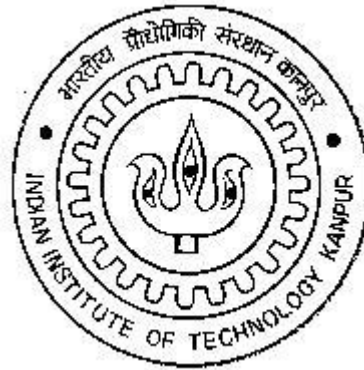


CHALLENGES FACED BY LEATHER INDUSTRY IN KANPUR

A Project Report Submitted
In Partial Fulfillment of the Requirements
For the course
ECO 332 – Development theory

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April 2007

CHAPTER 1

INTRODUCTION

The tanning industry is known to be very polluting especially through effluents high in organic and inorganic dissolved and suspended solids content accompanied by propensities for high oxygen demand and containing potentially toxic metal salt residues. Disagreeable odour emanating from the decomposition of protein solid waste, presence of hydrogen sulphide, ammonia and volatile organic compounds are normally associated with tanning activities. A significant part of the chemical used in the leather processing is not actually absorbed in the process but is discharged into the environment.

Liquid effluent from light leather processing contains organic matter, chromium, sulphide, and solid waste includes fleshing, wet blue splits, trimmings and shavings, buffing dust etc. The substantial relocation of leather production from the industrialized countries to the developing countries which occurred between the 1960s and the 1980s (known as "The Big Shift") in effect moved the most highly polluting part of the process away from the OECD countries. This occurred under the pressure of increasing cost of labour and cost of effluent treatment installations and operations. This process was accelerated by a combination of restrictions in exports of raw hides and skins and various incentives for higher processing levels provided in developing countries.

Since over 80 per cent of the organic pollution load in terms of BOD comes from early wet processing, this is the primary target of most pollution control measures. Low waste technologies, generally speaking, require better skilled personnel and closer technical control than conventional processing. Thus, the lack of properly trained staff at different levels remains one of the crucial constraints. The main barriers to the adoption of more environmentally acceptable methods of leather processing and effluent treatment are the additional costs as follows: specialty chemicals required in reducing or eliminating the use of the main polluting chemicals; the cost of purchase and installation of water conservation devices, wastewater collection and reuse equipment; effluent treatment chemicals and process and effluent monitoring equipment; extra personnel and training to maintain technical control of low waste technologies and effluent treatment. Another factor is the traditional conservatism derived from hesitation over process alterations especially when satisfactory leather is being currently produced. This is particularly the case in small to medium scale semi-mechanized family owned units. Another barrier is the frequent remoteness of government-backed R & D facilities from everyday practicalities of leather-making, together with reluctance on the part of traditional tanner groups where resistance to change is compounded by political influence.

The beam-house (un-hairing) and the tan-yard require cleaner technologies in leather processing. Also utilization of chrome-free solids as by-products and disposal of chrome containing sludge are possibly the main issues that need particular attention. However, legislation enforcement agencies lack skilled personnel to monitor performance of installed treatment plants. The cost of introducing a cleaner processing method may be prohibitive and beyond reach of a small scale tanner. The price of a special drum for hair save unhairing with the necessary auxiliary equipment may be as much as twice the conventional drum. Enzyme unhairing needs very accurate control and consistency of all parameters (pH, temperature, float, etc) which is possible to achieve only in rather sophisticated tanneries and it is associated with higher production costs (partly off-set by lower wastewater treatment

expenses). High chrome exhaustion tanning requires very expensive specialty chemicals, normally proprietary products. Effluent treatment costs depend on specific site conditions, and vary within a very wide range.

1.1 Issues

The Industry's Global Perspective

The leather and its related downstream industries can claim to be the world's largest industrial sector based upon a by-product. In the case of leather, the raw material is a by-product of the meat industry. Hides and skins and their downstream products are vital earners of foreign exchange and they compare very well with the other agricultural commodities and, in fact, with any internationally traded commodities. This industry helps convertible a putrescible material into a stable and marketable product.

Hides and Skins Production and Trade

Dependence on the market for meat:

Availability of hides and skins is governed mainly by the demand for red meat. A governing feature of the leather industry is in the elastic nature of its raw material supply. The bulk of bovine hides and ovine and caprine skins in industrialized countries are marketed to the leather industry and thus the number of heads slaughtered is roughly equivalent to the number of hides and skins available. A significant part of hides and skins is lost to tanners mainly in least developed countries in Africa owing to lack of marketing infrastructure, monopolies of various kinds or diversion into other uses such as food, tents, ropes, etc. Bovine hide is by far the most important raw material for the leather industry. Off-take ratio (i.e. weight per hide and skin) is very high in developed countries as compared to the developing countries which contribute about 70% of world bovine hide.

Change in global pattern of demand for hides and skins:

The leather industry has expanded substantially in the developing countries. A consequence of production expansion in some developing countries is that tannery input demands have outstripped locally available supplies and imports from the developed countries have become essential.

