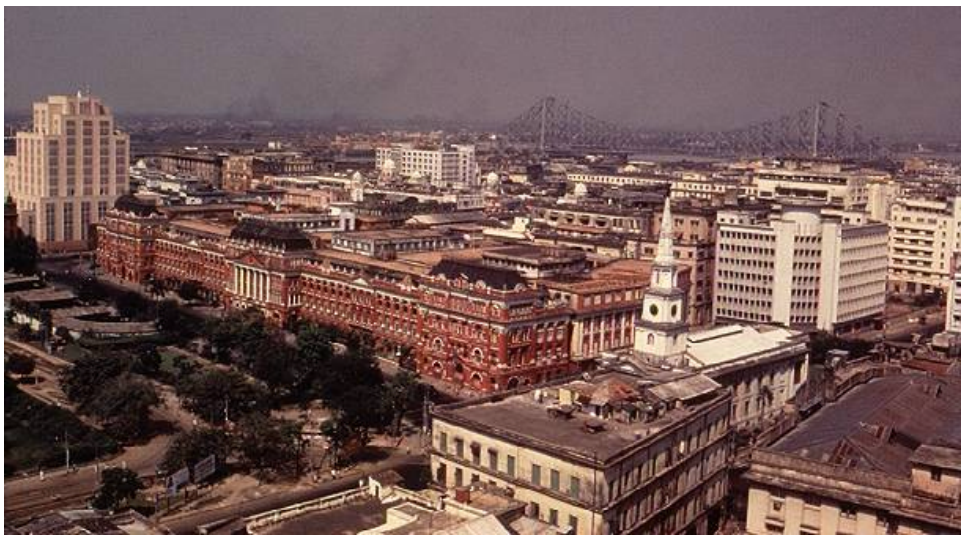
STUDY FOR THE RESTRUCTURATION
OF THE TANNING SECTOR
Kolkata – West Bengal



With the co-operation of the **Council for Leather Export**

STUDY FOR THE RESTRUCTURATION

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KOLKATA – WEST BENGAL

Premise

The present study was commisioned to the PISIE, following the decision of the West Bengal Government to set up an integrated leather complex 25 kms away from Kolkata was kept to encourage and support the development of the leather industry and to solve the environment degradation of the down town of Kolkata.

When we started our mission to develop the study, the framework of the project was defined in the following three aspects:

1) The principles or the general objective, that was the constitution of a technological leather district, to resolve problems of environmental protection and technological and commercial development of the leather cluster

2) The institutions or the rules through which these principles had to be realized, that was the envisagement of a promoting and managing organism to set up the constitution of the CLC (Calcutta Leather Complex)

3) The activities that had to be developed for realizing the development of the CLC, and for which had also been necessary to foresee the present study of investigation on the technological aspects of the sector in the local and international context.

During the carrying out of the mission, however, it has clearly appeared that, between the three above-mentioned aspects, the second, that one relative to the rules and the managerial institution, was weakly improved for several reasons of different nature.

However no study could have been developed, that had the possibility to get into real activities, because the CLC managing structure itself was still outstanding.

So, it has been necessary to rebuild the concept of the model of the district in object, the structures and the rules for its foundation and its development, before and together with the analysis to preview the necessary activities.

This analysis showed the extreme weakness of the local leather cluster, above all of the small and medium enterprises (SMEs). For this reason it is necessary to foresee a strong support of the public sector to allow the constitution of this district, that may be developed with success in order to improve the common social benefit of the interested area, and the whole Indian leather cluster.

1 INTRODUCTION

The present document consists of a methodology for the development of the CLC (Calcutta Leather Complex) by means of local and international clusters linkages, and it summarises the results of the study “The Industrial District” (§ 6), “Analysis of Kolkata tanning District” (§ 3), and the screening of the preliminary feasibility documents of MLD “calcutta Leather Complex - A Project Document", which were carried out by the experts of PISIE, within the framework of initiatives in the field of transferring the tanneries of 3 areas of Calcutta to the new CLC district.

The study proposes a method of setting up an advanced technology district on the basis of the analysis of best practice methodologies in the *Leather Districts* in Italy. The methodology therefore results from an in-depth empirical analysis of each sector of the tanning field and from a cross-field comparison. Success and failure factors were identified, on the basis of issues such as internal organisation, services provided, equipment, technology and production capacity.

This methodology stems from the analysis of field as a particular form of interenterprise relations (large, medium and small or artisan units, of Indian, Chinese or Muslim socio-economic areas) and as a solution for a number of challenges. These challenges are related to important changes in supply chains, which result from the fact that finishing manufacturers outsource increasingly and by pass local leather suppliers due to cost and innovation pressure down the supply chain to their clients.

Suppliers, who are often SMEs (small-medium enterprises), are faced with the need to improve their technological capability and to lower production costs simultaneously.

Globalisation further enhances these challenges and increases competition.

Outsourcing to various levels of suppliers being the rule, the competitiveness of a whole industry increasingly depends on the competitiveness of its suppliers.

Hence the important role of technology districts, which facilitate enterprises’ (mainly SMEs) access to resources such as technology, training, information on market requirements and support services.

As regards the methodology, these proposals put forward, first of all, model for the development of a local technology district.

Building on the Italian model, a methodology for the creation of a network grouping the Calcutta district and leather cluster to link and compete with others, in different areas and countries, is proposed.

The methodology emphasises that business support services at local and international level (including information and communication services) are fundamental in the establishment and development of a district.

1.1 Concept

1.1.1 Background

The leather industry of the West Bengal is essentially concentrated in the city of Kolkata.

As per many others countries in the past, there was no comprehensive environmental legislation to sustain both environmental and ecological quality along with conservation of the resources. The tanneries have been setup in Kolkata without any consideration for the environmental safeguard. Over the past 20-30 years, the population has been considerably growing and the expanding city has wrapped the tanneries located in these areas.

The production characterizing the Calcutta leather industry is penalized both in terms of quality and of quantity by its location, which prevents any possibility to reorganise and modernise the obsolete technology linked to the traditional standards of production.

Therefore, despite the presence of few large tanneries oriented to export, the quality of goods is poor and the yield of the hides is very low if compared with the intrinsic potential of the leather sector of Kolkata.

The figures concerning the tanneries of Kolkata show that: the effective output amounts to less than 50% of the established output capacity - 560 to 250 milion Sq.Ft; both exportations and importations of good-quality finished leather from the transforming industry, shoes and leathergoods factories of West Bengal have decreased by the half from 1976 – 77 to 1991- 92.

The West Bengal Government decided to set up an integrated leather district 25 km away from Calcutta. The goal was to encourage and support the development of the leather industry to manufacture a product marketable and competitive on local and international markets, as well as to solve the problem of environmental degradation.

The transfer will be designed to serve: 38% of total production units represented by workshops and/or family units, whose an output amounts to 10% of the total. By adding the small and small-medium tanneries, the amount reaches 80% of the total number of tanneries. The tanning pole of Kolkata alone reaches 44%.

These units, which are to be relocated, represent the majority of the tanneries.

They neither have the necessary technological - organisational structure, nor the productive capacity to face the relocation and survive in such a competition, which will become stronger than before.

They also lack the business culture, which would be necessary to organise themselves in a new and efficient way.

1.1.2 The objectives

The set up of the CLC was originnaly designed according to the following framework:

"The Calcutta Leather Complex is expected to meet most of the requirements for speedy growth of the leather industry in West Bengal as it encompasses the necessary basic infrastructural facilities required for the rapid growth of the leather and product sectors. The Complex is designed to house the complete industry starting from basic raw materials, processing of leathers, production of chemicals and manufacture of products. In addition, it is expected to solve one of the major problems that is confronting the industry, i.e. effluent treatment, through installation of a common effluent treatment plant. The proposed common facility centers are expected to lessen the capital commitment of the entrepreneurs."

As well us it may be understood why, for more important strategic reasons, the transfer plan defined under the supervision of the WB State Govt., is focused on environmental aspects, it is also very simple to understand that this objective of general benefit for the social impact on the whole area, alone does not represent an incentive to invest, upgrading the technology and know how in leather tanning procedures, for the relocation of the relevant tanneries and small tanning workshop, potentially involved in the project.

The objective will be reoriented, and focused on the vertical integration between the sectors of the leather cluster, at regional and international levels.

With the the environmental protection concerns, the CLC will find its own market justification when local sectoral exports will meet the trade standard of the international "Ecolabel" that will be required in the near future.

1.1.3 Market Constraints

A **general overview** of the leather and footwear-leathergoods and garment market, shows that India does not rank, Albeit its numbers (India has the largest bovine, and goat population in the world, accounting respectively 21% and 17% of the world total, and among one of the lrgest ovine livestock up to 5%), among the main leather and finished products producers, and its share on global trade is mere 3% of finished leather, and 4% of leather footwear production.

World statistical compendium for raw hides and skins, leather and leather footwear:

Item	World	India
numbers of bovine animals/1.000 heads / year 2000 :	1.515.098	312.572
Numbers of sheep and lambs 1.000 heads/ year 2000:	1.057.908	57.900
Number of goats and kids/1.000 heads/ year 2000:	720.012	123.000
Raw hides & skins/ year 2000		
Bovine hides / million pcs	321,9	40,1
Sheep skins	530,1	29,0
Goat skins	339,8	71,3
Leather		
Export value hide leather USD	11.113,2	155,5
Export value of skin leather USD	1.989,5	210,0
Availability heavy leather/ tonnes	520,0	51,8
Availability light leather/million sqft/hide Skin	11.146,5 4.434,5	495,0 500,7
Leather shoes/million pairs		
Production	4.242,4	160,0
Export	1.858,9	36,0
Availability	4.227,7	124,0

At the present moment India has still to emerge as a leading producer and exporter of leather products.

The set up of CLC will be outlined within a general change of the structures and requirements of the leather industry of Calcutta and the whole country.

Even taking into account an ever-harder competition with China and other giants, India may be able to carve a sector in the world market, when re-orienting some actual policies and business structures.

A decisive element to be taken into account in this matter, is that Indian footwear-leather goods and garment industry is composed by an impressive number of small scale handicraft factories, also as a result of governement's policies that tend to maintain the manufacturing sector at the level of cottage industry, in order to provide more earning opportunities to the population.

Another factor that hinders the growth of the industrial leather cluster in India, is the enormous number of Govt. Restriction imposed on the formal sector.. Restrictions that are compensated then by imports protection, but as a matter of fact, the leather industry still remain at an artisanal level and the exports account for just little more than 1% of the world trade in USD value.

CLC is a challenge to start to reform these policies and weighty market trends, by means of innovative methodologies of organisation and network partnership tools. In addition the set up of the CLC must have the assistance of public institutions.

1.1.4 Local Context

Localy, The CLC district plan has still missed to be implemented, with the tanneries still working in the former locations, out of legal issues.

This survey shows that at the present time only those firms capable to reorganise themselves with modern technology and efficient, productive and marketable structure not only would be able to relocate and find their own market area, but also to increase their present output.

Therefore, solutions should be found both for the small and medium tanneries to restructure and organize their production process after the relocation and for the bigger companies to gain competitivity on the international market.

From the technological point of view, the study depicts the tanning sector' know how and production capacity. The study proceeds along two main guiding lines, which are:

- The updating of machinery and plants with the objective to use state-of-the-art production techniques and methodologies to obtain higher effectiveness and productivity,
- The project aiming at establishing groups made up of partial manufacturers of processing phases, all sharing good quality standards and supported by skilled production methods. The organization by groups will lead to a reduction in the production costs, thanks to the larger use of the equipment available, and to workmanship re-qualification without leaving aside the heritage of tradition.

1.1.5 Partenership

An important role will be played by the partnership integration that will be developed wih the EU and specifically the Italian sector: the export value of Indian leather, footwear, leatherwear and leathergoods amounts to approx 2 billion USD, leather and leather products account for 4-5% of Indian exports and are more than one fifth of overall exports to Europe. And Italy is also India's main supplier of finished leather (35,52 million USD) and that imports have increased by more than 40% in the last year, a higher value than the average increase rate.

First action is the present feasibility: upon the request of the Council for Leather Export of West Bengal, and with the financial support of ICE, Pisie has undertaken to develop a hand-tailored study for the tanneries' reorganisation. This study aims at assisting the wide leather pole of Kolkata to identify which are the tools and the organisation system that will help its technologic and productive growth.

1.2 The Set-up of CLC

1.2.1 Project Idea

The idea is to set up a model of **"technology districts", defined for the purpose of complementary co-operation between SMEs, leather clusters and technology poles: this form of organisation is "a network district".**

The model will be designed on the base of the Italian leather districts experience, adapted to the specific socioeconomic, political and technological requirement of the local sector.

The model of local technology districts area results from the background analysis and evaluation of the clustering strategies in Italy and on the results of an enterprise survey carried out in three Calcutta areas (Tiljala, Tangra, Topsia). The model highlights first of all best practices that have successfully stimulated the participation of SMEs in networks and enhanced their access to technology.

1.2.2 Framework of the Project

The CLC will be managed by a *Network* form of association, that put together the tanneries that will be transferred in the new area, the other enterprises of the sector, the service suppliers and intermediate agencies (privates, associations and public institutions).

The field organisation (Network) will be divided between a sub-group including the large tanneries and another grouping small enterprises and artisans.

The following basic co-ordination processes must be handled: **exchange information and communication, achieve a balance of interests and conflict settlement, create mutual trust between the network partners, prepare the new production units in the CLC and start up decision-making, build on and strengthen common interest.**

1.2.3 Justification of the Project

Enterprises needs the network to assist them in transferring the production units, in accessing new market opportunities, and in achieving long-term competitiveness. If the network fails to deliver on these expectations, enterprises are likely to leave, especially the small ones.

The technology network offers suppliers an adequate framework to respond to increasing industry requirements. Co-operation in local networks, both vertically and horizontally, helps enterprises to face new challenges, although these have different expectations according to their size, financial position and technological profile.

Furthermore, the enterprise network is instrumental in offering business support services, and in facilitating enterprises' access to resources such as technology, qualification, internationalisation tools, etc. The CLC network should be well placed to generate the necessary contacts and to create new relationships.

1.2.4 Subjects of the Network

It is important to integrate the whole production chain in the network, including producers, service industries and technology poles, in order to generate a flow of communication and know-how between them. Competitiveness can only be achieved by means of grouping among enterprises and institutions that have different strategic goals such as developing, introducing or applying new technologies.

In order to guarantee the basic functions of the CLC network, such as providing access to new markets, facilitating technology transfer and strengthening the competitiveness of the local industry, both enterprises and intermediary organisations should be involved. The extent of the participation of such organisations must be adapted to the objectives of the network.. Associations can act as an important interface with national authorities.

As regards public sector involvement, the main question is to which extent a local technology district should serve local economic development objectives. If the district is part of an overall local development strategy, both politicians and the public administration are responsible for co-ordinating relevant activities.

1.2.5 Implementation of the Network

In the process of establishing the CLC network, three basic issues have to be dealt with:

- Determine the basic organisational principles in the technology district;
- Decide on available business support services;
- Set up a know-how management and communication structure.

In order to achieve successfully the target to transfer all local tanneries from the actual areas to the CLC district, initial expenses for setting up and running the network must be covered by public funds, as enterprises show little interest, if not forced, in investing in uncertain long-term projects. The need for external resources is crucial in the start-up phase.

1.2.6 Management

In all successful technology district-networks, co-ordination is ensured by neutral moderators: local institutions, associations, or other organisms designed by the partners themselves. Without a common, unified platform for technology networking, individual bottom-up initiatives may stay isolated from each other.

The traditional public sector support is indispensable in the setting up of the CLC district and network.

