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Scoping & Sustainability Analysis of the Leather Industry Network

The Slaughter houses, Tanneries and Leather manufacturing industries can be considered to be the major constituents of the leather industry network, considering their impact on the environment and the work force employed therein. All these players of the leather industry network are contributing to the social, economic and environmental sustainability and unsustainability aspects of this network.

Economic Aspects

Economic Sustainability

Modern leather production requires a steady supply of raw materials. This explains the development of the tanning sector notably in those countries and regions well endowed with an abundant supply of raw hides or skins. The production of raw hides and skins depends on animal population and slaughter rate and is related mainly to meat consumption that is why the tanning industry does not respond directly to the laws.

India is known to produce some superior qualities of hides and skins. The goat skins of North Bihar and Bengal (The Ganges valley) possess very fine grain and are prized all over the world as the finest raw material for superior glazed kid leather. The current annual availability of hides and skins is placed around 160 million pieces. It is estimated that 40 to 50 percent of cattle hides and 30 to 40 percent of buffalo' hides are obtained from fallen stock. In case of cattle hides, only 79 percent of the fallen stock is recovered. In buffaloes hides and sheep skins the recovery is around 90 percent. If the rate of recovery is improved there will be substantial increase in the overall availability of hides and skins. Some amount of raw skin is imported from the foreign countries to prepare fine quality of leather.

The transportation charges to bring the animals from the farm to slaughterhouse are borne by the supplier or by the buyer, as per the contract. The animals are transported in cruelly overcrowded lorries or sometimes if the distance is small, animals also arrive at the slaughterhouse on foot. As a major source of livestock producing country, India is earning from both the authorized and unauthorized slaughterhouses. Most of the employment is from the specified caste and of illiterate people. All these slaughterhouses are contributing to increase the leather production.

There are 2702 slaughterhouses in the country, which are recognized or authorized by local bodies. In addition a considerable number of animals are slaughtered in unauthorized places. A

rough estimate indicates up to 50 percent of animals slaughtered in any urban center are from unauthorized slaughter. Over the years, the facilities and hygienic conditions in most of the slaughterhouses have deteriorated. Improving existing slaughterhouses to accommodate higher capacities and creating new slaughterhouses with modern facilities can overcome the demand of raw material for leather industry, which can contribute in the environmental sustainability.

The Indian leather industry, one the most vibrant sector of the country's economy, is well-structured and spans various segments, such as tanning and finishing, footwear and footwear components, leather garments, leather goods, including saddles and harness. The domestic and international markets for leather products continue to grow. India's planners laid great emphasis on increasing trade in potential sectors including leather. As a result, the Indian leather industry has grown rapidly during the last three decades. Indian leather goods constitute about 7 per cent of India's export earnings. Besides being a significant earner of foreign exchange, the leather industry generates employment, ensuring jobs for over 2.5 million people, with 75 per cent of the production from small and cottage sectors. The Indian leather industry contributes export earnings of Rs. 125.46 billion (2.225 billion Euros). It is now poised for a big leap to double its global share from the present 3%. The industry covers a vast spectrum of inputs, activities, skills and products i.e. livestock, hides and skins, tanning, leather products and exports.

A report by CII highlights that India is a noticeable player in the world in the Footwear & Leather market with its exports growing at 8% CAGR (Compound annual growth rate). Multinational companies are looking at India; some of them have already entered India in different ways. The Government is keen to support industry modernization and help double exports by 2010. However, a heavy dose of investment in manufacturing segment and training facilities is required to build up a large number of skilled workers and artisans.

Economic Unsustainability

Most important activity that cow farming provides is milk production and cow dung is used as the best manure. The cows are slaughtered in India because the owner of the cow finds it difficult to maintain them after she stops yielding milk. The commonest way of disposing off a cow is sale to a middleman, who ultimately takes her to a slaughterhouse. This is because it is generally believed that milk is the only commodity obtained from cows, which is useful and can be sold in exchange of cash. Some Indian breeds of cattle were well known for their endurance and milk yielding capabilities, but now a day most of the cattles are grown, especially for the meat and skin production.