Environmental Impact of Leather Industry

The leather sector is well known for its effluent problems. The polluting nature of tanneries is evident from the notorious odour that characterizes tanneries and tannery zones. While local populations are daily aware of the air pollution, local authorities are equally, if not more concerned about tanneries' liquid effluents which tend to be high in organic and inorganic suspended solids content accompanied by propensities for high oxygen demand and containing potentially toxic metal salt residues. Treatment technologies in effect reduce pollutants in the liquid form and convert them into semi-solid or solid forms. Threat is being transferred from receiving waters to receiving land. Because sludge can affect the quality of soil and groundwater, it is understandable that local authorities and governments should be concerned that the disposal of sludge to soils and dry wastes to landfill should not adversely

affect the fertility of soil, nor that metal salt residues, such as chromium, should inhibit crop growth in any way.

Market Externalities

Economic, political and technological developments in several industries impinge upon the future characteristics of the leather industry, covering all contingent industries from livestock agriculture to finished goods industries and the markets that they serve. With the growth in the purchasing power of people, there is always an increased demand for inexpensive leather.

1.2 Challenges

Technical Barriers

By nature, tanners are very conservative. This is not simply obstinacy against change; it is because the quality and character of leather is prone to change when the parameters of processing are altered. Changes in the length of processes, process temperatures, float volumes, uptake of chemicals etc. influence the ultimate character of the leather. Leather being produced from a complex, non-uniform natural protein material still requires considerable craft in its manufacture. The adoption of low waste technology often requires a radical alteration of most tannery processes while, at the same time, ensuring that the ultimate product retains its marketable properties. Therefore if a tanner is producing consistent quality of leather which satisfies his customers using a process which may be wasteful in water, energy and chemical utilization, he may resist altering his operations to comply with environmental demands.

Small and Medium Enterprises

In most developing countries tanning operations is a family business, carried out in small to medium scale semi-mechanized units, very frequently grouped tightly in clusters which used to be outside residential areas. Tanners in such units have no formal education and have little or no understanding of the complexities of the leather processing, their skills acquired from their elders with hardly any perception of environmental protection. Low waste technologies, generally speaking, require better skilled personnel and closer technical control than conventional processing. Thus, lack of properly trained staff at different levels remains one of the crucial constraints.

Economic Barriers

In developing countries, leather industry suffers from economic constraints. They suffer the often inordinately high cost of capital or inflation rates. Amount of capital tied up in work in-progress has increased along with the necessity to keep higher inventories of chemicals, machinery spares, etc. Because of problems with poor infrastructure in many developing countries, the tanneries have always kept higher stocks of chemicals than their counterparts in developed countries, against the contingency of delays in delivery from ports. Another disadvantage is the imposition of import duties on chemicals and machinery. Few specialty

chemicals for tanning are produced in developing countries, although basic chemicals such as salt, lime, sulphuric acid, sodium sulphate or sodium carbonate may be available indigenously. Most tanning materials, dyes, fat liquors, special auxiliaries and finishes need to be imported.

Inadequate Legislation and Lack of Monitoring Facilities

Pollutant discharge standards in most developing countries are by nature rigid and have a disregard for specific site conditions. Instead of a gradual approach as called for which would phase installation of treatment facilities (for example the physico-chemical first followed by the biological treatment and appropriate sludge handling) a tanner is under pressure to put up a complete treatment system and meet all discharge limitations at once which is beyond his financial and technical means. However, very few tanners have the necessary process and effluent treatment control facilities and legislation enforcement agencies usually lack skilled personnel to monitor performance of the installed treatment plants.

Social Barriers

Governments often feel inhibited from dealing with problems related to modernising of the tanneries because of the social and even political upheaval that would occur. The problem is further exacerbated where tanners are traditionally regarded as socially inferior because of the nature of their work. These groups, because of traditional discrimination, have amassed considerable political privileges. Consequently there are difficulties in altering the structure of artisan industry.

Technical Assistance Laboratories

Most of the major leather and footwear producing developed and developing countries have research and development laboratories and technological teaching facilities. It is usual that either the R & D laboratories or the teaching establishments, or both, have pilot tanneries in which technological developments are taken a stage further towards commercial leather production by industry. Some of these have pilot effluent treatment facilities which are of benefit in helping the local industry adopt relevant methods of emission limitation and treatment. Nevertheless there remains a problem in transferring technology from laboratory and pilot plant of an R & D to practical everyday use in the industry.

CHAPTER 2

OBJECTIVES

The objective of this study is to analyze the leather industries in Jajmau area of Kanpur, U.P. located in an area south-east of the city, close to the military cantonment area, and on the southern bank of the river Ganges, to study the technology adopted by tanneries in production of leather from hides and disposal of solid and liquid waste. The motivation towards this work is to investigate the role played by government in promoting social, economical and environmental concerns related to leather industry. The focus has been towards describing how different issues and interests result into conflicts and how does it affect the socio-economic environment.

CHAPTER 3

LITERATURE SURVEY

3.1 Leather Manufacturing Process:

The processing of hides and skins into leather is a complex procedure that requires a precise combination of many chemical and mechanical operations. A step-by-step diagram of these processing operations is shown in Figure 3.1.

