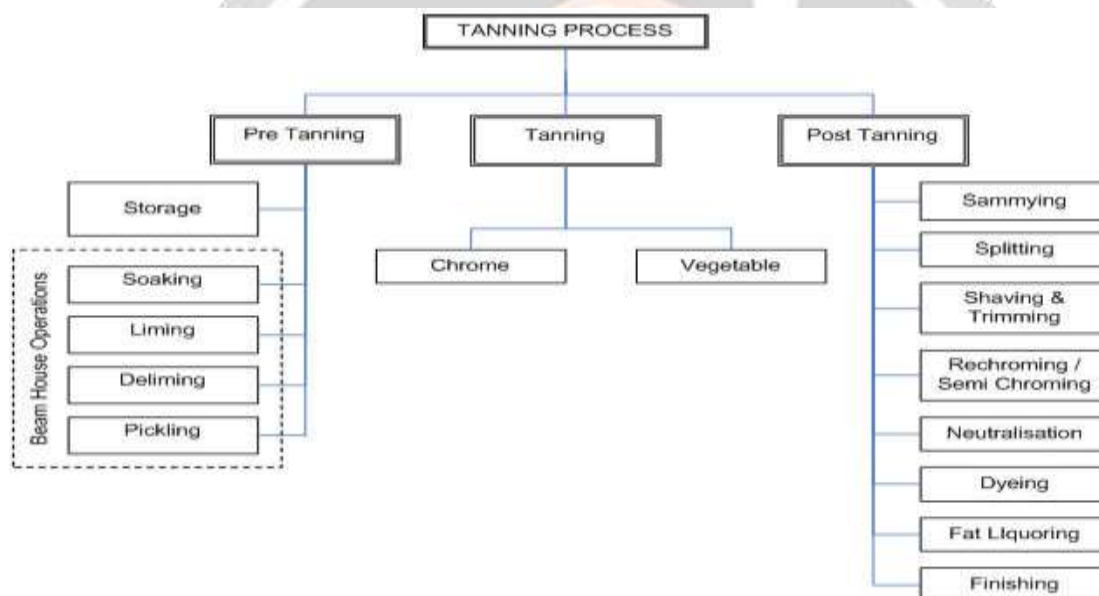


Figure 1: Process of tanning

The process of converting raw hides and skins into leather is called tanning. The operation falling in pre-tanning operation is depicted in the figure below:

4.3. Post-tanning operations

Post-tanning operations comprise of re-chroming of semi-finished wet blue leather, neutralization, dyeing, fat liquoring and finishing. In case if post-tanning of vegetable tanned semi-finished leather, the operations involved are semi-chrome tanning, neutralization, dyeing, fat liquoring and finishing. However the operations vary depending upon the final product.

1. Sammying: It is a mechanized process followed to remove excess moisture in the wet blue.
2. Splitting: After sammying, the material is split into required thickness using splitting machine.
3. Shaving and Trimming: The semi-finished leather is leveled using the shaving machine.

4. Re-chroming: Depending on the quality of wet blue, re-chroming is carried out to improve the chromium content in the leather.
5. Semi-chroming: In case of vegetable tanning semi-finished leather, chrome tanning is given depending on the final leather quality.
6. Neutralization: pH is adjusted to 4.5-6.5
7. Dyeing: The leather is colored using dyes such as anionic dyes, acid dyes, direct, metal complex compounds and basic dyes.
8. Fat-liquoring: Natural/ synthetic oils are applied for fat liquoring, thereby imparting softness to the leather.
9. Finishing: Phenolics, melamine, acrylics, polymers, naphthalene, etc., are used for finishing imparting fullness to the leather.