As regards the institutional status of the organisation co-ordinating the network, different models exist, like an independent association, or a local economic development agency, or an association, or a cluster organisation of associations.

A success factor of network coordination and district management is the availability of full-time, professional staff (mostly consultants).

The network in object may be developed into self-managed organisations in the second stage of life, after the start up cycle. Network co-ordination then will be transferred from public bodies, or independent agencies, to the partners of the CLC network district themselves.

1.2.7 Logic of Network Activities

The success of the network has to be geared towards bringing the greatest possible benefit to as many partners as possible. In order to fulfill this objective, it is necessary to make business support services available to individual enterprises. Most important, it is necessary to inform enterprises about the advantages of networking and about the availability of business support services.

The following services and activities may be provided in the network of CLC:

* Pre-feasibility study,
* Information and engineering to set up the technology district;
* Constitution of the Service Centre;
* Support to co-operation projects;
* Support to training;
* Support to internationalisation;
* Market promotion.
* Know how transfer at distance through internet communication management

1.2.8 Infrastructures of CLC

Starting from the analysis of the referred tanning processing areas, the report includes useful indications about a preliminary town planning requirements scheme, and technical profiles of the new production structures, envisaged to set up the CLC and upgrade the production units

The *drawings* draft the list of the equipment required, the size of the work area suggested for a particular process and for a given production capacity, the minimum space required for a competitive and effective layout of the plant, the average cost of machinery.

1.2.9 Follow up

The first next activity, identified by the present study, and important to start up the whole project, within the aim to restructure the **network outline or leather district management organization**, is to plan the **logic of the development of the district** and to **calculate the financial budget**, together with the tasks assignement, by means of a **pre-feasibility study.**

The study must examine directly on the field the followings aspects:

- Assistance to the legal and financing aspects of the NETWORK, for the incorporation, management, administration and winding up of the structure.

- analysis and sizing of the technical interventions planned by the private and public promoters for the construction of the CLC district, complete with the detailed cost of total investment of the project for the general infrastructures and the specific productive units involved.
- Analysis and feasibiltity study of the community Effluent Treatment Plant, and the sludge and waste treatment device. Installation and management, including handling costs.
- Analysis and feasibility study to create and start up a Service Centre, related to the network
- Analysis and identification of the interventions of technical assistance and training of the necessary personnel to guarantee the managerial objectives.
- Analysis of the local leather market and cluster industry.
- Analysis of the possible financial facilities offered in Calcutta and available by the international financial organisms.
- Analytical screening of all the management costs for start up (to 5 years).

1.2.10 The CLC And The Network At A Glance

CLC general objective	1) Start up a pollution free leather district 2) Developing a leather technology sector in the Calcutta area 3) Transfer the actual polluting tanneries of the industrial areas of Calcutta to the CLC	Start up: • Determine the basic organisational principles in the technology district; • Decide on available business support services; • Set up a know-how management and communication structure.
Operating	By means of the network in charge to manage the transfer and to start up the leather district	The CLC will be managed by a Network form of association, that put together the tanneries that will be transferred in the new area, the other enterprises of the sector, the service suppliers and intermediate agencies (privates, associations and public institutions).
Activities	∗ Pre-feasibility study, ∗ Information and engineering to set up the technology district; ∗ Constitution of the Service Centre; ∗ Support to co-operation projects; ∗ Support to training; ∗ Support to internationalisation; ∗ Market promotion. ∗ Know how transfer at distance through internet communication management	

1.2.11 The Set Up

Followup	Prefeasibility	• Assistance to the legal and financing aspects of the NETWORK, for the incorporation, management, administration and winding up of the structure. • analysis and sizing of the technical interventions planned by the private and public promoters for the construction of the CLC district, complete with the detailed cost of total investment of the project for the general infrastructures and the specific productive units involved. • Analysis and feasibiltity study of the community Effluent Treatment Plant, and the sludge and waste treatment device. Installation and management, including handling costs. • Analysis and feasibility study to create and start up a Service Centre, related to the network • Analysis and identification of the interventions of technical assistance and training of the necessary personnel to guarantee the managerial objectives. • Analysis of the local leather market and cluster industry. • Analysis of the possible financial facilities offered in Calcutta and available by the international financial organisms. Analytical screening of all the management costs for start up (to 5 years).

2 OVERVIEW

2.1 The world leather-shoe industry

Before starting to analyse the Indian leather-shoe industry and in order to define it in terms of competitive power, it is worth to outline the world reference scenario.

In this regard, it is important to point out that the degree of competitiveness of the whole sector depends on the synergies existing between the various branches of the leather-shoe industry.

The success of some countries, like Italy for instance, results from the synergy existing between the various sectors of the leather-shoe industry. Despite the high labour costs, which are typical of the developed countries, the Italian tanning, footwear and leather industries have been able both to maintain and update themselves, particularly by offering top-quality products, and trendy products. Some Chinese industrialized regions can also be mentioned as a further example of this synergy, since in the recent years China has become the first competitor in terms of price. Some tanning, footwear and leathergoods Chinese factories have also grouped into system-areas, though manufacturing poor quality goods, making use of cheap labour and focusing on large-scale outputs, rather than on small lots.

The development of an industrial system should be planned by using the international markets as a reference point with an eye on the market perspectives on the one side, and on the possible competitive strategies on the other. In this respect, this survey will focus on:

- the world scenery, by identifying the main actors of the leather-shoe system and the competitors of Indian industry;

- the state of the art of the Indian footwear, tanning and leather industries as a whole, without entering into the specific policy of each single business strategy.

2.2 The world footwear sector

a) The evolution of the world footwear sector

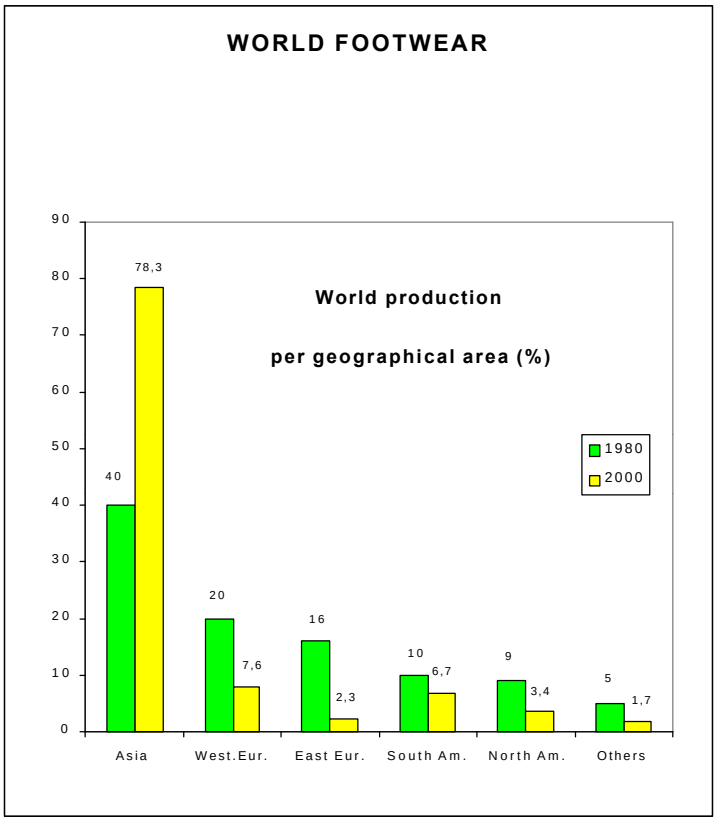
To understand the international role of the indian footwear sector it is necessary to have a picture of the world footwear industry as well as the footwear production-consumption's trend in the last 20 years.

Let us start by analyzing statistical data on shoe production at the international level.

This data tells us that we find ourselves in the presence of deeply troubling changes, which are taking us ever more frequently by surprise:

* Countries that used to be big producers of footwear have suddenly shrunk in producing power;
* Other Countries, on the contrary, have graduated from playing bit parts to become protagonists on the world market.

The globalization of the economy and the business recession throughout the world at the end of the '80s and during the early years of the '90s have profoundly changed the buying habits of consumers and, consequently, the needs of shoe-distributing channels. So a scenario which, up to ten years ago, seemed to be evolving, all things considered, at a rather slow pace, started sprinting ahead at an ever more frenzied rate of speed, thus undergoing a profound metamorphosis.



So let us see, first of all, with the help of a graph you can see on the screen (graph 1), how shoe production has evolved in various areas throughout the world in the last twenty years.

Certain crystal-clear trend lines emerge from a reading of these data:

Asia, which was the most important macro-area of shoe manufacture in the world in 1980, has enlarged its leadership and, according to the latest data, 78,3% of all the shoes produced in the world come from that region;

The other areas in the world have retreated in the face of this massive Asiatic advance and downsized their production of footwear.

This drop in production has been felt in western Europe, whose share in world production has sunk from 20% in 1980 to 7.6%, with a reduction in nearly all Countries, but with an anomaly called Italy which, with your permission, I should like to talk about briefly later on.

Other areas too, as you can see from the graph, have seen their percentages shrink:

* the Countries of eastern Europe plunged from 16 to 2.3%, because of a structural crisis in those systems that are now struggling through a very difficult and complex transitional phase;
* South American Countries from 10 to 6.7%;
* North American nations from 9 to 3.4%;
* and lastly Africa and Oceania, which together, in 1980, produced 5% of the shoes manufactured at the international level, have reduced their presence, which was marginal in any case, to 1.7%.

b) The present status of the footwear industry in the world

Besides being the major producer of shoes, Asia is also the only area to boast a positive trade balance (export-import), while more or less substantial deficits are recorded by the other countries.

Footwear industry world market

(2000)

Year 2000 - Market areas	**Production** *M Pairs*	**Import** *M Pairs*	**Export** *M Pairs*	**Consump.** *M Pairs*	**Trade balance** *M Pairs*
West Europe	917	1.667	934	1.650	-733
East Europe	278	621	153	746	-468
Central and North America	407	2.270	242	2.435	-2.028
South America	815	198	174	839	-24
Australia and New Zealand	12	96	3	105	-93
Asia and Middle East	9.456	2.111	5.769	5.798	3.658
of which * China	6.442	4	3.867	2.579	3.863
* India	715	2	53	664	51
* Japan	138	423	3	558	-420
Africa	194	371	59	506	-312
Total	***12.079***	***7.334***	***7.334***	***12.079***	***0***

Source: Satra data processed by Assomac

The table also identifies the major importers: since North and Central America (2.270 million pairs of shoes) and West Europe (1.667 million of pairs) are the major catchment areas, they should be aimed at in order to increase exports.

Footwear industry world market

(1995)

Year 1995 - Market areas	Production *M Pairs*	Imports *M Pairs*	Exports *M Pairs*	Consump. ***M Pairs***	Trade balance *M Pairs*
West Europe	1.114	1.399	907	1.605	-492
East Europe	319	227	112	436	-115
Central and North America	456	1.543	75	1.925	-1.468
South America	789	72	159	704	87
Australia and New Zealand	18	55	5	67	-50
Asia and Middle East	7.014	1.999	5.016	3.999	3.017
of which * China	4.270	8	2.540	1.738	2.532
* India	462	0	125	337	125
* Japan	204	386	4	586	-382
Africa	283	65	7	355	-58
Total	***9.993***	***5.360***	***6.281***	***9.091***	***921***

Source: Satra data processed by Assomac

It is also interesting to observe the data relevant to imports, exports and consumption in a given period, which confirm that the shoe consumption trend has been increasing everywhere. The highest increase percentage rates have been recorded in the emerging countries of South-East Asia.

Footwear industry market trends

Year 2000 - Market areas	Production *M Pairs*	Imports *M Pairs*	Exports *M Pairs*	Consump. *M Pairs*	Trade balance *M Pairs*
West Europe	-17,68	19,16	2,98	2,80	48,98
East Europe	-12,85	173,57	36,61	71,10	306,96
Central and North America	-10,75	47,12	222,67	26,49	38,15
South America	3,30	175,00	9,43	19,18	-127,59
Australia and New Zealand	-33,33	74,55	-40,00	56,72	86,00
Asia and Middle East	34,82	5,60	15,01	44,99	21,25
of which * China	50,87	-50,00	52,24	48,39	52,57
* India	54,76	0,00	-57,60	97,03	-59,20
* Japan	-32,35	9,59	-25,00	-4,78	9,95
Africa	-31,45	470,77	742,86	42,54	437,93
Total	***20,87***	***36,83***	***16,76***	***32,87***	***-100,00***

Source: Satra data processed by Assomac

c) Analysis of the offer

By the data referring to the year 2000, which are the most recent available, it emerges that 82,30% of the shoe production in the world was manufactured by the top 10 shoe-manufacturing countries, and particularly 53% by China, followed by India (5,92%), Brazil (4,80%), Indonesia (4,13%) and Italy (3,23%).

Footwear output in the world

(2000)

Countries	**Production** *millions of pairs*	**Exports** *millions of pairs*	**Exp/Pro** *%*
China	6.442	3.867	60,03
India	715	53	7,41
Brazil	580	163	28,10
Indonesia	499	208	41,68
Italy	390	362	92,82
Vietnam	303	277	91,42
Mexico	285	87	30,53
Thailand	267	133	49,81
Pakistan	241	8	3,32
Turkey	219	24	10,96
Others	2.138	2.152	100,65
Total	***12.079***	***7.334***	***60,72***

Source: Satra data processed by Assomac

Though 82,30% of world's total production comes from the top 10 manufacturing countries, the ratio between the exports of such countries and the total exports amounts only to 70,60%. This means that a number of these countries are not oriented towards exportations, but they prefer to meet the demand of the domestic market.

Indian exports account for 7,14% of overall production, a far lower value than the general average percentage.

Among the countries devoted to exports there is a strategic distinction, which unfortunately, does not emerge from the statistic data: on the one side there are the emerging countries of South-East Asia, the offer of which is driven by the buyers of shoes worldwide, while on the other side there are those countries boasting a strong tradition in footwear-making, like Italy and Spain, which have been pursuing penetration strategies on the developed countries' markets.

A deeper analysis carried out by comparing the manufacturing countries' current output with the values recorded over the last five years will reveal that the output increase in countries like India, Pakistan, Turkey and Mexico basically derives from their own domestic markets and not from exports, which account for just a small part of the total production, while on the contrary the output increase in China (more than 50%) is due both to domestic consumptions and exports.

Output trend of the top 10 shoe-manufacturing countries

Countries	**Year 2000 - Output** *millions of pairs*	**Year 1995 - Output** *millions of pairs*	**Var. 2000/1995** *%*
China	6.442	2.540	153,62
India	715	462	54,76
Brazil	580	500	16,00
Indonesia	499	371	34,50
Italy	390	476	-18,07
Vietnam	303	152	99,34
Mexico	285	180	58,33
Thailand	267	410	-34,88
Pakistan	241	175	37,71
Turkey	219	159	37,74
Others	2.138	4.568	-53,20
Total	***12.079***	***9.993***	***20,87***

Source: Satra data processed by Assomac

d) Analysis of the demand

If we focus our attention on the shoe consumption trends of the top 10 shoe-consuming countries, we notice that the shoe consumption rate has remained unchanged in the main developed countries, while an increase is recorded in China, India and Turkey.

Consumption trend of the top 10 shoe-consuming countries

Countries	**Year 2000 - Pair consumption** *millions of pairs*	**Year 1995 - Pair consumption** *millions of pairs*	**Var. 2000/1995** *%*
China	2.579	1.738	48,39
United States	1.794	1.602	11,99
India	664	337	97,03
Japan	558	586	-4,78
Brazil	426	415	2,65
France	330	342	-3,51
Germany	324	333	-2,70
Indonesia	303	162	87,04
United King.	278	281	-1,07
Pakistan	234	165	41,82
Other countries	4.589	3.130	46,61
Total	***12.079***	***9.091***	***32,87***

Source: Satra data processed by Assomac

Besides, it is reasonable to expect that future shoe consumption increases will be determined by the growing demand of the developing countries, while the developed countries' demand will rather be oriented to quality, i.e. typology of shoes, and suppliers.