Most of the slaughter houses in the country are more than 75 years old and also there is a noticeable increase in illegal activities of slaughtering animals, the meat industry does not meet the standards for discharge of effluents as laid down and notified under the Environment (Protection) Act, 1986. The unorganized nature of slaughtering is the main feature in this industry that has not been able to use state of the art of technology available in global meat market. This sector is facing many problems and constraints while going for modernization.

The Indian leather and tanning industry depends considerably on its supply of raw materials (hides and skins) and its ability to export production on the world markets. It is important for the industry to benefit from the globalization of trade in order to have access to raw materials on equal footing with its direct competitors and to exploit its comparative advantages.

It is commonly conceived that the leather tanning is a raw material and labour intensive industry, which contributes in a large extent to increase the production costs of leather products. Hides and skins have experienced over the time increasing price volatility. This lack of stability in the pricing of raw materials is at the source of major problems, notably for financially weak tanneries.

The Indian share on world markets tends to shrink with the development of the leather industry in other leather production centres in the world such as Mexico, Argentina, Brazil, USA, South Korea, China, Europe, and Pakistan.

If sustainable economic growth in the leather sector has to be achieved it is essential that certain trade partners such as Argentina, Brazil, Pakistan, Russia and Japan including India be brought together to give up their unfair competitive practices in the leather sector and that the conditions for free and fair trade be established in the international marketplace. This is important for sustaining a viable leather industry in India.

Social Aspects

Social Sustainability

Slaughterhouse hardly deals with the social sustainability of the particular region.

According to India's Ministry of Industry, direct and indirect employment in the leather industry is around 2.5 million people. No license is required for processing hides and skins. Sixty to seventy percent of leather production is in the small-scale sector.

Tanneries in India are economic activities with an eminently local socio-economic impact. They often constitute the most important wealth creating activity at local or even regional level and are therefore essential for ensuring the social and economic cohesion. In India tanneries tend to form clusters or districts featuring an above-average concentration of factories gaining thus considerable synergies in managing common issues and sometimes also certain political strength.

Most of the secondary business and service providers of the micro region depend on the leather industry network. Network generated secondary employment is in terms of transportation of raw hides and skin from slaughterhouses, finished leather to manufacturing units and leather products to the domestic and export market, women labour in footwear manufacturing and child labour in slaughterhouse, production, processing, distribution, packaging etc.

It is also observed that it is the marginalized section of the society that finds greater employment in the leather sector for possible reasons of the skills being handed down from one generation to the other or due to low level of literacy amongst this section of society. As these people do not find employment elsewhere, they take up the odd jobs involved in leather industry like collecting the skin from the slaughter houses, dehairing, liming and the tanning operations. As heads of 60 per cent of the households are engaged in leather work, it shows, child labour in leather flaying as an intergenerational phenomenon, where children contribute 20 to 40 per cent of the family income. Women are employed in large numbers, making important contribution to the national economy as well as to exports.

Raw hides and skins, wet-blue or sometimes crust, are the tanner's major production cost factor of the total production costs. The price and the quality constitute essential elements in the relations between the raw materials supplier and the tanner. These relations are fundamentally based on trust since it is virtually impossible to ascertain with precision the quality of the raw material in the raw stage. Indian tanners tend therefore to maintain close and friendly relations with their raw materials suppliers. These are either abattoirs selling fresh hides or skins, hide and skin traders or hide and skin markets (auctions). In general these are also small or medium-sized structures and, apart from relationship tensions in times of economic difficulties, the respective bargaining power appears to be relatively balanced.

Tanners are just as sensitive to animal suffering as any other person or group of persons, and it is actually in the interest of both the meat industry and the leather industry alike that animals are treated well and not submitted to stress or pain, let alone physical abuse before slaughter, as a

healthy animal assures better meat and undamaged hides. Tanners tend therefore to choose suppliers that comply with the principles of animal welfare.

The relations with suppliers of chemical substances and preparations required for tanning and finishing are slightly more complex. So, the tanner tends to be in a weaker bargaining position due to the size and nature of his business compared to his suppliers. Chemical suppliers tend to be larger and financially stronger than tanners.

Investments in machines represent an important entry barrier for sectoral operators. Tanners' relations with machine manufacturers are strong in terms of technical cooperation. With regard to the respective relative bargaining power, however, equipment producers tend to have similar strength as tanners.