Curing: Deterioration begins immediately when a cow is killed. After the hides are removed from the carcass, they are salted through and through at the slaughterhouses to prevent decay. After they are salted, 55% of the water in the hide is removed, and they are dried for 3 to 6 days. The rawhides are then sold to tanneries.

Soaking: In order for the tanning process to work properly, the dry salted hides must be washed free of the salt. This is done by soaking the hides in water to which chemical wetting agents (similar to household detergents) and disinfectants are usually added for 8 to 20 hours, depending on the thickness of the hides. This soaking procedure rehydrates the hides to their original flaccid condition and removes the dirt.

De-hairing: The hair must now be removed from the hides. This is done by soaking the hides in chemicals, or depilatory agents, which destroy the hair by attacking the hair root so it will release freely from the hides, loosen the epidermis, and remove certain soluble skin proteins that lie within the hide substance without destroying the desirable collagen of the hides.

Fleshing: Excess flesh, fat and muscle must now be removed from the hides. This is done with a fleshing machine.

De-liming: All the depilatory chemicals must now be removed from the hides. This is done by washing the hides in ammonium sulfate or ammonium chloride and then clear water in big drums. These chemicals not only clean the depilatory chemicals from the hides, they also adjust the acid-alkaline conditions (pH) to the proper point for receiving the bate, which are enzymes similar to those found in the digestive system of animals. When the bates are applied, they attack and destroy most of the remaining undesirable constituents of the hide.

Pickling: The hides must be placed in an acid environment (low pH) so they will be ready to accept the tanning materials, because chrome tanning agents are not soluble under alkaline conditions. This is accomplished by adding salt and acid to the hides. This is a preserving process in itself, and hides can be kept in this state for extended periods of time without any deterioration.

Tanning: The raw collagen fibers of the hides must be converted into a stable product which is no longer susceptible to rotting. This is done by adding chrome tanning agents to the hides in a revolving drum. These tanning agents also significantly improve the hide's dimensional stability, abrasion resistance, resistance to chemicals and to heat, the ability to flex innumerable times without breaking, and the ability to endure repeated cycles of wetting and drying.