According to the above-mentioned data, a few considerations should be made prior to decide on a particular strategy for the Indian footwear industry:

- is there any room for growth on the inner market, or favoring the exportations is the one key for industry development?

- does the Indian footwear industry possess in itself the prerequisites necessary to penetrate the international markets? or rather, does it need to be introduced by trade or production intermediaries to reach the consumers?

e) World footwear market predictions

It is not a simple matter to make predictions on a micro-economic scale, or to identify consumer or manufacturing on a local scale or for individual market segments of the footwear sector. Therefore we must abide by a macro analysis of future forecasts.

The starting point for making future manufacturing forecasts is obviously the consumption of shoes.

The following table shows that the largest increases in consumption will be in Asiatic countries.

CONSUMPTION OF SHOES (MILLIONS OF PAIRS)				
	1994	1998	2002	2006
Europe	2,198	2,239	2,393	2,437
Americas	2,952	3,011	3,291	3,373
Asia	3,835	4,744	5,359	5,994
Other Countries	771	1,086	1,179	1,303
Total	9,756	11,080	12,222	13,107

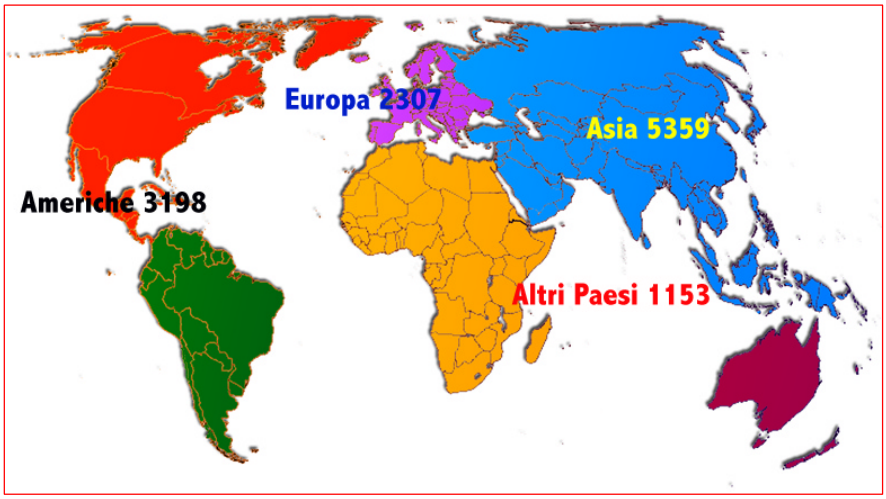
According to forecasts, incidence of Asian consumption on worldwide production will grow from 39% in 1994 to 46% in 2006.

However the United States will remain the country with the highest per capita consumption rate, stabilising at about 6 pairs per person per year, followed by France, Germany, Japan and Hong Kong with 5 pairs. The Chinese per capita consumption should increase from 2 to 3 pairs per year.

If these are the expectations for shoe consumption, where will manufacturing take place?

Asia, which already produces about 70% of shoes, will continue in expansion process, though at a slower rate, reaching more than 75% of worldwide production. More than 50% of worldwide production will be concentrated in China. The other main Asian manufacturers - India, Indonesia, Thailand and Vietnam - will produce collectively 12% of worldwide consumption.

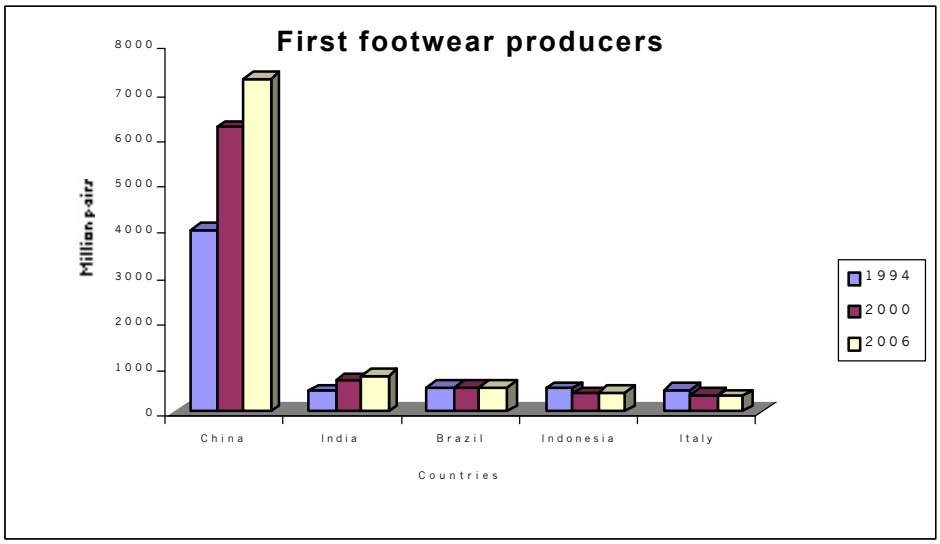
World footwear production (million of pairs)



PRODUCTION OF SHOES (MILLION OF PAIRS)					
	1990	1994	1998	2002	2006
Europe	2,444	1,529	1,299	1,177	1,098
America	1,369	1,319	1,243	1,287	1,322
Asia	5,657	6,284	7,926	9,123	9,977
Other Countries	504	624	612	635	710
Total	9,974	9,756	11,080	12,222	13,107

One aspect to be pointed out is that a large part of Asian production will never leave the geographic area, but will be used to meet the needs of the local population, which alone represents 57% of the world population.

China will expand and confirm its role as the leading in shoe production, but the other countries will not just stand and watch and will surely try to defend their sector.



Though far below Chinese quantities, Indonesia and Brazil will presumably defend their market shares, making the most of their manufacturing tradition.

MAIN SHOE MANUFACTURERS (MILLLION OF PAIRS)			
	1994	2000	2006
China	3,960	6,187	7,266
India	440	700	792
Brazil	541	534	539
Indonesia	500	389	430
Italy	471	377	330

f) The world market of leather shoes: international trade flows

Being the Indian footwear production mainly destined to leather shoes, it is worth to carry out a deeper analysis of production, exports and consumption of leather shoes worldwide.

Data disclosed by FAO and referring to the year 1999 show that the value of leather shoes manufactured in China (38,89%) accounts for a lower percentage (51%) of the total footwear production. The percentage value is higher in those countries boasting a tradition of leather shoe making, like India, Italy, Brazil and Mexico. Nevertheless, it must be considered that Chinese production of leather shoes has increased from 1.550 million pairs in 1996 up to 1.650 million pairs (+6,5%) to the present date. Exportations have grown from 500 million pairs to 700,1 million pairs (+40%).

In addition to observing the countries' export percentage rates compared with the total inner production, (around 42% in China and more than 69% in Italy), it is also interesting to make a parallel between the average prices of exported shoes, which range between 2 USD in India and 23,7 USD in Germany.

Production and exports of leather shoes (major manufacturers)

(1999)

Countries	**Production** *millions of pairs*	**Production** *%*	**Exports** *millions of pairs*	**Exports** *%*	**Exports** *millions of USD*	**Average export price** *USD*
China	1.650,0	38,9	700,1	37,7	3.927,4	2,4
Italy	309,0	7,3	213,6	11,5	4.818,5	15,6
Mexico	254,0	6,0	14,8	0,8	232,2	0,9
Brazil	170,0	4,0	102,7	5,5	1.125,3	6,6
India	160,0	3,8	36,0	1,9	320,0	2,0
USA	150,0	3,5	13,9	0,7	312,5	2,1
Indonesia	140,0	3,3	71,2	3,8	949,8	6,8
Spain	130,0	3,1	77,5	4,2	1.362,0	10,5
South Korea	90,0	2,1	16,5	0,9	263,8	2,9
Portugal	79,0	1,9	79,4	4,3	1.427,5	18,1
France	69,0	1,6	21,3	1,1	579,5	8,4
United King.	40,0	0,9	23,0	1,2	671,1	16,8
Germany	38,9	0,9	35,4	1,9	923,0	23,7
Other countries	962,5	22,7	453,5	24,4	7.329,0	7,6
Tot. World	***4.242,4***	***100,0***	***1.858,9***	***100,0***	***24.241,6***	***5,7***

Source: FAO data processed by Assomac

By analyzing the data referring to the leather shoe consumption market, we notice that the major consumers of leather shoes are: U.S., Germany, United Kingdom, France, Italy and others, with a total amount of 701,6 million pairs. In these countries, the domestic production is not sufficient to meet the demand.

Consumption of leather shoes

(1999)

Countries	**Domestic Consumption** *millions of pairs*	**Production for Consumption** *millions of pairs*	**Imports** *millions of pairs*
China	957,4	949,9	7,5
USA	793,9	136,1	657,8
Mexico	243,0	239,2	3,8
Germany	179,5	3,5	176,0
Italy	157,9	95,4	62,5
United Kingdom	157,7	17,0	140,7
France	137,4	47,7	89,7
India	124,0	124,0	0,0
South Korea	77,5	73,5	4,0
Brazil	67,9	67,3	0,6
Other countries	1.331,5	629,9	701,6
Tot. World	***4.227,7***	***2.383,5***	***1.844,2***

Source: FAO data processed by Assomac

2.3 The tanning sector

2.3.1 The tanning sector in the world

The tanning industry of cow hide

The world's production of raw cow hide is mainly concentrated in six countries - India, USA, China, Brazil, Russia and Argentina – which together account for more than a half of the total production amounting to 321,9 million pieces.

Production and trade of raw cow hides

(2000)

Country	Head of cattle *Thousands*	Prod. *M PCS.*	Prod. *THS TONS*	Exports *THS TONS*	Imports *THS TONS*	Consumption *THS TONS*	Average weight *KG*	Slaughter *%*
India	**312.572**	**40,1**	**401,0**	**0,0**	**7,2**	**408,2**	**10,00**	**12,83**
USA	98.048	37,6	941,0	518,1	68,2	491,1	25,03	38,35
China	127.148	36,0	577,0	29,3	389,8	937,5	16,03	28,31
Brazil	168.621	31,4	628,0	8,8	0,7	619,9	20,00	18,62
Russia	27.516	15,6	296,4	200,0	6,4	102,8	19,00	56,69
Argentina	55.000	12,7	254,0	0,3	1,1	254,8	20,00	23,09
Pakistan	44.700	9,0	90,0	0,0	4,8	94,8	10,00	20,13
Australia	26.716	8,3	166,8	118,0	0,0	48,8	20,10	31,07
Mexico	30.293	6,6	131,3	0,7	139,7	270,3	19,89	21,79
Ukraine	10.627	6,2	118,3	45,0	2,8	76,1	19,08	58,34
Italy	7.357	4,5	129,8	38,4	434,5	525,9	28,84	61,17
Egypt	6.380	3,2	70,8	0,0	0,0	70,8	22,13	50,16
Morocco	2.675	0,6	8,2	0,0	0,9	9,1	13,67	22,43
Algeria	1.650	0,6	8,8	0,2	0,0	8,6	14,67	36,36
Tunisia	790	0,2	2,9	0,0	0,7	3,6	14,50	25,32
Other Count.	595.005	109,3	1981,7	1186,5	1161,4	1956,6	18,13	18,37
Total	***1.515.098***	***321,9***	***5.806,0***	***2.145,3***	***2.218,2***	***5.878,9***	***18,04***	***21,25***

Source: FAO data processed by Assomac

With an increase of 12,32% compared with 1996, India is at the top of the list, followed by USA (-2,6%), China (+20,4%), Brazil (+25,6%), Russia (-12,4%) and Argentina (+10,4%).

However, differences can be noticed in the production of these countries in terms of:

- slaughter rate;
- average weight;
- destination.

A large gap exists between the low slaughter rate of India (12,83%) and Brazil (18,62%) and Russia's high rate (56,69%), the latter being far higher than the average values recorded in Argentina, China and USA.

On the contrary, more homogeneous values are recorded in the hide weight, being approximately 18 KG, except for India (10 KG) and USA (25 KG).

Almost the totality of U.S. output is destined to exports, while India, Argentina, Brazil and China mainly produce for domestic consumption.

As far as the production of finished cow hide is concerned, figures show that the two leading countries are Italy (1.420,8 million square feet) and Korea (1.000 million of square feet), while both of them do not rank among the top 10 producers of raw leather.

It is worth to stress that China ranks among the major producers of cow hide with an output of 1.404,3 million square feet (+40,4% compared with 1996).

Production and trade of finished cow hide

(2000)

Country	Prod. *M square feet*	Exports *M square feet*	Imports *M square feet*	Consumption *M square feet*	Exports *M USD*	Export price *USD*
Italy	1.420,8	1.399,0	861,3	883,10	2.285,8	1,63
China	1.404,3	662,9	3.098,0	3.839,40	969,4	1,46
Korea	1.000,0	929,0	241,3	312,30	952,5	1,03
USA	687,0	893,0	586,0	380,00	797,3	0,89
Mexico	617,9	32,3	44,0	629,60	122,5	3,79
Brazil	592,5	452,7	22,3	162,10	505,0	1,12
India	**575,0**	**120,0**	**40,0**	**495,00**	**155,0**	**1,29**
Argentina	380,0	197,9	14,3	196,40	734,7	3,71
Spain	280,0	98,2	199,0	380,80	136,2	1,39
Turkey	120,0	1,6	26,8	145,20	4,3	2,69
Egypt	89,9	26,3	0,0	63,60	8,6	0,33
Algeria	16,8	0,2	8,0	24,60	0,2	1,00
Morocco	14,4	3,3	29,9	41,00	1,7	0,52
Tunisia	6,1	0,9	25,7	30,90	2,4	2,67
Other countries	3.706,60	5.576,00	5.436,90	3.567,50	4.437,60	0,80
Total	***10.911,3***	***10.393,3***	***10.633,5***	***11.151,50***	***11.113,2***	***1,07***

Source: FAO data processed by Assomac

The figures referring to Italy and Korea show that it is possible to develop a transformation industry without being self-sufficient and having to resort to imports.

Their export average prices are nevertheless quite different : the average rate for one square foot of Italian products is 1,63 USD, while Korea sells at 1,03 USD.

If we analyse the figures referring to other countries, we notice that India and Brazil make use of their own raw materials, which are substantially destined to the domestic leather-footwear industry, while China, in addition to producing 1.404,3 million square feet, also imports 3.098,0 million square feet of finished cow hide.

Undoubtedly, when supplying finished leather, a deep analysis on the demands of the markets, both in terms of quantity and quality is to be carried out. It is also indispensable to determine whether the current price applied is competitive or not.

The tanning industry of sheep and goat skin

Contrarily to what observed in the figures referring to raw hide production, which has increased from 302,6 million pieces in 1996 to 321,9 in 2000, the production of sheep and goat skin has fallen from 545,9 million pieces to 530,1 million.

The major producers of raw sheep skin are China, Iran, Australia, New Zealand, India, Turkey and Spain.

China, India, Turkey and Spain are also consumers of sheep skin, which they export in small quantities and use to import instead.

The production of sheep skin in Morocco is almost exclusively destined to domestic consumption and amounts to approx 1% of total, in line with Italy (1,40%), Ethiopia (1,53%), Syria (1,85%) and Tunisia (1,02).