5. Slaughter houses in India

There are 2702 slaughter houses in the country, which are recognized or authorized by local bodies in addition a considerable number of animals, are slaughtered at unauthorized places; rough estimate indicates up to 50 percent of animal's slaughter. Over the years, the facilities and hygienic conditions in most of the slaughterhouses have deteriorated. Compared to 1951, livestock population too has increased by about 62 percent and human population increased by 134 percent but the number of authorized slaughter houses have not undergone any significant increase to meet the growing demand for meat production. The increased demand for meat is met either through overcrowding operations in the existing slaughter house operation at much higher capacity than feasible in the facilities or through unauthorized slaughter house at many places. In both these situations not only the meat hygiene is the casualty, at increase semantically pollution and adverse public reaction as well. The existing slaughterhouses capacity in the country is unable to meet the growing public demand for clean and hygienic meat. This can be achieved by improving existing slaughterhouses to accommodate higher capacities and creating new slaughterhouses with modern facilities.

6. Feature perspective of the leather industry

- I. The Leather Industry holds a prominent place in the Indian economy. This sector is known for its consistency in high export earnings and it is among the top ten foreign exchange earners for the country.
- II. With an annual turnover of over US\$ 7.5 billion, the export of leather and leather products increased manifold over the past decades and touched US\$ 4.86 billion in 2011-12, recording a cumulative annual growth rate of about 8.22 percent (5 years).
- III. The Leather industry is bestowed with an affluence of raw materials as India is endowed with 21 percent of world cattle & buffalo and 11 percent of world goat & sheep population. Added to this is the strength of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and the dedicated support of the allied industries.
- IV. The leather industry is an employment intensive sector, providing job to about 2.5 million people, mostly from the weaker sections of the society. Women employment is predominant in leather products sector with about 30 percent share.

Though India is the second largest producer of footwear and leather garments in the world, it accounts for a share of close to 30 per cent in the global leather import trade of US\$ 137.96 billion (2010).

7. Strengths of Indian Leather Sector

- Own raw material source – 2 billion sq ft of leather produced annually.
- Some varieties of goat / calf / sheep skins command premium position.
- Strong and eco-sustainable tanning base.
- Modernized manufacturing units.
- Trained / skilled manpower at competitive wage levels.
- World-class institutional support for Design & Product Development, HRD and R & D.
- Presence of support industries like leather chemicals and finishing auxiliaries.

- Presence in major markets.
- Strategic location in the Asian landmass.

8. Emerging Strengths

- ❖ Design development initiatives by institutions and individuals.
- ❖ Continuous modernization and technology up gradation.
- ❖ Economic size of manufacturing units.
- ❖ Constant human resource development programme to enhance productivity.
- ❖ Increasing use of quality components.
- ❖ Shorter prototype development time.
- ❖ Delivery compliance.
- ❖ Growing domestic market for footwear and leather articles.

9. Highlights of Leather Product Segments

- a. **Tanning Sector** – Annual production 2 billion Sq.ft. Accounts for 10 per cent of world leather requirement. Indian colors continuously being selected at the MODEUROPE Congress.
- b. **Footwear Sector** - Second largest footwear producer after China. Annual Production 2065 million pairs. Huge domestic retail market 1950 million pairs (95 percent) are sold in domestic market. Footwear export accounts for 45 per cent share in India's total leather & leather products export. The Footwear product mix gents 52 per cent, ladies 39 per cent and children 9 per cent.
- c. **Leather Garments Sector** – Second largest producer with annual production capacity of 16 million pieces. Third largest global exporter. Accounts for 10.43 per cent share of India's total leather export.
- d. **Leather Goods & Accessories Sector including Saddlery & Harness** - Fifth largest global exporter. Annual production capacity - 63 million pieces of leather articles, 52 million pairs of Industrial gloves & 12.50 million pieces of Harness & Saddlery items. Accounts for 23.44 per cent share of India's total export.

The Government of India has identified the Leather Sector as a focus sector in its foreign trade policy 2004-09 in view of its immense potential for export growth prospects and employment generation. Accordingly, the Government is also implementing various special focus initiatives under the foreign trade policy for the growth of leather sector. With the implementation of various industrial developmental programmes as well as export promotional activities; and keeping in view the past performance, and industry's inherent strengths of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and dedicated support of the allied industries, the Indian leather industry aims to augment the production, thereby enhance export, and resultantly create additional employment opportunities for overall one million people.

