

ADOPTION OF NEW TECHNOLOGY BY THE LEATHER INDUSTRY

(With special reference to Kanpur and Unnao)

Dr. Rohini Yadav*.

INTRODUCTION

The leather industry is India's fourth largest foreign exchange earner, and one of the largest shares in the leather export basket is that of footwear. India has overtaken Brazil and Italy to emerge as the second largest footwear producer -700 million pairs annually in the world. The treatment of tannery is a vital topic affecting supply of footwear, garment and upholstery leather. People and governments all over the world are becoming more sensitive to pollution created by industry, and this “green” philosophy is reaching into all parts of industry. In particular, the standard of purity of the effluent from tanneries is the subject of increasingly tougher legislation all over the world. Tanners today are more aware of the need for effluent treatment of tannery based water and thereby meeting social environmental obligations. Waste water sampling and testing are done in Kanpur and the CLRI and IIT are helping in the establishment of fully equipped laboratories for the UPPCB in Kanpur. The CETP needs to work continuously and should be relieved from power cuts for better performance. Supports for up gradation of CETPs in Uttar Pradesh sought for are:-

1. Observance of polluter pays principle.
2. Increased internationalization of management of CETPs by tanners including powers to delink tanners not complying with environmental responsibilities.
3. Increased transparency of regulatory norms / procedures.
4. Increased involvement of national institutions in testing waste waters, regulation, advising regulatory bodies and tackling environmental problems.
5. Fund assistance in the establishment and up gradation of CETPs as per national norms.

About 50 participants including leading tanners and officials from Uttar Pradesh Pollution Control Board, Jal Nigam, Common Effluent Treatment Plant (CETP) at Kanpur and Regional Director of the Central Region Office of the Council participated in a seminar held in Kanpur. The following main recommendations arrived and summed up are as follows:-

1. Every CETP may form a management committee with representatives from UPPCB, industry and institutions like CLRI or IIT. This committee may be empowered to internalize the regulation of PETPs and payment for recurring costs. UPPCB may consider seeking a clearance from the committee for decisions.
2. CLRI may be asked to provide a technical specification for primary effluent plants to be installed and verification of the installation may be left to the

* Assistant Professor, G.N.G P.G. College, Kanpur

management committee. If these are done, industry does not see a need for separate consent for every tannery every year.

3. When CETP complies with the norms, management of individual tanneries may be left to the management committee.
4. A coherent tannery group may be formed which can demonstrate the commitment of tanners to funding, management systems and organization modules suitable to the tanneries in Uttar Pradesh. This group may include the representatives of the Government Technology Institutions and Industry.
5. For Jajmau CETP, special task force may be constituted to assess the up gradation needs and develop a mechanism of fund mobilization. This task force may discuss also the needs of small tanneries in Kanpur.
6. The proposed task force may be constituted under the chairmanship of the Principal Secretary with Director CLRI as member.
7. The Government of Uttar Pradesh may kindly request the CPCB to call the preview meeting for tannery waste management and adopt the norms and procedures of CPCB.

ENVIRONMENTAL STANDARDS IN INDIA

The importance of environmental standards in India's export was first experienced when Germany, one of the major importers of leather and leather goods from India, banned the import of leather products containing more than 5 mg/kg of pentachlorophenol (PCP) in 1990. This was followed by a German ban on the import of leather and textiles treated with a number of azo dyes in 1994. Despite the difficulties, the leather industry was able to replace these substances with substitutes in a short time. For example, a study of the leather industry in Tamil Nadu found that within three years of the PCP ban, only 7% of all leather samples tested more than 5 mg/kg. Similarly, three years after the ban on the use of azo dyes, only 1 in 129 samples failed the azo dye test. Considering past experience, it appears that the Indian industry will be able to adjust to restrictions on the use of any other substances in the future. It is reported that Indian industry is interested in turning "clean tanning into a comparative advantage".

There are also moves to popularize eco labeling and to develop niche markets for environmentally friendly products, such as leather produced by vegetable tanning. The following criteria have been set by India's Ministry of Environment and Forest for the labeling of finished leather as environmentally friendly: The manufacturer must have consent from the Pollution Control Board as per the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. The material used for the product packing must be recyclable and reusable or biodegradable. In addition to these general requirements, the producers of leather goods are required to meet product specific requirements which deal with the maximum limits of formaldehyde, PCP, aryl amines released from azo-dyes and hexavalent chromium. Considering that most tanneries do not meet environmental standards and do not receive consent from the Pollution Boards (one of the conditions for eco labeling), they are unlikely to be

eligible to use the Eco label. Therefore, the Indian leather industry is unlikely to create a niche market for environmentally friendly leather.