Production and trade of raw sheep skin

(2000)

Country	Head of sheep *Thousands*	Prod. *M PCS.*	Prod. *M TONS*	Exports *THS TONS*	Imports *M TONS*	Consumption *THS TONS*	Average weight *KG*	Slaughter *%*
China	131.095	93,5	46,6	0,2	31,1	47,1	0,50	71,32
Iran	55.000	48,0	28,8	24,0	0,0	43,2	0,60	87,27
Australia	115.693	30,7	36,9	38,2	0,0	32	1,20	26,54
New Zealand	45.800	30,5	41,4	23,5	1,5	12,6	1,36	66,59
India	**57.900**	**29,0**	**17,4**	**0,0**	**3,3**	**11,6**	**0,60**	**50,09**
Turkey	29.435	20,2	10,1	4,1	55,0	14,2	0,50	68,63
Spain	23.700	19,4	13,6	3,6	9,5	9,4	0,70	81,86
Pakistan	24.100	13,0	7,8	0,0	0,8	5,2	0,60	53,94
Syria	14.500	9,8	7,8	1,1	0,1	3,1	0,80	67,59
Algeria	18.200	9,6	8,6	0,5	0,0	1,5	0,90	52,75
Russia	14.000	8,5	6,0	0,2	0,0	2,7	0,71	60,71
Ethiopia	21.000	8,1	5,7	3,0	0,0	5,4	0,70	38,57
Italy	10.970	7,4	6,7	1,1	22,3	1,8	0,91	67,46
Morocco	17.300	6,1	4,9	0,0	0,1	1,2	0,80	35,26
Kazakhstan	9.776	5,5	3,8	4,3	0,0	6	0,69	56,26
Tunisia	6.600	5,4	3,3	0,0	1,4	2,1	0,61	81,82
Other Countries	462.839	185,4	144,5	65,6	48,1	106,5	0,78	40,06
Total	***1.057.908***	***530,1***	***393,9***	***169,4***	***173,2***	***305,6***	***0,74***	***50,11***

Source: FAO data processed by Assomac

By contrast, the production of raw goat skin is growing: 339,8 million pieces in 2000 (+6,1% compared with 1996).

The Asian countries are the major producers of raw goat skin: 29,02% China, 20,98% India, 6,83% Pakistan and 5,5% Bangladesh.

Production and trade of raw goat skin

(2000)

Country	Head of goat *Thousands*	Prod. *M PCS.*	Prod. *M TONS*	Exports *THS TONS*	Imports *M TONS*	Consumption *THS TONS*	Average weight *KG*	Slaughter *%*
China	148.400	98,6	59,1	0	1,9	39,5	0,60	66,44
India	**123.000**	**71,3**	**71,3**	**0**	**0,9**	**0**	**1,00**	**57,97**
Pakistan	47.400	23,2	16,3	0	1	6,9	0,70	48,95
Bangladesh	33.800	18,8	13,2	0	0	5,6	0,70	55,62
Nigeria	24.300	12,1	6,1	0,1	0	6,1	0,50	49,79
Sudan	37.800	9	7,2	0,2	0	2	0,80	23,81
Ethiopia	16.800	7,5	4,5	2,2	0	5,2	0,60	44,64
Iran	26.000	7,4	5,9	0	0	1,5	0,80	28,46
Greece	5.293	4,6	2,3	0,2	0,3	2,5	0,50	86,91
Turkey	8.057	3,7	1,9	0,3	3,3	2,1	0,51	45,92
Egypt	3.300	2,9	1,8	0	0	1,1	0,62	87,88
Somalia	12.300	2,4	1,2	0,3	0	1,5	0,50	19,51
Morocco	5.120	1,5	0,9	0	0,2	0,6	0,60	29,30
Other countries	228.442	76,8	51	14,7	10,7	40,5	0,66	33,62
Total	***720.012***	***339,8***	***242,7***	***18***	***18,3***	***115,1***	***0,71***	***47,19***

Source: FAO data processed by Assomac

The major producers are: China, India, Turkey, Spain and Pakistan.

According to the figures referring to the production and trade of finished sheep and goat skin, it emerges that output has grown from 4.296,8 million in 1996 to 4.409,7 million in 2000.

Production and trade of finished sheep and goat skin

(2000)

Country	Production *M square feet*	Exports *M square feet*	Imports *M square feet*	Consumption *M square feet*	Exports *M USD*	Export price *USD*
China	898,6	26,0	247,2	1119,8	19,6	0,75
India	**693,2**	**198,0**	**5,5**	**500,7**	**210,0**	**1,06**
Italy	387,5	306,6	361,3	442,2	420,3	1,37
Turkey	396,0	1,6	60,6	455	4,6	2,88
Spain	215,0	55,8	109,8	269	137,5	2,46
Pakistan	155,1	100,0	4,0	59,1	140,0	1,40
France	82,0	50,3	54,8	86,5	67,7	1,35
Brazil	67,9	17,7	6,0	56,2	10,6	0,60
Nigeria	81,2	69,0	3,5	15,7	73,0	1,06
Algeria	61,2	0,3	1,0	61,9	0,5	1,67
Morocco	70,9	1,5	3,5	72,9	1,4	0,93
Syria	43,0	0,0	0,0	43	0,0	0,00
Tunisia	31,0	14,7	11,3	27,6	25,9	1,76
Afghanistan	14,5	12,0	2,5	5	8,7	0,73
Other countries	1.212,60	600,70	608,00	1219,9	869,70	1,45
Total	***4.409,7***	***1.454,2***	***1.479,0***	***4434,5***	***1.989,5***	***1,37***

Source: FAO data processed by Assomac

The comparison between:

- the production of finished cow hide and sheep skin worldwide;

- the incidence of exports on the production of cow hide and sheep skinleaves room for a final remark.

There is a gap between the two volumes of business,

- 10.911,3 million square feet of finished cow hide
- 4.409,7 million square feet of finished sheep skin

and while the trade of finished cow hide is consistent on the international markets (95% of overall production is destined to export), sheep skin is mainly produced for trade on the domestic market (only 33% is exported).

2.3.2 The European tanning industry as an outlet market for Indian manufacturers

Similarly to the footwear sector, the European market is undoubtedly an interesting outlet market for the Indian tanning sector.

Unfortunately, even in this case, the most recent data available refer to the year 1998.

In 1998, Europe imported raw cow hide for an amount of 193 million USD and finished cow hide for more than 409 million USD .

The main suppliers of raw cow hide were: India (5,3%), Argentina (5,2%), United States (2,0%), Brazil (2,0%) and Bangladesh (1,4%).

UE imports of raw cow hide

(1998)

Country	THS USD
India	**11.516**
Argentina	11.238
United States	4.246
Brazil	4.238
Bangladesh	2.957
Ukraine	2.026
Pakistan	1.125
Others	155.754
Total	***193.100***

Source: Eurostat data processed by Assomac

As to the imports of finished cow hide, Europe's main suppliers were: Argentina (15,7%), India (13,5%), Bangladesh (9,8%), Brazil (9,2%), United States (8,5%) and Pakistan.

UE imports of finished cow hide

(1998)

Country	THS USD
Argentina	64.318
India	**55.490**
Bangladesh	40.004
Brazil	37.796
United States	34.984
Poland	26.217
Pakistan	23.276
Others	127.732
Total	***409.817***

Source: Eurostat data processed by Assomac

By comparing the figures referring to the imports of raw cow hide and finished cow hide, it emerges that the 5 major suppliers for Europe were the same as above, which represent:

- 14,5% of raw cow hide European imports ;
- 56,7% of finished cow hide European imports.

As far as European imports of raw sheep skin (35 million USD) and finished sheep skin (39,6%) are concerned, it is worth to notice that India is not included in the list of major suppliers of the former, but is the main supplier of the latter.

UE imports of raw sheep skin

(1998)

Country	THS USD
Others	7.986
Syria	6.426
New Zealand	6.087
Morocco	5.772
Nigeria	5.137
Saudi Arabia	1.356
Tunisia	1.276
Turkey	975
Total	***35.015***

Source: Eurostat data processed by Assomac

UE imports of finished sheep skin

(1998)

Country	THS USD
India	**7.225**
Morocco	6.687
Nigeria	6.537
Indonesia	5.812
Hong Kong	2.667
Pakistan	2.027
Turkey	1.583
Others	11.565
Total	***44.103***

Source: Eurostat data processed by Assomac

In 1998, Europe imported raw goat skin for an amount of 36 million USD; the main suppliers were Nigeria (27,8%), India (18,2%), Saudi Arabia (13,2%) and Pakistan (8,9%).

UE imports of raw goat skin

(1998)

Country	THS USD
Nigeria	10.052
India	**6.571**
Saudi Arabia	4.771
Pakistan	3.218
Bangladesh	2.612
Brazil	1.661
Mali	1.083
Others	6.170
Total	***36.138***

Source: Eurostat data processed by Assomac

Again, India is the top supplier of finished goat skin.

EU imports of finished goat skin

(1998)

Country	THS USD
India	**57.600**
Pakistan	38.561
Nigeria	8.530
Bangladesh	7.377
Iran	2.778
Ethiopia	1.118
China	854
Others	5.168
Total	***121.986***

Source: Eurostat data processed by Assomac

Finally, it is worth to stress that European imports of goat and sheep skins are much lower than cow hides imports, as detailed in the following table.

EU imports of leather

(1998)

Type of leather	THS USD	%
Cow hide	602	71,75
Sheep skin	79	9,42
Goat skin	158	18,83
Total	***839***	***100,00***

Source: Eurostat data processed by Assomac

2.4 The leather-shoe industry in India

2.4.1 An overall view of the sector

The leather-shoe industry plays an important role in the Indian economy both in terms of employment and use of raw materials, and also affects the domestic product and the balance of trade.

As a matter of fact, approximately 2.5 million people are employed in the leather-shoe sector in India and most of them are women. The skilled and semi-skilled employers account for 50 % of total labour force.

Furthermore, the Indian leather-shoe industry can rely on one of the major zootechnic resources of in the world, with a population of

- 212 million cattle,
- 96 million buffalos,
- 144 million goats,
- 53 million sheep.

The following are the major sites for the production of leather and leather articles, including footwear:

Southern Region	
Tamil Nadu	Chennai, Ambur, Rapinet, Vaniyambadi, Trichy and Dindigul
Andhra Pradesh	Hyderabad
Karnataka	Bangalore
Northern Region	
Punjab	Jallandhar
Delhi	Delhi
Eastern Region	
West Bengal	Kolkata

Central Region

Uttar Pradesh Kanpur and Agra

Western Region

Maharashtra Mumbai

2.4.2 The output capacity of Indian leather-shoe industry

The following table shows the data disclosed by the **Council For Leather Exports** and referring to the productive capacity of India:

Product	Output capacity
Cow hide (hides)	65 million pieces
Sheep skin (skins)	170 million pieces
Leather shoes	776 million pairs
Uppers	112 million pairs
Non-leather shoes	960 million pairs
Leatherwear	18 million pieces
Leathergoods	60 million pieces
Gloves	52 million pieces
Saddles	0.10 million pieces

2.4.3 Indian leather-shoe exports

The export value of leather, footwear, leatherwear and leathergoods amounts to approx 2 billion USD.

Leather and leather products account for 4-5% of Indian exports and are more than one fifth of overall exports to Europe.

The following table shows the data referring to April-March 1998/1999, 1999/2000 and 2000/2001. After a decrease in 1999/2000, a recovery of exports has started, which should allow exportations to reach 2.405 million USD (April 2001- March 2002) despite the international crisis.

Indian exports of leather, leathergoods and shoes

Categories	April-March 1998-1999	April-March 1999-2000	April-March 2000-2001
Finished leather	264,67	238,79	381,86
Leather shoes	320,23	377,39	384,47
Components for shoes	237,72	215,09	238,06
Leatherwear	376,66	347,28	460,55
Leathergoods	405,38	376,28	443,83
Saddles	32,69	34,11	42,72
Non-leather shoes	17,52	14,12	19,50
Total	1654,89	1604,35	1970,98

Value: million USD

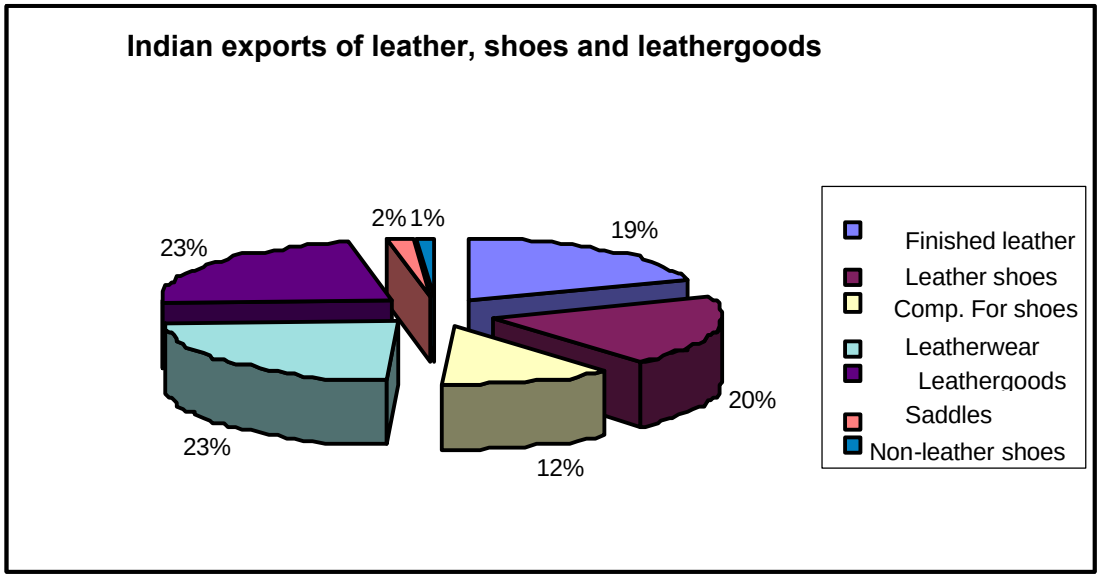
The following table shows the percentage variations of exports of finished leather, footwear, components, leatherwear and leathergoods.

Variation of Indian exports of leather, leathergoods and footwear

Categories	Var. % 2000-1999	Var. % 2001-2000
Finished leather	-9,78	+59,91
Leather shoes	+17,85	+1,88
Components for shoes	-9,52	+10,68
Leatherwear	-7,80	+32,62
Leathergoods	-7,18	+17,95
Saddles	+4,34	+25,24
Non-leather shoes	-19,41	+38,10
Total	-3,05	+22,85

The most marked increase in the last year was produced by the exports of finished leather, non-leather shoes and leatherwear.

The export value of footwear and leathergoods, with a high added value, has increased over the last twenty years compared with the exports of finished leather: footwear and leathergoods represent 81% of overall value.



The following table shows the main importers of leather/leathergoods from India in April-March 1999/2000 and 2001/2002.