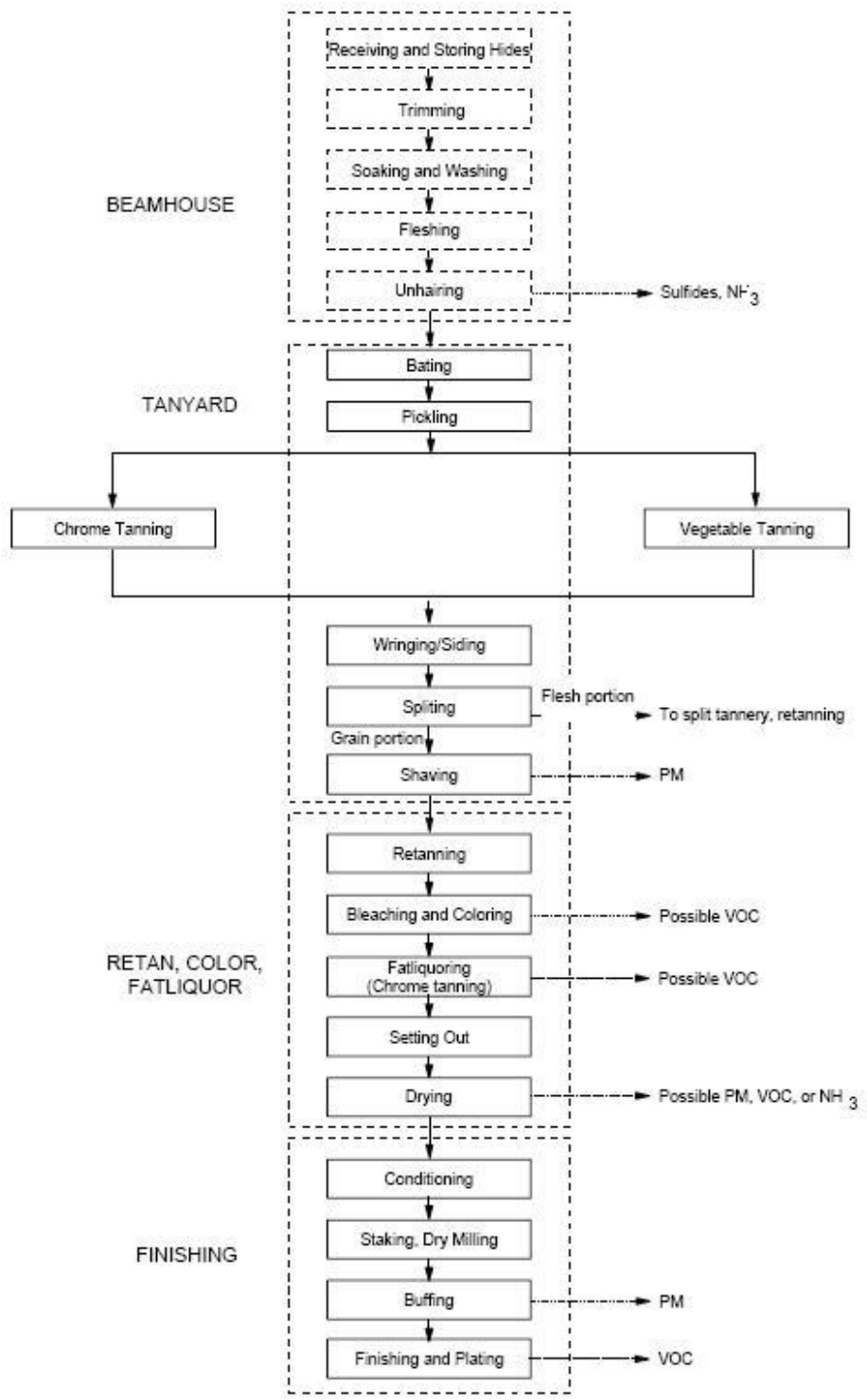


Figure 9.15-1. General flow diagram for leather tanning and finishing process.

Wringing: The excess moisture must be removed from the hides. This is done by placing each hide through two large rollers similar to those on a clothes wringer.

Splitting: The hides must now be split into the desired thickness. Unsplit hides average to be 5mm thick. The thickness for upholstery leathers range from .9mm to 2.0mm. The hides are put through a splitting machine that is set to split the hides to the desired thickness. It cuts the top grain off first. Another layer, and sometimes two, is cut. These layers are called splits.

Shaving: The thickness of the hides must be made uniform all over the hide. This is done with a shaving machine through which the hides are run. The helical shaped cutting blades level the overall thickness to exact specifications and open the fiber structure to better receive subsequent chemical processing.

Re-tanning: This process is done to impart special end-use properties with other tanning chemicals. The substances used add solidity and body to chrome leather and help minimize variations in the character of the leather that may still exist between different parts of the hide.

Coloring: As soon as the retanning process is completed, aniline dyes, derived primarily from petroleum and added to very hot water, are added to rotating drums to penetrate the hides for desired color.

Fatliquoring: This is the last of the wet chemical operations to which the leather will be subjected. Fatliquoring has the most pronounced effect on how soft leather will be and it contributes greatly to its tensile strength. The more fatliquors that are added, the softer the hides will be.

Setting Out: This operation smoothes and stretches the hide, while compressing and squeezing out the excess moisture. This puts the hides in the proper condition for drying.

Toggling: The hides are stretched across a perforated frame and held in place with clips called toggles. One hide is clipped to each side of the frame. The frames are then slid into channels in drying ovens.

Staking: Leather is staked to make it pliable. In combination with the correct fatliquoring treatment, staking governs the final firmness or softness of the leather.

Dry Milling: The hides are placed in a large dry drum and tumbled until the desired softness is obtained.

Buffing: This process improves the final appearance of the hides by lightly sanding the surface to remove some of the natural imperfections such as scratches, healed scars, etc. It provides the hide with better cutting yield.

Finishing: This process applies film-forming materials on the surface of the hide. Here is where layers of pigments are added if required. This process also adds the protective sealant to the surface.

Plating: This is the final step in the leather process. During this process, heat presses a chosen grain into the surface of the hides.

3.2 Government Regulation and Support

Since pollution is considered an externality, i.e. a cost of production that is not included in a product's market price, it is also considered a market inefficiency that the government could (or should) regulate to correct. Environmental regulation is the single most important factor to influence firms to consider environmental issues. But do regulations automatically result in implementation? Or what needs to be in place for the firms to take the regulations into action? A firm's decision to comply with regulation is connected to the cost of non-compliance, meaning that the regulations need to be enforced by some controlling authority capable of presenting real negative threats (such as a fine or a penalty) for the industry in question for firms. The decision of how to respond to environmental regulations is based on a consideration of the potential economic benefits or disadvantages of complying and not complying. Firms that are more restricted financially (often smaller firms) are less likely to formulate an environmental plan than firms that are better off. Hence, less profitable firms are more likely to have a lower environmental performance. In addition, the regulators must have the administrative capacity to enforce the regulations.

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. The Government of India has announced various initiatives to make the leather industry more competitive. Key policy initiatives include:

1. De-licensing of integrated tanneries that convert raw hides and skins into finished leather. Several leather goods have been de-reserved from the Small Scale sector.
2. Free import of raw hides & skins, semi-finished and finished leather.
3. Concessional duty on imported machinery and chemicals.
4. Free export of raw hides & skins, semi-finished and finished leather and leather products.
5. Policies to facilitate modernisation / upgradation: In June 2005 the government initiated a US\$ 64 million 'modernising scheme' called the 'Integrated Leather Development Programme', whereby all leather tanning and product units would be eligible for modernisation assistance. The assistance would be to the extent of 30 per cent of project cost for SSI units and 20 per cent for non-SSI units, subjected to a ceiling of US\$ 110 thousand per unit.
6. Setting up of leather parks: An outlay of US\$ 24.5 million for setting up five leather parks — two in Chennai and one each in Nellore, Agra and Kolkata. 12 The Council for Leather Exports has estimated that this scheme would generate a total investment of US\$ 267 million in about three years.
7. Establishment of 'design centres' at individual manufacturing units, to facilitate improvement in design capabilities: Under this scheme, 25 per cent of the project cost was provided to the units under the market access initiative scheme of the Ministry of

Commerce and Industry. Several individual units have come forward to establish their own design centres.