Table 1.1 : Environmental benefits of cleaner production methods

Parameters	Reduction/saving (%)
Water	40-50
BOD	50-60
COD	60-75
TDS	40-45
Sulfide	50-60
Chromium	45-50
Chloride	40-50
Chemical Input	20-25

Source: Internet.

As shown in Table 1.1, these technologies can lead to a substantial reduction in the pollution load in Indian tanneries. Since other empirical studies also have shown that environmental regulations are very important to force firms to deal with pollution matters, it is important to look at the regulations relevant for the tanning industry in India. It is also necessary to discuss how these regulations are being enforced. For the tanning industry, there are no international regulations, only domestic. However, the want to increase exports may induce governments and firms to let regulation other than the domestic influence production activities. For the tanning industry in India, the main focus of the regulations has been on water pollution rather than problems related to air pollution and solid waste. In Kanpur, water pollution issues came into focus with the Ganga Action Plan (GAP), established by the Central and the UP governments in 1985. The GAP required that the water quality should be monitored and primary treatment of effluents should be undertaken. Under the GAP, another project, aided by the Dutch development agency, operated from 1987 to 1994 with the mission to prevent pollution of the river Ganges and improve living conditions for the people in Jajmau. Among other things, this project included the construction of the CETP to treat tannery effluent.

The regulations that the tanneries have to meet today are all related to water pollution, and the regulations have remained unchanged during the 1990s. There are certain standards for pH, total suspended solids, sulfides and chrome that the tannery effluent shall not exceed. Hence, all tanneries are required to treat their effluent before letting it out either to the sewer system or to a river. Different standards apply according to whether the tanneries are connected to a CETP or not. For tanneries that are connected to a conveyance system that goes to the CETP, either in Jajmau or in Unnao, it suffices to have a primary treatment plant (PTP) where sludge in the effluent can settle and where the pH is adjusted. This means that the water they let out of their plant should contain no more than 600 mg per liter of suspended solids, 45 mg per liter of chrome and the pH should be in the range of 6.5 to 9.0. The purpose of this cleaning is mostly to avoid clogging of the conveyance system before the

effluent reaches the CETP where most of the treatment is supposed to take place. The tanneries that are not connected to a CETP have to meet the more stringent standards equal to those that apply to the CETPs. These are the standards that are listed in table 1.1. To achieve this, they need to have their own individual effluent treatment plants (IETP) that takes care of both primary and secondary treatment, it is not enough to only have a primary treatment plant to settle and take out the sludge.

Table 1.2 : International standards for discharge of tannery effluent to the surface

COUNTRY	pH	COD mg/l	Suspended Solids mg/l	Sulfide (S ²⁻) mg/l	Chromium Total mg/l
Argentina	5.5-10	250	Na	1	0.5
Brazil	5.0-9.0	Na	Na	0.2	2.5
China	6.0-9.0	300	200	1	1.5
Denmark	6.5-8.5	Na	30	2	0.2
Germany	6.5-10	250	Na	1-2	0.5-1
India	6.5-9.0	250	100	2	2
Italy	5.5-9.5	160	40-80	1	2
Poland	5.5-9.0	150	35	0.2	Na

Na: not available, mg/l: milligram per liter

Source: Internet.

As shown in table 1.2, compared to other countries' environmental regulations of the tanning industry, India's regulations are almost at par, even though they are slightly less strict than Germany's for the amount of total chrome and Italy's for the amount of sulfide.