Countries of destination for Indian leather, leathergoods and footwear exports

Country	*1995-1996*	*1996-1997*	*1997-1998*	*1998-1999*	*1999-2000*	*2001-2002*
USA	295,62	298,75	251,40	252,71	258,24	343,21
Germany	400,38	362,88	363,41	364,19	293,59	308.13
United Kingdom	200,93	204,92	219,26	235,79	266,29	271.35
Italy	221,26	182,99	221,53	197,16	165,47	241.06
Spain	50,765	46,97	54,96	69,23	66,72	100.88
Hong Kong	59,46	59,07	53,93	53,26	55,22	98.42
France	88,73	72,34	79,01	79,77	84,36	90.94
Netherlands	38,65	38,48	43,83	49,78	44,17	55.82
Portugal	23,70	20,21	31,91	29,39	24,41	37.44
Russia	47,58	30,22	50,99	25,19	27,97	31.49
Denmark	27,81	23,34	21,73	18,82	28,30	28.77
Australia	40,74	36,91	36,83	35,39	31,84	28.44
Canada	22,84	16,93	21,69	18,77	21,41	26.71
Sweden	12,70	11,20	12,76	15,40	19,79	25.47
South Africa	31,06	25,70	25,10	26,29	24,28	23.46
Switzerland	20,25	21,14	22,78	21,49	16,13	18.61
Austria	18,37	18,18	20,16	17,22	14,65	15.04
Japan	21,52	13,36	14,31	7,30	8,36	13.32
Greece	5,27	6,33	6,92	5,75	4,50	5.95
New Zealand	4,95	4,59	4,17	4,79	5,28	3.81
Others	130,41	121,07	115,23	127,20	250,73	250.37
Total	***1762,97***	***1618,27***	***1671,90***	***1654,89***	***1604,35***	***1970.98***

Value: million USD

Export increase value was substantial: +22,85. Most considerable increases in exports have been recorded in Hong Kong (+78,23%), Japan (+59,30%), Portugal (+53,36%), Spain (+51,20%), Italy (+45,68%) and United States (+32,90%). It is worth to notice that the four main outlet countries alone – United States, Germany, United Kingdom and Italy – represent almost 50% of Indian exports. Such good market penetration may nevertheless result in a great deal of risk in case of consumption recession!

2.4.4 Classification of Indian exports by type of production

By the analysis of the export values by type of product and country of destination, it emerges that the exports of finished leather have increased by 59,23% in the last period. Such growth is for the most part due to the increase of exports to Italy (+131,68%), which is the second importer of Indian leather after Hong Kong, the latter being only a transit market and not a market of destination. Altogether, Hong Kong, Italy, Spain and Germany absorb almost 60% of Indian leather exports.

Countries of destination for Indian leather exports

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
Hong Kong	50,47	90,38	23,67	79,08
Italy	36,93	85,56	22,40	131,68
Spain	21,89	29,94	7,84	36,77
Germany	19,02	20,93	5,48	10,04
Korea	5,59	15,64	4,10	179,58
Portugal	11,14	13,97	3,66	25,36
South Africa	15,02	13,78	3,61	-8,26
France	11,90	13,38	3,50	12,40
United States	9,56	12,45	3,26	30,19
China	4,02	8,39	2,20	108,80
United Kingdom	5,15	6,05	1,58	17,49
Japan	3,27	5,39	1,41	64,83
Netherlands	2,58	5,27	1,38	104,32
Australia	4,13	3,34	0,87	-19,21
Austria	2,26	3,10	0,81	37,28
Indonesia	2,35	2,72	0,71	15,87
Russia	1,19	2,58	0,68	116,57
U.A.E.	1,00	1,68	0,44	68,00
Saudi Arabia	0,69	0,76	0,20	10,42
Belgium	0,56	0,71	0,19	27,08
Canada	0,65	0,67	0,17	3,20
Finland	0,08	0,49	0,13	483,33
Greece	0,34	0,40	0,11	18,58
New Zealand	0,41	0,37	0,10	-10,92
Switzerland	0,22	0,27	0,07	24,53
Denmark	1,14	0,20	0,05	-82,13
Sweden	0,32	0,09	0,02	-70,53
Ireland	0,09	0,01	0,00	-89,38
Others	27,84	43,33	11,35	55,66
Total	***239,82***	***381,86***	***100,00***	***59,23***

Value: million USD

Countries of destination for Indian leather footwear exports

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
United States	89,65	104,00	27,05	16,01
Germany	54,66	48,81	12,70	-10,71
France	16,50	19,45	5,06	17,91
Italy	15,28	12,81	3,33	-16,21
Netherlands	6,99	11,14	2,90	59,43
U.A.E.	6,86	8,61	2,24	25,50
Canada	6,18	6,69	1,74	8,23
Russia	8,51	6,41	1,67	-24,66
Australia	6,73	5,51	1,43	-18,20
Belgium	4,16	5,10	1,33	22,67
Sweden	4,84	4,95	1,29	2,26
Denmark	6,12	4,82	1,25	-21,19
South Africa	5,65	4,44	1,15	-21,44
Spain	2,31	3,86	1,00	67,17
Austria	1,57	2,02	0,52	28,69
Switzerland	2,51	1,94	0,50	-22,98
Hong Kong	1,33	1,92	0,50	44,19
Japan	1,21	1,89	0,49	55,95
Greece	1,11	1,74	0,45	56,03
Ireland	1,07	1,69	0,44	57,69
Portugal	0,39	1,63	0,42	321,23
Saudi Arabia	1,28	1,55	0,40	20,65
New Zealand	0,84	1,02	0,26	20,87
Finland	0,64	1,02	0,27	61,26
United Kingdom	112,85	0,55	26,15	-10,90
China	0,07	0,17	0,04	121,61
Indonesia	0,09	0,16	0,04	77,48
Korea	0,04	0,12	0,03	166,68
Others	17,94	20,48	5,33	14,13
Total	***377,39***	***384,47***	***100,00***	***1,88***

Value: million USD

In April-March 2000-2001, there was a slight increase in footwear exports compared with the same period of the previous year. The main countries of destination for leather shoes from India are United States (104 million USD), Germany (48,81 million USD), France (19,45 million USD), Italy (12,81 million USD) and Netherlands (11,14 million USD).

Exports of components have increased by 10,67% instead. The major importers are Italy (25,60%), United Kingdom (21,05%) and Germany (20,43%).

Countries of destination for Indian shoe components

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
Italy	48,56	60,95	25,60	25,52
United Kingdom	49,33	50,10	21,05	1,57
Germany	44,65	48,63	20,43	8,91
Portugal	10,42	17,86	7,50	71,32
France	14,08	8,42	3,54	-40,17
Spain	4,84	7,00	2,94	44,41
United States	8,62	6,92	2,91	-19,78
Australia	6,20	5,24	2,24	-13,88
Switzerland	4,46	4,94	2,08	10,74
Netherlands	1,91	2,97	1,25	55,32
Austria	2,79	2,85	1,20	2,41
South Africa	0,85	1,60	0,67	88,31
Canada	1,35	1,38	0,58	2,07
New Zealand	2,01	1,13	0,47	-43,85
Hong Kong	0,23	0,98	0,41	328,18
Denmark	0,89	0,95	0,40	6,54
Belgium	0,87	0,95	0,40	8,32
Japan	0,33	0,83	0,35	153,69
U.A.E.	0,63	0,66	0,28	5,16
Saudi Arabia	0,49	0,57	0,24	15,76
Russia	0,66	0,46	0,19	-30,24
Sweden	0,10	0,46	0,20	379,46
Ireland	0,69	0,43	0,18	-37,71
Indonesia	0,03	0,39	0,16	1133,77
Finland	0,02	0,19	0,08	1084,26
Greece	0,06	0,17	0,07	185,67
Korea	0,12	0,17	0,07	46,69
China	0,01	0,02	0,01	123,18
Others	9,91	10,76	4,52	8,56
Total	***215,09***	***238,06***	***100,00***	***10,67***

Value: million USD

Countries of destination for Indian exports of leatherwear

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
United States	48,98	102,40	22,24	109,09
Germany	89,52	93,75	20,36	4,72
United Kingdom	53,34	54,28	11,79	1,76
Italy	42,67	54,18	11,76	26,96
Spain	22,11	40,00	8,69	80,90
France	23,48	24,88	5,40	5,93
Denmark	12,01	15,70	3,41	30,72
Netherlands	13,11	14,30	3,10	9,03
Sweden	6,34	11,38	2,47	79,57
Canada	5,03	8,32	1,81	65,64
Switzerland	3,22	5,40	1,17	67,72
Austria	4,98	3,49	0,76	-29,91
Russia	3,13	3,17	0,69	1,27
Japan	1,84	2,73	0,59	48,56
Belgium	1,79	2,18	0,47	22,36
South Africa	1,06	1,77	0,38	66,07
Portugal	0,62	1,72	0,37	177,63
Greece	1,69	1,69	0,37	0,10
Finland	0,65	1,48	0,32	126,10
Hong Kong	0,20	0,79	0,17	285,60
U.A.E.	0,65	0,68	0,15	4,17
Korea	0,04	0,65	0,14	1356,38
Ireland	0,38	0,34	0,07	-8,47
China	0,06	0,18	0,04	207,70
Saudi Arabia	0,12	0,12	0,03	-1,99
Australia	1,07	,079	0,17	-26,11
New Zealand	0,43	0,06	0,01	-85,07
Indonesia	0,01	0,00	0,00	-75,58
Others	8,75	14,12	3,07	61,48
Total	***347,28***	***460,55***	***100,00***	***32,62***

Value: million USD

In the last year, exports of leatherwear have increased by 32,62%: the most considerable increases among the major importers have been recorded in the U.S. (+103,09%), Spain (+80,90%) and Italy (+26,96%), while Germany and United Kingdom have witnessed just a slight increase.

The major importers for leathergoods have been U.S. (24,33%), Germany (19,54%), United Kingdom (10,56%) and Italy (5,37%).

Countries of destination of Indian leathergoods exports

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
United States	93,78	107,98	24,33	15,14
Germany	78,25	86,74	19,54	10,86
United Kingdom	38,57	46,87	10,56	21,51
Italy	21,00	23,83	5,37	13,51
Netherlands	17,02	20,11	4,53	18,13
France	13,89	19,32	4,35	39,04
Russia	13,19	18,70	4,21	41,85
Spain	14,28	18,32	4,13	28,35
Australia	11,78	11,05	2,49	-6,19
Canada	7,74	8,74	1,97	12,92
Belgium	5,73	6,99	1,57	21,83
Sweden	6,33	6,94	1,56	9,70
U.A.E.	3,72	6,46	1,46	73,69
Denmark	7,02	6,08	1,37	-13,31
Saudi Arabia	4,20	5,46	1,23	30,07
Switzerland	5,50	5,45	1,23	-0,89
Hong Kong	2,21	4,11	0,93	85,83
Austria	2,88	3,34	0,75	16,19
Ireland	1,23	2,34	0,53	89,76
Japan	1,62	2,22	0,50	36,47
Greece	1,30	1,93	0,43	48,66
Portugal	1,60	1,84	0,41	15,22
South Africa	1,46	1,53	0,34	4,82
New Zealand	1,22	0,97	0,22	-10,94
Finland	1,05	0,83	0,19	-20,53
Korea	0,16	0,10	0,02	-38,15
China	0,42	0,07	0,02	-84,04
Indonesia	0,12	0,07	0,02	-38,79
Others	19,26	25,43	5,73	32,01
Total	***376,52***	***443,83***	***100,00***	***17,87***

Value: million USD

Countries of destination of Indian exports of saddles and tacks

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
United States	7,37	8,95	20,95	21,45
United Kingdom	3,62	8,58	20,09	136,76
Germany	6,93	7,63	17,86	10,07
France	2,76	3,17	7,42	14,66
Australia	1,85	2,00	4,68	8,04
Netherlands	2,44	1,90	4,45	-22,31
Sweden	1,86	1,63	3,82	-12,09
Belgium	1,58	1,40	3,28	-11,05
Spain	1,10	1,18	2,76	6,72
Italy	0,68	1,14	2,68	67,22
Denmark	1,08	0,91	2,12	-15,87
Canada	0,44	0,68	1,60	56,50
Finland	0,20	0,35	0,82	77,86
Ireland	0,14	0,29	0,68	101,71
Austria	0,19	0,22	0,53	19,15
New Zealand	0,33	0,21	0,48	-37,80
South Africa	0,15	0,19	0,44	26,47
Switzerland	0,19	0,18	0,41	-8,44
Portugal	0,20	0,18	0,42	-8,40
Hong Kong	0,07	0,13	0,31	80,73
U.A.E.	0,09	0,13	0,29	43,15
Russia	0,02	0,11	0,25	552,11
China	01,0	0,11	0,25	7,04
Japan	0,05	0,06	0,13	14,09
Korea	0,01	0,03	0,06	252,73
Saudi Arabia	0,03	0,03	0,07	-4,48
Greece	0,01	0,01	0,02	-10,14
Indonesia	0,00	0,01	0,01	0,00
Others	0,62	1,34	3,13	114,14
Total	***34,11***	***42,72***	***100,00***	***25,24***

Value: million USD

Countries of destination for exports of Indian non-leather shoes

Country	**April-March 1999-2000**	**April-March 2000-2001**	**% value 2000-2001**	**Var. %**
United Kingdom	3,42	4,93	25,26	44,11
Italy	0,35	2,59	13,28	632,27
France	1,74	2,21	11,34	27,26
Germany	0,57	1,65	8,45	188,66
U.A.E.	2,16	1,04	5,32	-52,03
Spain	0,19	0,59	3,01	217,08
Saudi Arabia	0,67	0,54	2,75	-19,71
United States	0,29	0,50	2,59	76,54
Australia	0,08	0,42	2,16	430,95
Switzerland	0,02	0,42	2,18	1619,75
Portugal	0,05	0,25	1,28	400,05
Canada	0,04	0,22	1,10	510,03
Japan	0,04	0,21	1,08	374,76
Ireland	0,05	0,18	0,91	294,49
South Africa	0,08	0,15	0,78	87,28
Netherlands	0,11	0,14	0,71	23,21
Hong Kong	0,70	0,11	0,58	-83,99
Denmark	0,05	0,11	0,57	122,35
Belgium	0,06	0,11	0,55	66,42
Russia	1,28	0,07	0,34	-94,90
New Zealand	0,02	0,05	0,28	118,96
Greece	0,00	0,02	0,10	0,00
Austria	0,00	0,02	0,09	1493,52
Sweden	0,01	0,01	0,07	21,95
Indonesia	0,03	0,01	0,07	-59,26
Korea	0,00	0,01	0,03	469,11
Finland	0,00	0,01	0,03	0,00
China	0,00	0,00	0,00	0,00
Others	2,10	2,95	15,11	40,55
Total	14,12	***19,50***	***100,00***	***38,09***

Value: million USD

The export trend of non-leather shoes was much more positive (+38,09%) than leather shoes (+1,88%). It was mostly determined by the increase of imports from Italy (+632,27%) and Germany (+188,66%). England nevertheless is the first importer of non-leather shoes, with a share of 25,26%.

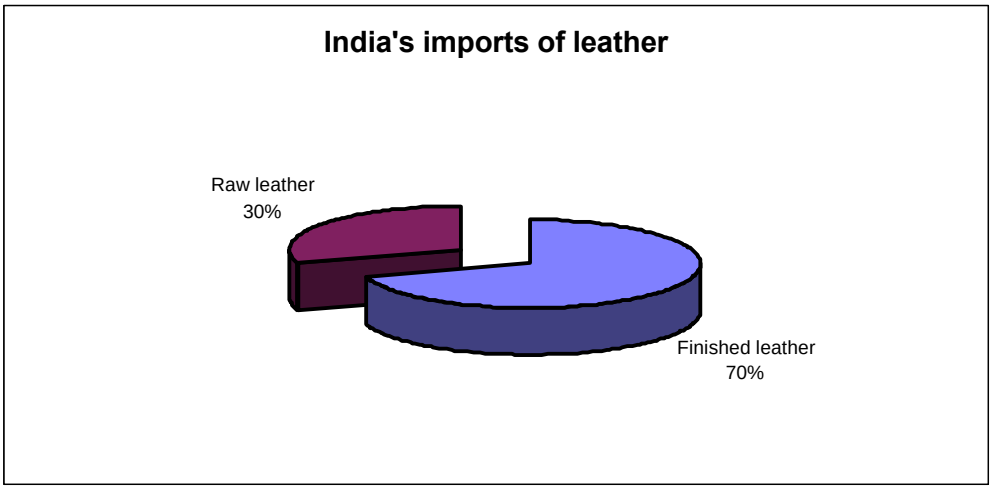
2.4.5 Leather imports by the Indian leather-shoe industry

In addition of being one of the major manufacturers of leather, India is also an importer of raw and finished leather.