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 of 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 adjusted¹⁴. 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. For them, pH should be in range 6.5 to 9.0, COD should be less than 250 mg/l, suspended solids 100 mg/l, sulphide 2 mg/l, and chromium 1 mg/l. 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.

To enforce these regulations, the state pollution control board (SPCB, in this case the UPPCB) is the authority. They have the right to go for inspections in all tanneries, at any time and without warning, to check that they have a PTP and that it is being run properly. They may also take water samples from the water that is let out from the PTP. If the values of the test results exceed the standards, the tannery is given a warning, but no fine, and if they do not comply properly with the regulations, the SPCB can shut the tannery down. The regulations are backed by the Supreme Court (SC), and if closed down, the tannery will have to wait for a long time before their case can be processed by the court. The SPCB is also supposed to monitor the operation of the CETP, but since the SPCB is the government, and the CETP is run by the government, the control function is less than towards the tanneries which are private sector.

CHAPTER 4

COVERAGE AND METHODOLOGY OF STUDY

4.1 Methodology

The survey was aimed at gathering information from different sources that play role in leather manufacturing and are affected by the after effects of the production. In order to assess the level of technology used in leather production and waste disposal technology, tanneries located in Jajmau were selected since most of the small scale and large scale tanneries are concentrated in this area. Some 380 odd leather units are located in Jajmau area, right on the bank of river Ganga. These units, which use many toxic chemicals, are the single largest contributor to the pollution of the surface as well as groundwater of Jajmau area in Kanpur.

After this in order to determine social impact of leather production on the nearby society and workers, labor working at the waste disposal site and the villagers of the nearby village were interviewed. And finally, an officer incharge of WasteWater Treatment Plant was consulted to assess the effluent treatment technology used in cleaning the effluent coming from tanneries.

4.2 Coverage

Most of the tanneries are located in Jajmau, an area south-east of the city, close to the military cantonment area, and on the southern bank of the river Ganges. This location was optimal in the early days, because the tanning activity was kept outside of the city area (so that stench and waste would not be a problem for the city dwellers). Also, to have access to water was important because the tanning industry has a high consumption of water. Today, the area of Jajmau is crowded, not only with tanneries, but also with the houses of the people living there. Jajmau is no longer separate from the city, and most of the people living there are workers in the tanneries. Many of the tannery owners also live there, even though Jajmau is considered a very poor area. The area has narrow dirt roads with no drainage and no light, and litter and waste from the tanneries are everywhere

Tanneries

No tannery allowed us to enter into their building. Several excuses like the chief not being available, tannery not working (although the chimney was emitting black smoke) were given.

Workers

Three labourers were working in collecting slush, the watery mud and spreading out in open to be heated and dried by sun. The dried mud consisted of leather waste and remains of hides. These hides are boiled to produce adhesives, organic manure and chicken feed. The fumes emanated from these factories pollute air and discharge foul smell much to the dislike and annoyance of the residents of the area. But despite these effects, when the workers were asked about the consequences and their willingness to do such kind of work they replied that there are no after effects of this work, they do not sustain any kind of skin or breathing disease, there is no wastage from tanneries, everything that tanneries release are disposed in

one or another way, there is no damage to soil by the effluent rather it contains elements that make land more fertile.

Pan Wala

A Pan Wala, resident of a nearby village was interviewed and gave information regarding the kind of pollution that tanneries of the area cause to the neighborhood. He told that agricultural fields are destroyed because the water which is used for irrigation is highly toxic. A lot of air pollution is caused by the bhattis (illegal glue factories) which burn leather. He complained that the open channels that drain into river Ganga contain black water and stink heavily. He talked about problems faced by villagers and lack of appropriate measures by government to tackle their problems.

Villagers

Residents of village named 'chakeri' were interviewed to state their problems with the pollution caused by tanneries. They told that people suffer from diarrhoea, cholera, skin diseases and spontaneous abortions. They showed swollen spots on chest and damaged nails. They gave instances when cattle kept jerking their neck, lied down and then died. They also said that sick animals gave lesser milk. They found isolated from the rest of the world and felt that there polluted surroundings has harmed their relationships with people from other villages. They told that people are reluctant when it comes to marrying a person from this village. When asked about the efforts they have made to raise their voice against this problem, they told that they have send mails to district magistrate, but no support has come to their rescue. They said that on the letter addressed to the President of India explaining the situation faced by the people, High Court ordered for the closure of the bhattis but these became operational again and now operated in night instead of the day time. This worsened their problems and made it extremely difficult to sleep in night. They blamed the politicians who themselves are owners of tanneries and said that these people bribe policemen and condemned system for taking bribes. They asked why government becomes so careful when it comes to religious importance to ensure safety of river Ganga (as in Kumbh Mela 2007) and control its quality but on other hand close their eyes towards maintaining quality when a person or a kid from a village takes bath in the same Ganga river?