Tanner's relations with customers vary depending on the various sub-sectors for which they work including the byproduct manufacturing industries.

Overall the tanning sector at national level has set up the framework for conducting a stakeholder dialogue. The topics in the dialogue with the chemical industry focus notably on environmental and health and safety matters.

Social Unsustainability

Animal Rights Violation

India is the only country in world that provides in its Constitution for mercy and care of the animals. According to laws enacted to prevent cruelty to animals, it is considered a crime to treat any animal with cruelty (beating, over-burdening, inflicting pain, etc.). On the contrary, the leather industry network has the dubious distinction of violating the animal rights in the quest for making money. The government has announced 100% supports for opening new slaughterhouses, and the agriculture department has already approved several slaughterhouses. According to laws, only those animals can be slain, which are older than 16 years of age, and are useless. However, now meat of young healthy buffalos between 4 months and one year is allowed for exports. The cows and calves often purchased under the pretense that they'll live out their lives on rural farms, are marched for days and crammed into overcrowded lorries in direct violation of the Constitution of India. Those who collapse have chili peppers and tobacco rubbed into their eyes and their tails deliberately broken in an effort to keep them moving.

Abattoirs, like Deonar in Mumbai, and other municipal slaughterhouses in Calcutta, Delhi and Bangalore, fail even minimum humane, hygienic, religious and legal standards for slaughter and

animal handling. Investigators witnessed frightened buffalos and bullocks that have their throats slit in full view of each other on the floor, then are shackled and hoisted upside down to be bled while conscious. Diseased cattle and cattle, goats, sheep and pigs injured during transport were left in the hot sun to die in pain, dehydrated and suffering from wounds.

The violent operations of the slaughterhouse create the psychological disorders mainly in the child workers and to survive and get habitual to that atmosphere; workers take a support of alcoholic drinks.

Even if the leather industry is labour intensive, there is inappropriate provision of safety equipments by tanneries and leather industries for workers in India. Labors working in this sector are salaried with very low wages; it shows indirect impact on standard of living of the workers.

Child Labour & Occupational Health Hazard

The footwear industry which is a significant segment of the Indian leather industry employs children between 10 to 15 years old mainly for assembling shoes. Most slaughter houses use child labour as it is cheaply available. The gory sight of blood and death can have a negative influence on the young minds. Children work on soling (fixing upper portions of shoes to leather or rubber soles) with glue. Children in cramped, poorly lit rooms suffer from continuous skin contact with industrial adhesives and breathing vapors from glues. The children working in the footwear industry are exposed to physical factors like poor illumination, noise and poor ventilation and chemicals like leather dust, benzene that is used as a solvent in glues and p-tert butyl phenols, which is used in neoprene adhesives. Thus most children suffer from respiratory problems, lung diseases and skin infections through constant exposure to glue and fumes. They are also exposed to the risk of nasal cancer, neurotoxicity and adverse physical factors. The children employed in the footwear industry usually carry out the sewing process manually. During this they are susceptible to injuries from sharp special needles. Besides, there is always a risk of wound contamination because of poor knowledge of wound care and neglect of the injury.

Tanneries maintain numerous exchanges with their local community. Their relations focus on economic, environmental and cultural matters. These relations although rarely of a controversial nature can provoke some friction, especially related to noise and odour issues, thus the need for further developing a dialogue. The tanning process requires huge quantities of water in its whole processing. About 40 cubic meters of water is generally required to process one ton of hides. This is a large volume, as the average per capita water availability for human settlements in India is estimated at around 30 liters per day. Energy used by tanneries and leather industries is mostly used in all the machineries used for converting raw material to the finished leather and production

of leather products. So huge requirement of water and energy leads to competitive resource consumption by a tannery which creates a problem for the local population.

Environmental Aspects

Environmental sustainability aspects

Slaughtering of animals in the slaughterhouse for meat production gives skin and hides of the animals as a byproduct. This activity produces several solid and liquid waste leads to environmental pollution. Use of new environmentally friendly technologies can overcome the problem of pollution of the slaughterhouse.