Category	April-March 1999-2000	April-March 2000-2001	Var. %
Raw cow hide and sheep skin	45,95	56,96	23,97
Finished leather	103,52	132,92	28,41
Total	**149,47**	**189,89**	**27,04**

Value: million USD

Finished leather is the biggest share (approx 70%).



Countries of origin of raw leather imports

Country	**April-March 1999-2000**	**April-March 2000-2001**	**Var. %**
Italy	3,77	5,37	42,31
Netherlands	1,99	4,85	143,88
Germany	4,04	3,78	-6,51
United Kingdom	6,60	3,37	-48,91
Somalia	0,55	3,15	470,54
UAE	1,06	2,73	158,90
New Zealand	4,64	2,36	-49,19
Australia	0,58	1,85	220,48
Saudi Arabia	3,60	1,85	-48,71
Spain	0,89	1,80	101,56
France	1,09	1,73	58,72
Indonesia	0,52	1,54	196,29
United States	0,89	1,47	65,33
Kenya	0,90	0,71	-20,60
China	0,59	0,70	18,48
Brazil	1,17	0,63	-46,49
Sweden	0,85	0,62	-27,30
Greece	0,49	0,56	13,73
Canada	0,00	0,55	0,00
Nepal	0,88	0,51	-42,40
Switzerland	0,24	0,41	68,26
Norway	0,56	0,36	-36,34
Korea	0,02	0,34	1359,78
Turkey	0,24	0,22	-9,20
Bangladesh	0,10	0,21	101,14
Belgium	0,14	0,19	34,52
Denmark	0,25	0,15	-39,46
Austria	0,04	0,09	116,16
Pakistan	0,01	0,07	1182,57
Sudan	0,55	0,06	-89,67
Nigeria	0,20	0,05	-75,73
Argentina	0,04	0,04	16,88
Hong Kong	0,52	0,03	-93,93
Others	7,93	14,64	84,47
Total	***45,95***	***56,96***	***23,97***

Value: million USD

Countries of origin of finished leather imports

Country	**April-March 1999-2000**	**April-March 2000-2001**	**Var. %**
Italy	25,03	35,52	41,91
United Kingdom	10,02	9,00	-10,17
Argentina	9,08	8,88	-2,19
United States	10,70	8,68	-18,93
Germany	8,52	6,53	-23,39
New Zealand	3,08	6,23	102,21
Saudi Arabia	1,68	5,21	210,82
Spain	2,71	3,84	41,84
Brazil	2,56	2,82	10,11
Netherlands	1,69	2,69	59,42
Korea	1,56	2,20	40,99
Australia	2,57	2,07	-19,30
Indonesia	1,99	2,04	2,12
Hong Kong	2,57	1,84	-28,69
Bangladesh	',82	1,51	84,91
Greece	1,15	1,13	-1,35
Kenya	0,13	1,07	738,60
UAE	0,10	1,01	903,31
France	1,41	0,80	-43,50
Switzerland	0,34	0,51	47,73
Austria	0,88	0,37	-57,90
Sudan	0,00	0,37	0,00
China	0,89	0,34	-62,18
Nepal	1,06	0,34	-68,01
Pakistan	0,47	0,30	-37,00
Canada	0,35	0,28	-20,06
Denmark	0,30	0,23	-25,17
Turkey	0,00	0,23	0,00
Belgium	0,30	0,11	-64,55
Norway	0,10	0,08	-23,09
Nigeria	0,00	0,04	0,00
Somalia	0,00	0,04	0,00
Sweden	0,09	0,00	-100,00
Others	11,38	26,66	134,48
Total	***103,52***	***132,93***	***28,41***

Value: million USD

It is worth to notice that Italy is India's main supplier of finished leather (35,52 million USD) and that imports have increased by more than 40% in the last year, a higher value than the average increase rate.

3 THE ANALYSIS

3.1 Generalities

The leather industry of the West Bengal is essentially concentrated in the city of Kolkata.

As per many others countries in the past, there was no comprehensive environmental legislation to sustain both environmental and ecological quality along with conservation of the resources. Therefore no environment-oriented action has been taken to protect the water, the land and the air.

The tanneries have been setup in Kolkata without any consideration for the environmental safeguard. Over the past 20-30 years, the population has been considerably growing and the expanding city has wrapped the tanneries located in these areas.

The production characterizing the Calcutta leather industry is penalized both in terms of quality and of quantity by its location, which prevents any possibility to reorganise and modernise the obsolete technology linked to the traditional standards of production.

Therefore, despite the presence of few large tanneries oriented to export, the quality of goods is poor and the yield of the hides is very low if compared with the intrinsic potential of the leather sector of Kolkata.

There results a low exploitation of the established output capacity, as well as a reduction in the exportations and an increment in the importations of finished leather from other areas of India and from abroad, thanks to the transforming industries of West Bengal.

In fact, the figures concerning the tanneries of Kolkata show that: the effective output amounts to less than 50% of the established output capacity - 560 to 250 milion Sq.Ft; both exportations and importations of good-quality finished leather from the transforming industry, shoes and leathergoods factories of West Bengal have decreased by the half from 1976 – 77 to 1991- 92.

Around 10 years ago, the West Bengal Government decided to set up an integrated leather district 25 km away from Calcutta. The goal was to encourage and support the development of the leather industry to manufacture a product marketable and competitive on local and international markets, as well as to solve the problem of environmental degradation.

The transfer of an entire productive sector to an industrial district always requires deep technologic and organised restructuring, but in the case of the Leather Pole of Calcutta, problems are also connected with the dimensions and with the quality of the industries to be relocated.

38% of total production units is represented by workshops and/or family units, whose an output amounts to 10% of the total. By adding the small and small-medium tanneries, the amount reaches 80% of the total number of tanneries. The tanning pole of Kolkata alone reaches 44%.

These units, which are to be relocated, represent the majority of the tanneries.

They neither have the necessary technological - organisational structure, nor the productive capacity to face the relocation and survive in such a competition, which will become stronger than before.

They also lack the business culture, which would be necessary to organise themselves in a new and efficient way.

Only those firms capable to reorganise themselves with modern technology and efficient, productive and marketable structure not only would be able to relocate and find their own market area, but also to increase their present output.

Therefore, solutions should be found both for the small and medium tanneries to restructure and organize their production process after the relocation and for the bigger companies to gain competitivity on the international market.

A further aspect is to be considered in the examination of the tanning industry of Kolkata, not relevant to the technology employed or to the products quality, is linked with the chaotic growth of the city that encompassed the leather production areas.

However it could influence the activity of the tanneries when relocated in the CLC area and the rehabilitation of the present sites.

Slums, where workers and their families live and where the children grow up hopeless, enclose a large part of the tanneries areas. In many cases open-air drains to the sewers convey the tannery liquid emissions or they are wasted underground causing pollution risks of the underground waters. The liquid and gaseous emissions cause pollution of the surrounding environment and damage the health of people working in tanneries, which being often family shops they are employing school age children.

The relocation of the tanneries in an area quite far away from the present location may generate a new migration of the workers with their families and may recreate the same very poor living conditions.

It is necessary to know the magnitude and the characteristics of this problem to permit an organized and controlled displacement of the people that will move near the industrial centre, the realisation of new more human conditions for people that will remain in the present place and the rehabilitation of the previous areas.

A proper survey performed by an NGO could define the extent and the consistency of the demographic problem of these areas – number of people, families composition, number and age of the children etc. – and **his solution** will help not only the upgrading of the living conditions of the workers and their families but will have also as result an higher production efficiency of the leather industry.

The data of the demographic survey will allow to evaluate the dimension of the problem and to envisage the possible solutions and their costs.

3.2 The aim of this work

Upon the request of the Council for Leather Export of West Bengal, and with the financial support of ICE, Pisie has undertaken to develop a hand-tailored study for the tanneries' reorganisation. This study aims at assisting the wide leather pole of Kolkata to identify which are the tools and the organisation system that will help its technologic and productive growth.

The restructuring and re-organisation of the workshops and the small tanneries will meet the specific requests of the shoe and leathergoods factories of the Country oriented to manufacture good quality products. These industries will be no longer forced to import raw materials for their productions and the synergies created from the trade relationships and the environment proximity, resulting from their relocation in the CLC, will lead the tanneries and the finishing industries to increase their sales.

To reach these goals, Pisie organized two missions, aiming at investigating the actual status of the tanning sector in the area of Kolkata.

It was necessary to diversify the investigations, in order to collect information on the organisation of the two main groups making up the tanning sector of Calcutta: the workshops, and small-medium tanneries on one side and medium-large and large tanneries on the other.

Specific survey forms and questionnaires have been used to support the investigations of Pisie experts, in order to acquire a more detailed knowledge of the sector. The questionnaires have been distributed to the tanners by personnel of the Leather Technological Institute, filled-in with their assistance after a door-to-door persuading action. The inquiry personnel have been co-ordinated by the staff of the Council for Leather Export.

On the basis of the data collected in the survey forms and through the investigation of its specialists, Pisie has drafted the present proposal.

This study will help in the re-designing the tanning sector both in terms of proposed technology and production capacity. The study proceeds along two main guiding lines, which are:

- The updating of machinery and plants with the objective to use state-of-the-art production techniques and methodologies to obtain higher effectiveness and productivity,
- The project aiming at establishing groups made up of partial manufacturers of (processing phases), all sharing good quality standards and supported by skilled production methods. The organization by groups will lead to a reduction in the production costs, thanks to the larger use of the equipment available, and to workmanship re-qualification without leaving aside the heritage of tradition.

The project aiming at the re-organisation of the sector will include a brochure reporting for any suggested partial manufacturer:

- The list of the equipment required,

- The size of the work area suggested for a particular process and for a given production capacity, i.e. the minimum space required for a competitive and effective layout of the plant,
- The average cost of machinery.

In this way, it will be possible to give a positive answer to the tanners' requirements, by introducing new productivity and quality concepts that will make the investors come back to this area.

3.3 The leather system of West Bengal

The Council for Leather Export of West Bengal, which is the export Association sponsored by the Indian Ministry of Commerce & Industry, has been the promoter of the Pisie investigation. The Council, in fact, had acknowledged the problems of the tanners in relocating and reorganising the units with modern technology and effective, productive and marketable structures. These difficulties are more evident in the small and medium firms that represent about the 80% of the total tanneries.

In order to reach these objectives, the capacity of the West Bengal tanning industry has been examined from a macro-economic point of view during a first investigation in co-operation with the Council personnel.

The general data edited by the public institution and by the company in charge of setting up the CLC have been collected. Investigations have also been carried out on the source and on the availability of the raw materials.

However, the values and the figures stated in the different documents contrast with the information obtained through the questionnaires. Neither the data referring to the actual output of finished leather nor the potential working capacity of the Kolkata tanneries have been found in any official source investigated.

The amount of the output of the West Bengal leather industry is a crucial point to understand the production capacity of the sector and its possibility of development, not only in terms of finished leather factories but also of the downstream transforming industry.

To overcome the lack of these data, we have examined several official documents on the availability of raw hides and finished leather production in all India, which we have compared both between them and with the data collected through the interviews.

The following "Production of hides and skins – India" is extracted from FAO Statistical Compendium:

Production of hides and skins - India

(In million Pieces)

Year	Cattle	Buffalo	Goats	Sheep
1992	24.7	18.4	80.7	31.4
1997	25.0	20.1	93.2	32.2
2000	25.4	21.1	100.8	34.3

Source FAO

The estimated production of hides and skins in 1999 extrapolated by the above data is the following

Estimated production

(In million Pieces)

Year	Cattle	Buffalo	Goats	Sheep
1999	25.3	20.8	99.0	33.5

The Directorate of Economic & Statistics, published in 1999, is the source of "Ratio of leathers produced (All India)":

Ratio of leathers produced

Description	Finished Leathers (1999) Mill. Sq.Ft.
Cattle Based	567.40
Buffalo Based	592.60
Goat Based	440.90
Sheep Based	201.80
Total	**1802.7**

Source DES

Our goal is a most accurate assessment of the present processing capacity of the tanning clusters of Calcutta.

From the official data reported above (Tab. 2 and Tab. 3) and from the figures generally used from the tanners interviewed, it is possible to deduct the average value in tons, of hides and skins, processed in the Indian tanneries every day.

Average value of Sq.Ft/hide/skin in 1999, obtained from the figures of the above 2 tabs is:

Cattle	25.300.000 hides	...	567.400.000 Sq.Ft = 22.43 Sq.Ft/hide
Buffalo	20.800.000 hides	...	592.600.000 Sq.Ft = 28.50 Sq.Ft/hide
Goat	99.000.000 skins	...	440.900.000 Sq.Ft = 4.45 Sq.Ft/skin
Sheep	33.500.000 skins	...	201.800.000 Sq.Ft = 6.02 Sq.Ft/skin

The average weight of each hide can be obtained applying the suggested yield and commonly used in processing the fresh hide:

Cattle = 22,43 / 1.8 = 12,5 kg/hide

Buffalo = 28,50 / 1 = 28,5 kg/hide

Thanks to these values it is possible to estimate the average tons of fresh hides processed every day in India. It is assumed for the tanneries, a number of working days per year (wd/y) of 288 days (24 days a month).

Cattle ton/y. = 25.300.000 x 12.5 = 316.250 ton/y: 288 wd/y = 1.098 ton/d.

Buffalo ton/y. = 20.800.000 x 28.5 = 592.800 ton/y: 288 wd/y = 2.058 ton/d.

The assumed average weight for the ovine skins is based on the data collected on the spot:

Goat = 1 ÷ 1.2 kg/skin

Sheep = 1.3 ÷ 1.5 kg/skin

Goat ton/y. = 99.000.000 x 1.1 = 90.000 ton/y: 288 wd/y = 312.5 ton/d.

Sheep ton/y. = 33.500.000 x 1.4 = 23.930 ton/y: 288 wd/y = 80.1 ton/d.

Average value of the Indian tanning daily capacity = **3548.6 ton/day**

For a first estimation, we assume as figure of the average total weight of hides and skins tanned daily in the Kolkata area in comparison with the weight of the material tanned in all Indian tanning clusters, **proportional** to the ratio of the Kolkata/India tanneries.

However this value is not to be considered as the true quantity of the material processed per day, but the hypothetical one. In fact, we have to consider some factors such as the bad effects of the rain, which floods a lage part of the tanneries in the clusters during the monsoon period, the different ratio of hides and skins processed in Kolkata, etc.

Going back to the estimate stated above: the total number of Indian tanneries amounts to approx 2100, while the clusters of Calcutta are approx 580.

In proportion, the local tanneries should process an average weight of 980 ton/day of hides and skins.

These figures and the above considerations seem to confirm the information collected during the local surveys among some of the most qualified tanners, which estimate that an average value of about 800 tons of hides/skins per day is presently processed in Kolkata. These figures contrast with the **estimated** productive capacity indicated in table 4.0.1 and based on the general data obtained during the investigation on the spot.

Generally speaking, it is worth to point out that despite the West Bengal livestock is quite abundant, the local tanneries complain for a certain shortage of raw material because the fresh hides are exported in other Indian Countries, and some of them to Bangladesh.

The tanneries of the Madras region can be listed among the major importers. They can afford to pay a higher price for the goods and thus get the major quantities because the transforming industry of Madras, i.e. the footwear industries produce good quality shoes, a large part of which is destined to exportation.

3.4 Analysis of Kolkata tanning district

The necessity of relocating the tanning district of a city generally derives from two essential needs:

- Eliminating the principal causes of environmental pollution and
- Redeveloping wide areas to build houses and facilities.