Doctor

Dr. Shivilal Sharma, member of Bhartiya Manwadhikar Association, resident of Chakeri village talked of mostly what other people said but expressed it more explicitly. He told that people have been suffering from diseases originating from polluted air (from bhattis), acidic water (contaminated groundwater from pumps), and contaminated food chain. He told before the launch of Ganga Action Plan (GAP), Kanpur Nagar Niagm supplied the villages river water mixed with sewage in the ratio 3:1 for irrigation; sewage is rich in nutrients and helps increase the yield. But this was stopped post- GAP and the government started supplying treated effluent and sewage with very little river water mixed in it. The acidic water containing salt, caustic soda, chuna (limestone), acid and other chemicals has decreased the productivity of the land. The land which produced 15 quintal of wheet now produces 5-6 quintal. Rose agriculture is destroyed completely. He told that the land has become soft which is indicative of its decreasing fertility. He told that the land on which remnants of animal hides and leather is burned are properties of zamindars and they have rented it to the

tanners who pay them heavily (order of lakh per month). This land exploitation is destroying the future of farmers.

Wastewater Treatment Plant

A senior officer managing the operation of wastewater treatment plant was interviewed regarding the kind of technology being used in the plant, quality of effluent released for irrigation and disposal of waste. He explained us the entire process of tanneries and domestic wastewater treatment. He told that main component of contamination is organic loading which is represented in terms of Biochemical Oxygen Demand (BOD) and inorganic load as Total Dissolved Solids (TSS). When asked about the efficiency of the plant, he told that the plant is working undercapacity at an efficiency of around 65%. This he said is due to lack of funds available for operational and management costs. He told that the wastewater is highly corrosive and damage iron bolts and pipes. He even showed us pipes colored green that were made of special kind of fibre which was resisting corrosion since the time when the plant was established even showing signs of corrosion. He told that as per the directive of Supreme Court, the tanners and the Kanpur Nagam Nigam (KNN) are supposed to share the operation and management costs of the plant on 50:50 bases. Both have diverted from their commitments. When asked to comment on the presence of high traces of toxic elements like chromium in the effluent discharged from the plant, he said that it is the responsibility of tanners to remove chromium from their effluent. He told that tanners producing more than 50 leather hides per day, big tanners, are installed with chrome removing facility but they do not abide by the law and do not care for the environmental degradation. He told that it is favourable to remove chrome at the source because it is easier and beneficial from the tanner's point of view since he can convert the hexavalent chrome to trivalent chrome and recover it to save his cost on raw material. But their ignorance has not only elevated problems for them but also created problems for the environment. For tanners producing less than 50 leather hides per day, small or medim tanners, effluent is brought through tankers and treated.

CHAPTER 5

ANALYSIS OF PRIMARY AND SECONDARY INFORMATION

India's leather industry occupies a prominent role in international trade, generating foreign exchange and providing employment. The industry employs more than 2.5 million people. Much of the economic benefits derived from leather production and trade, however, have typically come at considerable cost to the environment and human health. The case study has presented important findings and analyses, leading to an enhanced understanding and appreciation of the multiplicity of barriers and opportunities for the further development of the Indian leather sector. The problems faced by leather industry in India shows the very nature of the Indian economy. It shows how democratic structure shatters when every individual defends his failures with other's shortcomings. As for the common man, this ignorance has led to financial, social and health related problems and they feel desolated on their own land. The following section gives the analysis of role played by different players:

Government

GAP was implemented in Kanpur in 1985. After more than Rs 67 crore spent, the Ganga is more polluted than ever before. Before Ganga Action Plan (GAP), raw effluent from the leather industry in Jajmau area of Kanpur used to flow unabated into Ganga through drains. A conveyance system was built under GAP-I in which Intermediate Pumping Stations (IPS) were used to collect and carry tannery effluent to the CETP. Untreated tannery effluent is still discharged into Ganga, owing to malfunctioning of the IPS. Thus, despite four intermediate pumping stations along the Ganga intercepting and diverting the waste to the main pumping station, over 60 per cent of Kanpur's 360 million litres per day (MLD) sewage and 9 MLD effluents are dumped into the river. Some tanneries have even bored holes in their premises, and dump the waste directly into the city's aquifers.

Also, the waste that reaches the treatment plants from the main pumping station is ill managed. The plants rarely function due to power failure. Lack of electricity has rendered dysfunctional the infrastructure set up under GAP's first phase. This has resulted in discharge of sewage and effluents rich in hexavalent chromium, a known carcinogen, supplied for irrigation. Such occasional functioning also means the chromium-rich sludge is dumped carelessly. Lack of proper controls, corruption in bureaucracy and insufficient fund transfer to CETP reveals the true attitude of government towards handling the problems.