The environmental challenge to make the slaughterhouse activity sustainable can be threefold by adoption of following technologies:

- to raise technology levels and increase knowledge on waste prevention, use of by-products and waste treatment;
- to strengthen institutions to establish and enforce environmental regulations; and
- to develop infrastructure to linking rural-based production and processing to growing urban markets.

Leather production consists of four main processes. These are beam house, tanning, post tanning and finishing. Several pollutants are produced by all these processes leads to environmental pollution. Use of new environmentally friendly production methods and technologies can overcome the problem of pollution of the leather sector.

Environmentally friendly production methods and technologies

The quantity of pollution load generated by the leather industry can be reduced by:

- Process modification to reduce the generation of waste and pollutants in the beam house
- Reuse of chemicals (mainly sulphides and chrome) and spent liquors
- Economical use and reuse of water

The modifications required to make various processes in leather making environmentally friendly are described below.

Desalting and soaking. The salt load in the effluent can be reduced by:

- Decreasing the amount of salt used to preserve hides by adding environmentally acceptable anti-septics such as boric acid and sodium sulphide. It must, however, be mentioned that the use of these preservatives reduces shelf life.
- Use of improved methods of desalting by using Dodeca frames and desalting machines.

- Processing fresh (green) hides, which have been preserved by chilling.

Unhairing and liming. The pollutants from these processes can be reduced by using the following technologies:

- Recycling spent float. This also leads to a reduction in the amount of water consumption.
- Enzymatic unhairing. This can lead to a reduction in the use of sulphide, leading to a reduction of COD by 30-40%.
- Deliming and Bating. The environmentally friendly alternatives include: ammonia free deliming and bating and carbon dioxide deliming.

Chrome tanning. Cleaner technologies to reduce chrome content in the effluent are:

- High exhaustion process in which short floats at higher temperature and pH are used. The process increases the extent of chrome exhaustion and reduces the chrome content in the effluent.
- Recovery/recycling of chrome. In this process, chrome in the effluent is recovered and reused in tanning process.
- Low or no chrome tanning.

Post Tanning. The methods to reduce the load of pollutants generated by these processes are:

- High Exhaustion
- Chrome fixing in neutralization
- Chrome precipitation.
- Replacing nitrogenous compounds with other filling agents;
- Phasing out environmentally hazardous chemicals with high COD and BOD values, and limited biodegradability.

Finishing. A reduction of volatile organic compounds can be accomplished by using aqueous finishes for base and middle finish coats.

Environmental unsustainability Aspects

Over the last several decades, the Indian leather industry experienced a significant increase in demand of the leather products. Consequently, footwear and leather goods have become one of the top exports from India to various developed countries. However, in recent years, the pollution caused by the wastes from hundreds of tannery firms has adversely impacted public interests resulting in judicial intervention.

The Leather-tanning sector in India is included in the “Red” category of industries due to the potential adverse environmental impact caused by tannery wastes. More than one-half of India’s tanneries are located in the State of Tamil Nadu in Southern India. The effluents from these tanneries caused extensive contamination to ground water resources and produced severely negative impacts on crops and human health.

Slaughterhouse is providing different quality of raw materials to the leather industry; but because the drainage of untreated effluents and improper dumping of the waste, slaughterhouse leads to the environmental unsustainability.

Pollution from the slaughter house:

- Unhygienic surroundings: the floor of the slaughter houses is littered with blood, waste meat, flesh, etc which give out a very offensive odour and spread the diseases.
- Pollution: The blood pollutes the surface and ground water bodies in the vicinity of the slaughter houses, while the rejected organs of the butchered animals are dumped carelessly contributing to the solid waste problems which ultimately gives birth to the animal diseases.
- Odour: The foul smell emanating from the decomposing organs that are left on the floor of the slaughter house is a major pollution problem, even for the local community of that area. Lack of proper ventilation, inadequate provision of water further compound the problem.

Wastes and chemicals released to the water system are the key pollution issues for the tannery industry. They are produced during washing, dehairing, and tanning of the leather.