10. A New Approach to the Environmental Problem

Since so many agencies have been working on solving the pollution problem, the study team found it difficult to define the kind of input that it could provide. The Central Leather Research Institute has a vast pool of expertise, which deals with every aspect of leather production and serves as a point of reference for the industry and the government. The institution has done commendable work in many aspects of pollution prevention and reduction in the leather industry. Some of the important contributions of the institution include a technology for recovery of chrome from the effluent and systems for minimizing the use of water in the process. Although, many laudable steps have been taken, such as the setting up many, Common Effluent Treatment Plants (CETP), a solution to the problem is still not in sight. All the studies so far had focused on the issue of pollution from the tanneries and ways to treat it. The attempt was to use science to bring the effluent as close to the acceptable norms as possible. The quest was for the Best Available Technology. However, it was obvious that the Best Available Technology was still not good enough in any practical sense.

The problem is not just the pollution from the tanneries, but whether the local community could afford to provide this valuable resource to the industry. The second aspect is whether the community could afford its freshwater resources being poisoned by the effluents. Water is a serious issue affecting the lives of the population of the region and an academic exercise of how close can we get to the prescribed standards is certainly not just adequate. If the industry were not using the water resources of the region, a major part of the problem would be solved. Hence it is logical that the industry find some other source of water and does not compete with the population for this scarce resource. Thus, any sustainable solution has to ensure that the

industry does not use the water resources of the region. It also has to ensure that the industry does not pollute the water needed by the population.

References

1. Abhay, S. and Rajput, V. (2009), Enzymes and Biotechnology for cleaner leather Processing, *Current Science*, 96(11): 1439-1440.
2. Bhalli, J.A. and Khan, M.K. (2006), Pollution level analysis in tannery effluents collected from three different cities of Punjab, *Pakistan Journal of Biological Sciences*, 9(3): 418 – 421.
3. Chakraborty, P. & Chakraborty, D. (2007), Environmental Regulation and Indian Leather Industry, *Economic & Political Weekly*, May 12, 2007, pp 1669-1671.
4. CPCB (1999-00 to 2008-09), *Annual Report, Central Pollution Control Board*, Ministry of Environment & Forests, Government of India (online available at <http://cpcb.nic.in/annualreport.php>).
5. EXIM Bank (2006): *Indian Leather Industry- Perspective and Export Potential*, Research Brief, No. 22, March, 2006.
6. Fisher, H & Pearce, D. (2009), Salinity Reduction in Tannery Effluent in India & Australia, *ACIAR, Impact Assessment Series*, Report No. 61. <http://aciar.gov.au/files/node/11131/IAS61.pdf>.
7. Gowd, S.S., Reddy, M.R.M. and Govil, P.K. (2010), Assessment of heavy metal contamination in soil at Jajmau (Kanpur) and Unnao Industrial areas of the Ganga plain , Uttar Pradesh, India, *Journal of Hazardous materials*, 174: 113-121.
8. Hasan, Kamrul (2011), Tanning Industry in India Environmental Problem: A Special Reference to the Kanpur Area, *SHODH PRERAK A Multidisciplinary Quarter International Refereed Research Journal*, Vol.-1 Issue-4.
9. Hasan, Kamrul (2013), Indian Tannery Labourers and Health Problems: Special Reference to the Kanpur and Unnao Area, *Indian Journal of Social and Legal Study*, January 2013, Vol. No.2.
10. Nihila, M. (1993), Development Process and Status of Women: Tanning Industry in Tamil Nadu, *Economic & Political Weekly*, Oct 9, 1993, pp 2220 – 2228.
11. Prasad, P. M. (2006), Environment Protection - Role of Regulatory System in India, *Economic & Political Weekly*, April 1, 2006, pp 1278-1288.
12. Rajamani, S. (2001), Tannery Waste Management & Technological Options for Up gradation of Environment System for Tanneries in Kanpur, *Proceedings of Leather Research Industry Get-Together*, Kanpur, Chapter, Aug 22, 2001
13. Sankar, U (2006), *Trade and Environment- a Study of India's Leather Exports*, Oxford University Press.
14. Sankar U (2006), Trade Liberalization and Environmental Protection- Responses of Leather Industry in Brazil, China and India, *Economic & Political Weekly*, June 17, 2006.