CETP

The Common Effluent Treatment Plant (CETP) is not equipped to deal with chromium. The plant works under capacity due to insufficient money supply from tanners and government. This result in increase in concentrations of chemical constituents beyond their standard levels laid down by government. The chromium released by the tanneries goes untreated to join river Ganga or agricultural land for irrigation.

Industrialist

The most important explanations of firms' non-compliance with environmental regulations are that the enforcement of the regulations is poor and fraudulent, that many of the tanners believe their activity does no harm to the environment, that there is no customer or market demand for cleaner production. There is a difference between 'cleaning' and cleaner technology. The firm using cleaner technology will only have an advantage in International markets where they would be competing firms from other countries having stringent environmental norms and would have a first mover advantage in the sense that the native firm would take time in reaching that level of technology. But this first mover thing is not valid in India because most of the countries India export to have already implemented equally or more stringent environmental norms. So this concept won't apply for a developing nation exporting to developed nation. Also, there are again bureaucratic obstacles to the paying for the CETP's operation. Since the politicians are also tannery owner, the anti-pollution drive is often of no use as there are many ways to circumvent laws if lawmakers themselves are involved in the process. They don't install chromium recovery plants and argue saying that they have done their part by contributing 17.5 per cent cost of the CETP.

Since the CETP in Jajmau is a joint tannery waste and city sewer treatment facility, many of the tannery-owners are critical to the fact that the tanning industry is the only industry that has to pay. They claim that many other industries are letting their waste into the general city sewer, and therefore should also pay. Only the tanneries should not pay because so many other industries are also discharging their effluent into the same city sewer channel. Also, on top of these attitude problems, there are misunderstandings on part of the tanners' either because of lack of information or because policies change with time, and makes it hard to know what one is supposed to be doing. Also the operational price paid is not dependent upon how much quantity water one use or discharge. Customer demand and government pressure are the most important factors leading the firm to implement environmental practices. Most of the tanneries have a very short-time perspective for their business, for some the survival is from year to year, for even smaller tanneries the operations is on and off on a monthly basis. With these short time frames, no one is thinking of spending time and effort to develop a 5 or 10-year strategy on any issue.

Common Man (Farmers)

Chromium enters in food chain. These irregularities have had a disastrous economical, social and health impacts.

Economical: The yield of wheat, paddy and barseem (a local animal feed plant) has reduced 50 per cent due to the use of contaminated irrigation water. Earlier floriculture, mainly rose farming, sustained the economy of these villages. But these roses stink. The size was also very small. The flower yield has dipped by 60 per cent. Vegetables grown in these villages couldn't be sold in the city even at very low rates. This decrease in output strips the basic earning of farmers.

Health: Glue-making units that use the waste (flesh) and other by-products of tanneries on the outskirts of most villages have aggravated the trouble. Besides, the affected villages do not have primary health centres.

CHAPTER 6

SUGGESTIONS AND CONCLUSIONS

Suggestions

However negative these findings may be, there are opportunities to improve this situation. A comprehensive, well synchronized action by respective governments, industry, R&D and establishments, environmental authorities, international organizations, etc. to address the main constraints mentioned earlier is a prerequisite to achieving sustainable development in the tanning industry.

I. *Government Regulations*

First, there is an immediate need to stop the corruption that is making it possible for the tanners to get away with not cleaning their effluents as the regulations abide them to. Second, there should be an increased reciprocity between the tanners and the CETP in Jajmau so that the tanners would feel more responsible for the effluent let out by them to the CETP. The focus on corruption is extremely important because it gives the tanners not only an opportunity to escape from cleaning their effluents as they should, but an actual encouragement to not do so, because non-compliance with regulations is the only way of having only one cost (for corruption) rather than two (for corruption and cleaning). Hence there are not only no incentives to clean, but the corruption is an actual impediment to clean. No matter how well the tanners do in cleaning, they still have to pay bribes. The need to end this corruption is therefore urgent. It is also important to make sure that the PCB officers that are responsible for the control of the tanneries have enough skills to do the control properly, and that they have the knowledge to teach the tanners how to achieve the standards if they are not meeting the norms at the moment of control.

II. *Effective Monitoring*

Charge each tanner for the cleaning on the basis of how much effluent the tannery emits. This would be possible by establishing a measuring unit at the end of each tanner's pipe, measuring the amount of effluent it creates before it goes in to the common conveyance system. This would force the tanners to be more careful about their water consumption, and reduced water use could reduce the quantity of chemicals used. An even better option would be to have measuring equipment that could monitor the quantity of chrome and other chemicals contained in the effluent, and that each tanner would pay according to these measures. This would further encourage the tanners to reduce their use of chemicals as well as it would be another incentive to install recycling options such as chrome recovery plants. One obstacle is that the installment of these measuring equipments could be expensive. Instead, one could invent a system of discounts for tanneries that had for example chrome recovery plants, so that they would pay some percentages less for their effluent treatment at the CETP than other tanneries sending heavier pollution loads to the CETP. The way in which the CETPs function today (based on quantity of hides or water consumption), they are "anti-cleaner technology"

III. *Inter Tannery Monitoring*

A less technical alternative is to improve the environmental performance of the Jajmau tanners by so-called “noisy monitoring”. This means that the tanneries should monitor and report on each other. This is possible because already today the tanners in Jajmau are closely related and well informed about each other’s activities. One would have to find a way to ensure reporting and avoid “brotherhood” tendencies between the different tanners. Any reported defaulter should be highly penalised in addition to warning of permanent closing down in case of any further disobedience.