Pollution from the tannery:

- Occupational health hazards: Chemicals used during tanning are used by the workers with bare hands without any protection that exposes them to various diseases like dermatitis, skin cancer, etc.
- The odour caused due to the release of various chemicals like ammonia and hydrogen sulphide, during the leather manufacturing process produces respiratory disorders as well as serious problems like asphyxiation.
- Excess water consumption: Tanneries are amongst the biggest water consumers. Every 10 kg of raw skin tanned requires about 350 liters of freshwater. This demand by the tanneries results in severe depletion of the surface and ground water tables.

(Research Communication, Impact of pollution due to tanneries on groundwater regime, N. C. Mondal*, V. K. Saxena and V. S. Singh, Groundwater Group, National Geophysical Research Institute, Hyderabad 500 007, India)

- Waste water production: Wastewater discharged for 100 kg of skin and hide processed varies from 3000 to 3200 litres. This water is loaded with chemicals like common salt and chromium which makes water treatment difficult and tedious.
- Water Pollution: Tannery effluents, which are rich in chemicals like chrome and sulphides in addition to insecticides, fungicides and ammonia, when discharged untreated or partially treated, pollute the receiving stream and if allowed to percolate into the ground for a prolonged period seriously affect the groundwater table. Wastes from that effluent because of the decomposition of organic matter may give rise to noxious odour. The water may also become saline and hard due to the presence of inorganic salts.
- Effect on land: Treated effluent is used to irrigate crops. Soil has a certain capacity to neutralize pollutants, but uncontrolled level of pollutants damages the soil.
- Tanneries generate substantial quantities of solid waste. About 50 per cent of the raw materials (trimmings, fleshing and shavings) in the process occur as wastes. If disposed on land, these waste containing hazardous chemicals (primarily chrome) that can leach into the subsoil and contaminate the ground water. The effluent treatment plants also generate sludge. The sludge from the tanneries is classified as hazardous because it contains chrome.
- Some mechanical operations are the source of noise problems, both with high frequency (Health & Safety in the workplace) and with low frequency (domestic nuisance). Proper design and maintenance should reduce noise to acceptable levels and additional workplace protection generally resolves the problem in tanneries.

Though Common Effluent Treatment Plants (CETPs) have been installed to treat these wastes, most tanneries do not divert their wastes to the CETP resulting in the pollution of the surface and ground water bodies.

The use of chromium in the tanning process is an environmental problem attracting considerable attention. Waste chrome comes in three forms: liquid waste, tanned waste, and sludge. Chrome recovery from the wastes is a major issue for the tanneries. Chrome in the sludge is typically in very low concentration making recovery extremely difficult.

Pollution caused during leather manufacturing:

This involves re-tanning, dyeing, and fat-liquoring to impart special properties to the leather, to increase penetration of tanning solution, replenish oils in the hides and impart color to the leather besides finishing for attaining the final product specifications.

- Waste water production: This results due to the use of a variety of chemicals like pigments, resin binders and waxes on the tanned hides
- Solid Waste: The finished hides are shaved on the flesh side to produce equal thickness and hand trimmed to their final size resulting in the generation of solid waste in the form of flesh shavings.

From the above discussions, it can be concluded that the leather industry network comprises of largely unsustainable characteristics especially from the point of view of use of water and human resource requirements. The only sustainable contribution of this network is the employment that it provides to the local population in the industries that are dependent on the use of leather to manufacture their products. Therefore looking at the larger picture that emerges from the study of the leather industrial network; this sector network presents a rather grim picture from the point of view of the sustainability component that is desired, to enhance the synergies amongst the various components of this network.

Recommendations

Certain recommendations that could help to make the leather sector network more sustainable than what it is presently are enumerated below:

- Legalizing all the slaughter houses
- Setting pollution control and labour standards for the slaughter houses
- Regular checking of the slaughter houses to ensure that they are adhering to the defined norms
- Use of chrome free tanning process
- Use of chrome tanning process with chrome recovery plant
- Use of CETP for better effluent treatment
- Company should fulfill its corporate social responsibility in leather and spirit
- The municipalities should use the revenue generated by the leather sector network industries for development of the region.

The Government of India has launched an integrated Leather Development Program, which will catalyze the modernization of the leather sector and right sizing of production units on the one hand and provide soft ware assistance to adoption of technologies on the other. Thus the policy makers, law enforcement agencies and the leather sector network industries all have a major role to play for creating synergies within this network and make it sustainable.

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