In the city of Kolkata, the tanneries are located in three particular areas: TILJALA, TANGRA and TOPSIA.

Each area has developed a different typology of tannery in terms of structure, product and trading sector. Their point in common lies in the fact that these tanneries operate in environmental conditions, which are far from being in line with any conception of modern industry or craft.

In fact, as there is no sewerage, the sewage flows on the surface along the narrow streets of the “industrial” blocks into the canals between the houses.

The three industrial areas of the leather sector are:

- **Tiljala** – where the tanneries managed by mainly Hindus from traditional leather processing communities are located
- **Tangra** – where the tanneries managed by the Chineses are located
- **Topsia** – where the tanneries managed by the Muslims are located

The figures reported in this document are based on those supplied by the Organization that had been appointed to plan and develop the new industrial district destined to house the leather sector with its tanneries and transformation plants.

The tables show the list of those companies ready to purchase a building lot in the new district. According to what stated by the majority of these companies, the fact that the sale price for these lots is not very convenient has led to a demand that does not reflect the actual needs of the sector.

A lot of operators have given up their option to purchase, while those submitting a purchase application have just asked for small lots, either equal or little wider than the ones they already have.

This fact, which actually occurs because of money reasons, is likely to affect the future technical and technological development of those factories deciding to move to the new district. In fact, in such dimensioned areas they would be able just to move their activities **as they are** nowadays, and they would use the same multi-level layout, which is inadequate in terms of typology and space to house new machinery and technology.

By this approach, any chance of concrete output increase would be eliminated from the start together with the hope for a quality improvement, the latter being the essential prerequisite for this sector to survive on a more and more globalized market of fierce competition.

By contrary, the de-localization of the tanneries should rather offer the chance of making buildings without the architectural and structural barriers characterizing the previous plants. In this way, thanks to adequate layouts, it would be possible to lay down the basis for a technologic and productive progress, in full respect of the local traditions and cultures.

3.4.1 The raw leather

Among the types of leather available on the local market, buffalo and cow hides are the most widespread, followed by sheepskin and goatskin. Therefore, a massive majority of tanneries use to process only cow and buffalo hides, while just a few of them use to work sheepskin and goatskin (either exclusively or altenatively).

a) Cow hides

Most Indian cows do not come from farmings breeding animals for meat purposes; therefore, hides come from rather light animals.

The grain is normally compact and fine but its quality depends on the season conditions and is often damaged by parasites and traumatic injuries (scratches, wounds, etc.).

The traditional process of manual skinning, which is commonly used in each and every slaughterhouse, causes enormous damages to the hides. In fact, the cow splits are very thin and they are often made unusable because they are perforated during the manual skinning.

The same is true also for the buffalo hides, except for the fact that they are stronger. The splitting of this type of hide allows obtaining a good quality split, which would be better used if it were not damaged by the deep cuts made during the skinning process.

The tanneries processing buffalo hides use to split in W.B., while the splits are sold to the small tanneries located in the district of Tiljala.

The parts deriving from the leather trimming and larger than 1½ to 2 square feet are sold to the specialized tanneries of Tiljala.

The grain is normally judged to be of good quality, with high percentages of first choice material (50% I° - 30% II° - 20% III°).

The market of raw leather is controlled by the Muslims.

The price of a green salted cow hide depends on its surface:

- **Light cow hides** (average: weight 12 Kg - surface 25 Sqft) 30 Rupees / Sqft
- **Buffalo hides** (average: weight 25/30 Kg – surface 40/45 Sqft) 28 / 34 Rupees / Sqft

Considering an exchange rate of approx 50 Rupies / US $, the price/Kg is:

- Cow hide 1,25 US $ / Kg
- Buffalo hide 1,12 / 1,14 US $ / Kg

As per the data collected, the average transformation cost (all included) is of:

15 / 17 Rupees/ Sqft.

As far as cow hide is concerned, the overall cost of the finished product is of:

45 / 47 Rupees/ Sqft.

As to the cow hide, **the incidence rate of the crude oil price** on overall transformation cost is of **64 / 65 %.**

As to the buffalo hide, the incidence is likely to be the same or slightly lower than cow hide, depending on the profits deriving from the split salt in W.B., of which we lack reliable data.

The average sales price as emerging from the interviews is around 50 Rupees/Sqft, with a profit rate ranging from 7 to 10 %.

It is not easy to interprete these data: they should be acknowledged as very generic information.

b) Sheepskin and goatskin

The animals are not very young when they are put down; their average weight is approx 10 / 13 Kg. (the weight of the hide is 3,5 / 4 Kg, 2 / 3 Kg of which is wool, in case of sheeps), while the **average surface is approx 40 / 50 square dm.**

Sheepskin is dewolled in the tanneries, most of the times in paddle, with no particular care for the wool, which is not given much importance and is often handed over for free to those who collect it.

3.4.2 The labour

Most of the interviewed companies declare that their labour consists of a few workers employed indefinitely, while the largest part of workers is employed either temporarily or work by the job.

During the visits to the tanneries a slow productive rhythm has been observed, which was probably due to the low market demand of that particular moment. The same slow rhythm was kept by the workers by the job too.

As far as the employees' skill is concerned, the technicians and the machine operators seemed to be both accurate and trained; the quality of their work looked quite good if we consider the poor conditions of the machinery and the technology they used.

The most common defects were to be referred to the planning and managing aspects, and above all the layout of the factories, where paths rationally conceived to obtain the ordinate flow of the material were seldom found.

In many cases, this is due to the type of buildings, which most of the times are not suitable to house tanneries.

No control methodology has been observed during the standard manufacturing process and this may be the symptom of a lack of duly trained managers capable of dealing with the problems concerning production and timing.

3.4.3 The tanneries of Kolkata

The following tables have been drafted in agreement with the data collected by the various sources:

- **Table 3.0.1**: it shows the data collected during the interviews with reference both to the number of existing companies in the various areas and to their output capacity.

- **Table 3.1.1**: it shows the data of those companies located in Tiljala, which answered the questionnaires on the following issues:
  - The type of leather processed,
  - The number of employees,
  - The working area

- **Table 3.1.2**: it shows the data of those companies located in Tiljala, which answered the questionnaires on the following issue:
  - The type of machines used for the production

- **Table 3.2.1**: it shows the data of those companies located in Tanga, which answered the questionnaires on the following issues:
  - The type of leather processed,
  - The number of employees,
  - The working area

- **Table 3.2.2**: it shows the data of those companies located in Tanga, which answered the questionnaires on the following issues:
  - The type of machines used for the production

- **Table 3.3.1**: it shows the data of those companies located in Topsia, which answered the questionnaires on the following issues:
  - The type of leather processed,
  - The number of employees,
  - The working area

- **Table 3.3.2**: it shows the data of those companies located in Topsia, which answered to the questionnaires on the following issues:
    - the types of machines used for the production

TILJALA

Tiljala is the area where the tanneries are managed by mainly Hindus from traditional leather processing communities.

Despite the number of companies working in the tanning sector amounts to 500 approximately, nevertheless just a few of them can be said to be “Tanneries”, since:

- Only 100 start from raw leather or W.B. and all of them processe around 50.000 Sqft /month of finished leather, while
- Among the remaining 400 companies, **some** purchase the Buffalo splits, in W.B. and process them to get a finished product suitable to manufacture work gloves and linings for bags and suitcases, while **others** purchase 2 Sqft trimmings of raw leather from the tanneries (this leather normally comes from the head of the cow) and process it almost fully by hand by means of Indian-made small shaving machines and plates press. The result is finished leather for bags.

The figures relevant to the labour, included in **table 3.1.1**, show that most of the small companies processing splits and trimmings are family-run factories. Besides, the figures relevant to the working area show that the space is almost never compatible with the room required by a technological line.

The number of employees is low and the work areas are small, if compared to the considerable output declared. This anomaly may be explained by the fact that:

- The tanneries, not to be neglected at the moment of the transfer operation, may have overestimated the actual figures.
- A sistematic use of labour and equipment from other factories is made to complete the working process.

The analysis of **table 3.1.2** (showing which types of machines are present in each factory as well as a Low value of Technological Density) will confirm such consideration. Three important points emerge:

- A lot of factories use to start working process from W.B.
- The lack of some types of machines is balanced by carrying out the relevant processing ex-house, at some other tanneries.
- Some types of machines, which are nowadays considered indispensable for applying state-of the-art transformation technologies, are missing in all the tanneries.

TANGRA

Tangra is the area where the tanneries managed by Chineses are located.

The number of companies working in the tanning sector amounts to 268, but only 50 / 60 among them, which are the market leaders, can boast an output of around 12.000 Sqft / day of finished leather. As to the others, their output capacity is lower and can reach max 4.000 Sqft a day.

The figures of **table 3.2.1** show that only 10 out of the 50 companies interviewed use to work exclusively sheepskin and goatskin, while a further 10 % mostly work cow and buffalo hides but can also work sheep and goat hides.

The processing of cow and buffalo hides destined to the manufacture of bags and suitcases is predominant and the tanneries often have in-house stitching departments.

Both the finished product and the finished leather, though the latter to a lesser extent, are mainly exported to US, Canada and Europa.

The figures of **table 3.2.2** show a good and commonly widespread technological density with just a few weaknesses in the key points of the process and with a common capacity of applying good-level technologies.

The interviews reveal that a common sense of discouragement pervades the sector and that a number of tanneries are willing to accept the purchasing offers from the Muslims, who can be said to monopolize the raw leather market.

TOPSIA

Topsia is the area where the tanneries managed by the Muslims are located.

The number of companies working in the tanning sector amounts to 230 in this area. Their average output capacity is the following: 200 factories process 150.000 - 200.000 Sqft / month; 20 factories process 300.000 Sqft / month and 10 process more than 300.000 Sqft / month.

The figures of **table 3.3.1** show that the 20% of the 17 factories interviewed process only sheepskin and goatskin, while a further 10 % process mainly cows and buffalo hides but can also work sheepskin and goatskin. The remaining 70% tanneries work only cow and buffalo hides.

Cow and buffalo hides are predominant in Topsia too; all the production is destined to the manufacture of bags and suitcases and the tanneries often have in-house stitching departments.

Both the finished product and the finished leather, though the latter to a lesser extent, are mainly exported to the western countries.

The figures of **table 3.3.2** show a good and commonly widespread technological density with just a few weaknesses in the key points of the process and with a common capacity of applying good-level technologies.

Some reservations must be made on the type and the quality of some low-tech machines, which often jeopardize the quality of the operation and in some cases do not allow applying state-of-the-art technologies.

These tables resume the data regarding **a hundred of companies** who filled in the questionnaire here enclosed.

For more information all the questionnaires are kept at our offices.

3.4.4 The technique and technology applied

We have observed that the three existing industrial districts in Kolkata are very different one from the other, since they result from three different socio-economical conditions.

In **Topsia,** thanks to machinery and structure investments, it has been possibile to build some plants suitable for good industrial production, the companies have started to look for foreign markets to sell finished leather, and in some cases, their products too (bags and suitcases), which are manufactured in the departments located close to the tannery.

The existance of an “industrial” planning of establishment and management of the company has been noticed during our visits to the factories. Such planning aims at realizing a product marketable not only because of its low cost of production, which is due to the low cost of labour, but also thanks to its qualities.

Because of much lower investments, the dimensions of the production units in **Tangra** are smaller. Nevertheless, faithful to the typical Chinese market tradition, these factories are interested in export too.

Here, we noticed a slightly greater capacity of manufacturing a marketable product than in Topsia, resulting from a larger use of the human factor to balance the scarsity of investments.

Lastly, only a few factories in **Tiljala** can be said to be something more than family-run enterprises.

The investments in machinery and structure are reduced to the minimum. Here, the production made with low-cost materials, either raw or semi-processed, results in poor items like work gloves and local craft leathergoods. The use of low cost labour is the only winning factor.

From a general point of view, it has been observed that specific environmental factors have determined some technical aspects, which in turn have negatively affected the tanning process in Kolkata, and in particular:

- Labour low cost
- Manual skinning in the slaughterhouses
- Low cost machines built in loco, the performance of which is far too poor to apply good working techniques.

The last point is even truer if referred to the early phases of the tanning process, such as soaking, unhairing, liming and fleshing.

In most cases, the drums are not suitable to work the leather correctly, since they lack in size, power, systems and controls. Such deficiencies in the early phases jeopardize the results of the next steps, as well as the quality of the finished product.

With a poor liming, for instance, it is not possible to carry out a good fleshing, since this operation is made very difficult by the poor quality of the leather available in Kolkata and becomes even impossible when the liming is deficient and the fleshing machines are totally inadequate.

By the way, it is worth to stress that the type of leather worked is very light cow leather and buffalo leather.

To obtain a good fleshing of light cow leather, a good liming and a correct swelling of the leather are first of all necessary. Then, a very stiff fleshing machine allowing accurate adjustments is required, in order to preserve the thin skin and to enable the complete removal of the fat layer and the flesh residues over the whole surface.

In the particular case of the thicker-skinned Buffalo leather, besides an adeguate liming, a powerful fleshing machine and an elastic support with a large possibility of self-adjustment are also required. By this equipment, it is possible to obtain a thorough cleaning of both the thick parts, like the butt, and the less thick parts, like the belly on the one hand, and to cause as little damage as possible to the precious middle part of the backside on the other.

A poor fleshing prevents a good pelt splitting, which would be necessary for the hides worked in Kolkata to obtain good results, in terms of quality and environment preservation.

In fact, tanning thin hides after a poor fleshing is counter-productive, because:

- Chemical products are wasted to tan a split too thin to be used after the splitting in W.B.
- The tanning products do not penetrate the leather from the flesh side, since it is still covered with fat etc., but rather from the grain, by damaging its surface and its quality.

It is also counter-productive to tan buffalo hides without first carrying out the pelt splitting operation, because:

- The tanning products do not penetrate the leather from the flesh side, since it is still covered with fat etc., but rather from the grain, by damaging its surface and its quality.

- The buffalo hide, with its typical wrinkles, stretches more easily during the tanning bath if it has been pelt split first; this will also allow obtaining a wider grain surface.
- Chemical products are wasted by tanning all those parts of the split, which are too thin and will be trimmed after the splitting in W.B., while they could have been trimmed after the pelt splitting, before the tanning.

A further problem is the use of the through-feed roller sammying presses built in loco.

Such machines cannot reach the ideal values of residual humidity; therefore, it is not possible to perform the splitting and shaving operations correctly and finally, the necessary accuracy on thickness on the finished leather cannot be attained.

Moreover, since these machines cannot open the leather sufficiently, the leather sides are heaped up and deep folds develop on the legs, thus causing serious damages to the leather during the splitting and also a loss of the surface area.

The low cost of the labour induces the entrepreneurs to limit the investments in machinery and tanning systems, as they can dispose of an impressive number of employees. However, there are some phases that cannot be fully replaced in a sufficient way, for example:

- The precision and the effectiveness ensured by the roller painting with manual padding
- The uniformity of the spraying ensured by a rotating spray gun cabinet with manual painting.

A further mistake in the use of technology resulting from the environmental conditions has been found in the drying department, where the value of residual humidity in the leather between the drying and before the processes of staking or buffing is not given the due importance. The changes in weather would require a much greater attention as well as more modern drying systems. The vacuum dryers are missing quite completely.

Owing to the low cost of labour, the rational use of the transport means of the leather in the factory is not given the right importance, thus missing both the flow of the material and the operation sequence.

The result is a delay in the transformation cycles as well as an increase of the material bulked along the path, the cost of which often wastes the advantage deriving from the low cost of the labour.

For the same reasons, in the small-medium companies there is just a remote chance of developing effective layouts even in those factories where the structure would allow it.