Most of the tanneries in Kanpur and Unnao use old and inefficient technologies in leather production methods. Even in large tanneries the general level of technology is low. The use of inefficient technology is largely responsible for the wasteful use of water and chemicals, high load of effluent pollutants and low productivity of the tanning industry. A study of India's tanning industry, carried out on behalf of India's Ministry of Science and Technology, brings out these facts clearly, which are as follows:-

- i. The raw hides and skins are salt preserved in India, which causes a serious problem of excess of salt in tanning effluent.
- ii. The yield of leather from wet salted stock is lower in India than international norms. This is partly due to higher level of process waste.
- iii. The chemical consumption in Indian tanneries is about 25 to 30% higher than international norms. This is due to the insufficient equipment and processes and the absence of recycling.
- iv. The specific water consumption in Indian tanneries is more than double than that of tanneries in developed countries. The tanning units in India consume an average of 40 liters/sq.ft. of finished leather. Compared to this, the tanneries in developed countries consume about 12-15 liters/sq.ft.

- v. Most of the tanneries in India are very old and their layout is not efficient. This leads to bottlenecks for process and material handling, multidirectional material flow and excessive material handling. Most of these tanneries have very unhygienic working conditions, inadequate ventilation and lighting too.

The tanneries in India are reported to consume between 30-40 liters of water per kilo of finished leather. This can be brought down to 15 liters/kg by the use of more efficient process management and reuse of water but the cost of water in many places such as Kanpur is very low. Consequently, the tanneries have little incentive to save water. Faced with the shortage of water some of these tanneries have brought down their water consumption to as low as 7-8 liters/kg. This is largely achieved through better process management, without significant investment in equipment. The discharge of effluent with a very high load into water bodies and farmlands has been a serious cause of concern during the last decade. This has resulted in a number of directions by the Supreme Court to compel the pollution boards to enforce environmental regulations and the tanneries to comply with the rules. While a number of large tanneries have now setup effluent treatment plants, many smaller tanneries (in clusters) have been connected to Central Effluent Treatment Plants (CETPs). For example, the tanning industry in Tamil Nadu faced a serious crisis in 1966, as the Supreme Court ordered the closure of tanneries which were not meeting the effluent discharge norms. While some of the large firms (about 80%) joined common effluent treatment plants.

Similarly, the tanneries in Jajmau cluster in Kanpur have joined a CETP. According to CLRI, about 150 tanneries have set up independent effluent treatment plants. Furthermore, 17 CETPs, catering to cluster of tanneries are operational and another 13 are planned. The tanneries which have not installed Effluent Treatment Plants (ETPs) generally complain that the cost of setting up and operating ETPs is too high. The cost of a 1,000 cubic meter/day ETP is estimated to range between Rs.25 million and Rs. 40 million. The operational cost to run a plant of this size is estimated to range between Rs.10, 000 to Rs.35, 000 p.m. Even when they are built, in many instances ETPs are found to be ineffective in treating effluents to meet the environmental standards. This is for a number of reasons which are as follows:-

- i. The ETPs are not designed to cope up with the large variations in the volume and nature of effluent.
- ii. A number of toxic and bio-degradable chemicals and preservatives are used by tanneries. These affect the performance of ETPs.
- iii. Different streams such as soak liquor, pickle liquor, chrome liquor are not separated from the main stream. These need to be segregated and treated separately.
- iv. The ETPs do not receive regular power supplies. Although many tanneries have diesel generator sets, they are reluctant to use this power to operate an ETP.

ROLE OF GOVERNMENT RESEARCH INSTITUTES

Most of the leather related research in India is concentrated in the Chennai based Central Leather Research Institute (CLRI). The institute, which was set up in 1953, has about 200 scientists and the capability to provide technical support to the leather industry in most fields, including cleaner production methods and technologies. Most the work on cleaner technology is carried out by the leather process technology division, which develops and demonstrates these technologies to industries. The institute has also developed technology for building effluent treatment plants (ETPs) and for the utilization of fleshing and sludge. In order to bridge the gap between research and industry, CLRI has five regional centers. These are located in the main centers of leather production.