IV. *Eco-Labeling*

For the leather industry, there have already been suggestions to market vegetable tanned leather as environmental friendly or give the leather an eco-label. This is problematic both because it is not so certain that the vegetable tanned leather is any more environmentally sound than the chrome tanned leather and anyway, there is not a demand for such “clean” leather among the customers. It is hard to find good standards that take into consideration both the product itself as well as the production process, that suit all countries. Even though there are many challenges to the development of such labeling, the efforts should be continued. Only by market response would tanners be forced to improve their environmental performance.

V. *Financial Support*

Changes in the financial and in the insurance markets could be effective tools to improve the environmental performance of the tanning industry. If better interest rates on loans were given to tanneries with a good performance, or maybe a discount in the insurance premium, tanners would strive to achieve environmental standards. Special financial schemes can be floated for small and medium scale enterprises.

VI. *Qualitative boost*

Despite the economic importance of the leather industries for the economies of developing countries there is a discriminating attitude towards them because of the high pollution level. The younger generation at colleges and technical institutions do not find the tanning industry very attractive and are likely to select other industrial options. Developing countries should work towards a qualitative up-grading of the tanning industries. New industrial complexes should be designed, on a modern basis, incorporating all possible equipment safeguards and intrinsic safety features, to house new tannery units and relocate those currently beset with serious pollution problems.

VII. *Human Resource Development*

Most of the developing countries are facing acute shortage of technically qualified personnel for the operation, monitoring and maintenance of effluent treatment plants for tannery wastes. Appropriate training and education programmes are needed to cater for the

needs of technical personnel at various levels (operating, supervisory, managerial and design). There is an urgent need to prepare a working paper which precisely identifies a training curriculum, type of faculty and infrastructural facilities required for this purpose. The existing expertise and facilities available in some of the developing countries should be taken into consideration and if necessary they should be strengthened and made more broadbased to cater for the regional needs.

VIII. Development of Commercial Plants

Pollution control technologies have to be techno-economically viable with attractive financial returns for adoption in the traditional leather sector. The technology packages should consist of in-plant control, end of the pipe treatment and waste management components. There is a great need to set up demonstration plants for common effluent treatment, in-plant process controls and tannery waste utilization in the midst of tanneries in selected developing countries in order to enable them to see the performance of the new systems under field conditions. The demonstration plants should also be utilized for training of technical personnel from the developing countries. Adequate attention should be paid to the management of the demonstration plants. Sharing of managerial responsibilities by the existing tanneries will promote the cause of smooth technology transfer and generate a multiplier effect.

IX. Others

1. Good Housekeeping - water conservation at all stages of wet processing.
2. Savings in chemicals by introducing reuse-recovery-recycle systems can pay for the simple equipment needed to run them, such as collection pits, pipes and pumps.
3. Maximization of returns on tannery by-products, residues from sludge and solid wastes (production of gelatine, protein powders and collagen for sausage casings and medical and surgical films, glue, animal feed protein and fertilizers, leatherboard, filter media, non-wovens, etc).

It is believed that by combining strict process control, good housekeeping measures and cleanliness, introduction of recycling of some floats, predominantly aqueous finishing together with simple treatment of wastes it would be possible to eliminate nearly 50 per cent of the total pollution load discharged into the environment with only marginal investment.

Conclusions

Even though the Indian environmental regulations for the tanning industry are equally stringent as the international regulations, the pollution load coming from the tanneries is still heavy, and it is a problem both for the people living nearby, and for the river and ground water. There is a wide gap between the environmental regulations for the tanning industry and the environmental performance among the tanneries in the Kanpur area. Though few tanneries have the prescribed equipment to do primary treatment but most still fail to operate them properly or at all. Many of the tanners believe their activity is not harmful to the environment, or they do not see the environment as something that needs to be protected or treated properly. Much of the reason for this is the problem of corruption and the bribery that

the PCB officers demand. The poor financial position and the small size of many tanneries are also important factors. Even though the cost of doing primary treatment is very low in India, the organization of the payment for secondary treatment has led to a lot of confusion, mal-information and mistrust between the tanners and the state bureaucracy administrating the CETP in Jajmau. Many tanners have failed to contribute their share of the cost. Also the fact that most of the tanneries in India are supplying the world market with low quality products or intermediaries, limits the opportunities to benefit from technological upgrading towards cleaner technology. Finally, “demanding customers” are too far away to be able to influence the environmental performance of the tanneries. All these factors contribute to explain the tanners’ environmental performance. Finally, it is important to acknowledge that the opportunities for technological upgrading that could trigger a better use of resources and hence reduce the production of waste, are few and costly. Implementing costly technology or even cleaning mechanisms is a problem particularly for the many small tanneries (around 80% of the total number) that are in a poor financial position.