The agencies and projects such as UNDP, UNIDO, USTDA, GTZ and Indo-Dutch projects have been actively involved with the technology up-gradation of India's leather industry. An important objective of the support provided by these agencies is to promote the adoption of environmentally friendly production methods and technologies by Indian tanneries. They have also provided financial and technical support to set up CETPs and chrome recovery plants. Some of the important contributions of these agencies are as follows:-

- a. UNIDO has a regional programme office in Chennai to promote environmentally friendly technologies in leather production. The programme has assisted in the introduction of a number of cleaner tanning technologies in Tamil Nadu and Uttar Pradesh. It has also provided technical assistance to two CETPs for tannery clusters and two individual effluent treatment plants for isolated tanneries.
- b. UNDP has assisted in setting up of the Calcutta Leather Complex, where the entire Calcutta leather industries will be shifted.
- c. The US Trade and Development Agency (USTDA) is supporting a study to explore industrial waste water recycling for the tanneries of Tamil Nadu. The USTDA has provided US\$1, 80,100 to the Tamil Nadu pollution control board for the study. The study will focus on an economic and environmental analysis of the ESTs for the leather industry. It will generate data which will be useful to promote waste water treatment and recycling in Indian tanneries.
- d. Global Environment Facility (GEF) of the UNDP has supported the setting up of a biomethanation plant at the Melvisharam CETP in Vellore district. In addition to the funds provided by GEF (Rs.2.73 million), the ministry of non-conventional energy sources (MNES) has contributed Rs.6.74 million. Support has also come from the UNIDO (Rs.2.76 million) and the leather technology mission (Rs.2.76 million). The tanners have contributed Rs.0.79 million. The plant can handle two tons of CETP primary sludge and three tons of fleshing every day.
- e. Indo-Dutch project has supported the setting up of a CETP to treat the effluent from the tanneries in Jajmau in Kanpur. The project has also assisted in the setting up of a pilot plant to popularize chrome recovery technology in the Jajmau cluster.

ROLE OF GOVERNMENT

The Indian government has taken a number of steps to support the modernization of the leather industry. For example; it launched a leather technology mission in 1995. An important objective of the mission was to improve the environmental performance of the industry through the development and diffusion of cost effective environmentally friendly technology for the tanning industry. The mission, who was completed in 1999, implemented about 170 projects at 62 locations in 16 states. The mission is claimed to have resulted in the demonstration of cleaner tanning technologies in over 200 tanneries and micro processor based controlled wet operations in 6 tanneries. It also designed and commissioned 6 CETPs for tanneries clusters in south India. More recently, the government has initiated a programme providing subsidy to encourage the leather industry to modernize its production facilities. The scheme, which is administered by the Ministry of Commerce, was initiated in 2000 for 2 years. Its main objectives are:-

- a. Replacement of obsolete machinery.
- b. Replacement of pit technology with drums.
- c. Installation of instrumentation and process control systems.
- d. Promote float recycling.
- e. In-house chrome recovery re-use facilities.
- f. Up-gradation of finishing facilities.
- g. Promotion of non-conventional sources of energy.

The scheme provides a subsidy of 25% of the total investment in modernization. According to the data available with the CLE, 144 applications had been received for subsidy under the scheme by early of March, 2008. Of these 93 applications seeking a subsidy of Rs.9.4 million has already completed the modernization process. They have received assistance amounting to Rs.68 million. Applications from another 37 tanneries are under consideration. It must, however, be pointed out that the subsidy has been used by industry to modernize finishing facilities. Very little investment has been made in modernizing the beam house operations and tanning process, which is the main cause of pollution in the tanning industry. Therefore, the impact of this scheme, in improving the environmental performance of the industry will not be significant. After a thorough study some suggestions have been suggested which are as follows :-

- i. Detailed study of markets should be done for total investment in India.
- ii. Set up two large dedicated footwear parks and two leather parks with testing labs, design development houses and warehousing facility for the export community.
- iii. Invite key resource persons for fairs, seminars and lectures for exchange of information, ideas and strategies.
- iv. To serve as a bridge between the government and the industry members, while focusing on the overall health and growth of the Indian leather industry.
- v. Promote foreign direct investment, joint ventures and technical/strategic alliances.

- vi. Disseminate market information, trends and policy implications and publishing information on commercial, technical and technological developments in the Indian leather industry.

ABBREVIATIONS

1. CLRI - Central Leather Research Institute.
2. IIT - Indian Institute of Technology.
3. UPPCB - Uttar Pradesh Pollution Control Board.
4. CETP - Common Effluent Treatment Plant.
5. PETPs - Primary Effluent Treatment Plants.
6. CPCB - Central Pollution Control Board.
7. UNDP - United Nation Development Programme.
8. UNIDO - United Nation Industrial Development Organization.
9. USTDA - US Trade and Development Agency.
10. GTZ - Generalized Trade Zone.