The low cost of labour also justifies the existance of those small family-run workshops, where the trimmings of raw leather and splits are worked with complicated manual operations.

Presumably, the majority of these workshops are destined to close in consequence of the industrialization and contemporaneous moving of the sector to the new district. In fact, their activity is likely to be reconverted in a type of work on behalf of third parties and to specialize in particular type of working.

TABLE 3.0.1 Estimation of existing companies in Calcutta and their output capacity

Area	Estimation of monthly output capacity measured in SQFT of finished leather						
	20.000 Sqft per month	50.000 Sqft per month	100.000 Sqft per month	150 / 200.000 Sqft per month	300.000 Sqft per month	Over 300.000 Sqft per month	Total
	With an hypotetical yield of 1,6 Sqft / kg and 24 working days per month, we have in daily Kg						
daily Kg	521	1.302	2.604	5.208	7.813	> 8.000	
Tiljala	400	100					500
Tangra			218		50		268
Topsia and other				200	20	10	230
TOTAL from tanneries							**998**
TOTAL Sqft / m	8.000.000	5.000.000	21.800.000	35.000.000	21.000.000	5.000.000	**95.800.000**
daily Kg	208.333	130.208	567.708	911.458	546.875	130.208	**2.494.792**
	20.000	50.000	100.000	200.000	300.000		
Trimmings and splits	8.000.000						
Grain	87.800.000						
Considering an average value between 25 Sqft per bovine hide and 40 Sqft per Buffalo hides (30 Sqft per hide) we have that about 2.870.000 hides per month are processed in Calcutta.							

TABLE 3.1.1
SURVEY OF TECHNICAL / NON-TECHNICAL DATA OF THE EXISTING TANNERIES IN **TILJALA**

	Tanneries	Daily processed Hides					Workers		Surface			
	Name	Bovines	H/Splits	Ovines	Today	Future	engaged	jobbing	Total	Covered	Floors	Future
1	Nizamuddin Tannery		x		400	1000	1	5	800	800	1	1000
2	Ram Prit Tannery		x				1	5	200	200	1	500
3	Sundari Tannery		x		500	1000	1	5	150	150	1	500
4	P. Pagnan Co. Pvt. Ltd.	x		x	300	400	6	44	350	350	2	400
5	Kalidas Ram Tannery		x				1	4	80	80	1	200
6	India Tannery		x		900	2000	1	5	550	550	1	550
7	Basudev Ram Tannery		x				1	5	137	137	1	150
8	Globe tannery		x		10	150	1	5	550	550	2	550
9	Ram Dayal DasTannery		x				1	5	130	130	1	130
10	Bright Leather		x		900	2000	1	5	250	250	1	250
11	Ram Jee Ram Tannery		x				1	5	70	70	1	70
12	Panna Leather						1	5	200	200	1	180
13	Md. Saud Tannery		x		600	700	1	5	150	150	1	150
14	Khadem Hussain Tann						1	5	300	100	1	267
15	Badiuzzaman Khan & S		x				1	5	300	300	1	300
16	J.S. Tannery		x				1	4	500	500	1	1000
17	Indotan	x			70	300	3	27	2000	1500	2	3000

TABLE 3.1.2
SURVEY OF TECHNICAL / NON-TECHNICAL DATA OF THE EXISTING TANNERIES IN **TILJALA**

	Name	Pad	Dru	Flesh	Split	Dru	Press	Split	Shav	Dru	Sett	Vacum	Tunn	Stak	Toggl	Buff	Dust	Coat	Emb	Finish	Misu
1	Nizamuddin Tannery	x	x	x		x		x	x	x	x		x	x					x		
2	Ram Prit Tannery								x	x			x			x			x	x	x
3	Sundari Tannery	x	x	x		x			x	x			x						x	x	
4	P. Pagnan Co. Pvt. Ltd.	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
5	Kalidas Ram Tannery								x	x			x			x			x		x
6	India Tannery	x	x	x		x	x		x	x	x		x	x		x			x		
7	Basudev Ram Tannery								x	x						x			x	x	
8	Globe tannery	x	x	x	x		x	x	x	x	x		x	x	x	x			x	x	
9	Ram Dayal DasTannery								x	x			x			x			x		x
10	Bright Leather	x	x						x	x	x		x	x					x	x	
11	Ram Jee Ram Tannery								x	x				x					x	x	
12	Panna Leather								x	x			x			x			x	x	x
13	Md. Saud Tannery	x				x			x	x			x						x	x	
14	Khadem Hussain Tann									x	x		x			x				x	x
15	Badiuzzaman Khan & S								x	x			x			x			x	x	
16	J.S. Tannery								x	x									x	x	x
17	Indotan	x	x	x	x	x	x	x	x	x	x		x		x	x			x	x	x

TABLE 3.2.1
SURVEY OF TECHNICAL/NON-TECHNICAL DATA OF THE EXISTING TANNERIES IN **TANGRA**

	Tanneries	Daily processed Hides					Workers		Surface			
	Name	Bovines	H/Splits	Ovines	Today	Future	engaged	jobbing	Total	Covered	Floors	Future
1	United Chrome Tann.	x		x	150	200	7	23	4000	3000	1	5000
2	Kanungoe Leathers			x	1000	1200	3	19	1400	1000	1	3000
3	Mow Chong Tannery	x		x	500	600	5	30	1500	1350	3	1800
4	Azad Ali Tannery	x			1000	1200	1	9	100	100	2	150
5	Ciria Tanning	x			400	500	10	90	5500	3000	1	6000
6	N.J.Leather Enterprise			x	1000	1000	2	28	800	750	1	800
7	Mod Tan Enterprise	x			100	200	1	9	300	300	2	400
8	IndianTanning Ind	x		x	1000	1500	17	83	4500	4500	3	5000
9	Chi Thai Tannery	x			300	400	5	25	3000	2500	2	3500
10	Maitra Tanners	x			150	200	2	28	700	600	2	800
11	Olympic Tannery	x			300	300	2	28				
12	Lucky Leather	x			300	500	5	25	550	550	2	600
13	Weblec India Ltd.	x		x	300	400	10	40	2600	1800	2	3000
14	G.A. Jolli	x			300	400	4	36	700	400	1	800
				x	1200	1400						
15	Rishi Leather Pvt. Ltd.	x			300	400	2	28	700	650	3	800
16	Winsome Tannery	x			100	300	3	17	3000	2500	2	3000
17	Paragon Leather Co.	x	x		200	400	2	18	350	300	2	400
				x	800	1200						
18	Sin Sin Tannery	x			100	300	2	18	350	350	2	400
19	GBS Tanney Pvt. Ltd.			x	1200	1400	3	17	400	350	2	500
20	Wei Hing Tannery	x			150	200	1	14	350	350	2	400
21	Victor Lexport	x			100	200	2	18	550	550	2	600
22	Tiger Tanning Industr	x			450	600	2	28	7700	680	2	800
23	Ahyin Tannery	x			300	350	2	28	550	550	2	600
24	Afoo Tannery	x			100	200	4	31	500	500	2	600

	Tanneries	Daily processed Hides					Workers		Surface			
	Name	Bovines	H/Splits	Ovines	Today	Future	engaged	jobbing	Total	Covered	Floors	Future
25	Chens Leather	x			100	200	3	32	300	300	2	400
26	Standard Leather	x			400	600			800	750	2	800
27	Fu Sheen Tannery	x			300	400	3	32	700	600	2	800
28	Gouri Entreprise	x			200	300	1	11	200	180	2	250
29	CPL Tannery	x			450	600	9	51	3500	3500	3	5000
				x	100	200						
30	Wu Leather	x			400	600	8	42	4000	4000	2	5000
31	Hock Soon	x			200	250	5	35	2700	2000	2	3000
32	A. Kong Tannery	x			300	500	1	20	500	500	3	800
33	Ah Fee Tannery	x			300	400	5	20	350	300	2	400
34	Ka Fung Tannery	x			300	325	5	45	4000	4000	2	4200
35	Jameel Leathers	x			250	300	2	28	2000	2000	2	2200
36	Hupson Tannery	x			180	200	7	43	1000	1000	3	1200
37	Sip Shing Tannery	x			200	300	3	37	700	700	3	800
38	Hsin Yeh Tannery	x			150	200	5	35	3000	3000	3	4000
39	Sing Hing Tannery	x			300	400	2	38	1000	900	3	1500
40	Canton Tanney	x			600	800	5	25	700	600	3	1000
41	Ah Chung Tannery	x			400	450	5	20	350	300	2	500
42	Wing Sung Tannery	x			300	400	5	55	800	800	2	850
43	Yunkiu Leather Corpn	x			100	200	2	38	550	550	2	600
44	Huw Fa Tannery	x			50	200	1	19	500	500	2	600
45	Grand Leather Works	x			200	400	4	60	2000	1800	2	3000
46	Goodwill Tannery	x			1200	1200	5	45	950	900	3	1200
47	Clement Exports	x			200	300	5	55	1200	1200	2	1500
48	Li Wei Seong	x			250	400	5	55	2200	2000	3	3000
49	H. Hsin & Brothers	x			60	80	2	28	1400	1000	3	2000
50	Diamond Tannery & Co.	x			25	50	2	13	2800	1400	2	3000

TABLE 3.2.2
SURVEY OF TECHNICAL/NON-TECHNICAL DATA OF THE EXISTING TANNERIES IN **TANGRA**

	Name	Pad	Dru	Flesh	Split	Dru	Press	Split	Shav	Dru	Sett	Vacum	Tunn	Stak	Toggl	Buff	Dust	Coat	Emb	Finish	Misu
1	Unitd Chrome tann.						x		x	x	x		x	x	x	x			x	x	x
2	Kanungoe Leathers	x	x	x		x	x		x	x	x	x	x	x	x	x	x		x	x	x
3	Mow Chong Tannery	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	Azad Ali Tannery	x	x	x	x	x	x		x	x	x		x	x	x	x			x	x	x
5	Ciria Tanning	x	x	x	x	x	x		x	x	x		x	x	x	x			x	x	x
6	N.J.Leather Enterprise	x	x			x	x		x	x	x		x	x	x	x			x	x	x
7	Mod Tan Enterprise	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
8	IndianTanning Ind	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
9	Chi Thai Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x	x		x	x	x
10	Maitra Tanners	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
11	Olympic Tannery	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
12	Lucky Leather	x	x			x				x			x	x	x	x	x	x	x	x	x
13	Weblec India Ltd.	x	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
14	G.A. Jolli	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
15	Rishi Leather Pvt. Ltd.	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
16	Winsome Tannery						x		x	x	x		x	x	x	x	x	x	x	x	x
17	Paragon Leather Co.	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
18	Sin Sin Tannery	x	x	x		x	x	x	x	x	x	x	x	x	x	x			x	x	x
19	GBS Tanney Pvt. Ltd.	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
20	Wei Hing Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
21	Victor Lexport	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
22	Tiger Tanning Industr	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
23	Ahyin Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
24	Afoo Tannery	x	x	x		x		x	x	x			x	x	x	x			x	x	x
25	Chens Leather	x	x	x		x		x	x	x			x	x	x	x			x	x	x
26	Standard Leather	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x

	Name	Pad	Dru	Flesh	Split	Dru	Press	Split	Shav	Dru	Sett	Vacum	Tunn	Stak	Toggl	Buff	Dust	Coat	Emb	Finish	Misu
27	Fu Sheen Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
28	Gouri Entreprise								x	x	x		x	x	x	x	x	x	x	x	
29	CPL Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
30	Wu Leather	x	x	x		x	x	x	x	x	x		x	x	x	x	x		x	x	x
31	Hock Soon	x	x	x		x	x		x	x	x		x	x		x			x	x	x
32	A. Kong Tannery	x	x	x		x	x		x	x	x		x	x		x			x		x
33	Ah Fee Tannery	x	x	x	x	x	x		x	x	x		x	x	x	x			x	x	x
34	Ka Fung Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x		x
35	Jameel Leathers	x	x	x		x	x		x	x	x		x	x	x	x			x		
36	Hupson Tannery	x	x	x		x	x		x	x	x		x	x	x	x			x		x
37	Sip Shing Tannery	x	x	x		x	x		x	x	x	x	x	x	x	x			x	x	x
38	Hsin Yeh Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
39	Sing Hing Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
40	Canton Tanney	x	x	x	x	x	x		x	x	x	x	x	x	x	x			x	x	x
41	Ah Chung Tannery	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
42	Wing Sung Tannery	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x	x	x	x
43	Yunkiu Leather Corpn	x	x	x		x	x	x	x	x	x		x	x	x				x	x	x
44	Huw Fa Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
45	Grand Leather Works	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
46	Goodwill Tannery	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
47	Clement Exports	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
48	Li Wei Seong	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
49	H. Hsin & Brothers	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
50	Diamond Tannery & Co.	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x

TABLE 3.3.1
SURVEY OF TECHNICAL/NON-TECHNICAL DATA OF THE EXISTING TANNERIES IN **TOPSIA**

	Tanneries	Daily processed Hides					Workers		Surface			
	Name	Bovines	H/Splits	Ovines	Today	Future	engaged	jobbing	Total	Covered	Floors	Future
1	Modern Leather	x			200	300	3	37	450	450	2	500
2	Continental Leather	x			300	400		30	700	700	2	800
3	Agra Fine Leather	x			400	500	2	28	350	350	1	400
4	Aslam Tanning			x	1200	1500	5	20	350	300	2	400
5	Soni Leathers	x			200	400	3	37	1400	1150	2	1500
6	Nafis Tanning Industries			x	2000		2	28	350	320	1	400
7	Alam Leather Industries	x			500	600	5	10	550	550	2	600
8	J.S. Leather			x	600	700	8	12	5200	5200	2	6000
9	Ahmed Tannery	x		x	2000	2200	14	31	1500	800	1	2000
10	Z.S. Leather			x	300	400	1	19	600	500	1	700
11	Alam Tannery	x		x	400	600	8	42	4000	3600	2	4500
12	ITI Exports Pvt. Ltd.	x			450	600	2	18	2000	15000	2	2000
13	Crescent Tannery	x			300	350	3	27	550	550	2	550
14	Bengal Reptile Exporting	x			300	350						
				x	1200	1400	3	27	400	350		400
15	Mercury Exports			x	2000	2500	5	35	1000	1000	2	1200
16	Mani Leather Industries	x			350	400	4	41	550	500	2	600
17	Taj Leather Works	x			200	300	7	23	9000	9000	2	10000
				x	600	650						

TABLE 3.3.2
SURVEY OF TECHNICAL/NON-TECHNICAL DATA OF THE EXISTING TANNERIES IN **TOPSIA**

No.	Name	Pad	Dru	Flesh	Split	Dru	Press	Split	Shav	Dru	Sett	Vacum	Tunn	Stak	Toggl	Buff	Dust	Coat	Emb	Finish	Misu
1	Modern Leather	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
2	Continental Leather	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
3	Agra Fine Leather	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
4	Aslam Tanning	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
5	Soni Leathers	x	x	x		x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
6	Nafis Tanning Industries	x	x			x	x		x	x	x		x	x	x	x			x	x	x
7	Alam Leather Industries	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
8	J.S. Leather	x	x	x	x					x	x	x	x	x	x	x	x		x	x	x
9	Ahmed Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x	x		x	x	x
10	Z.S. Leather	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
11	Alam Tannery	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
12	ITI Exports Pvt. Ltd.	x	x	x		x	x	x	x	x	x		x	x	x	x	x		x	x	x
13	Crescent Tannery	x	x	x		x	x	x	x	x	x		x	x	x	x			x	x	x
14	Bengal Reptile Exporting	x	x	x		x															
15	Mercury Exports	x	x	x		x	x		x	x	x		x	x	x	x			x	x	x
16	Mani Leather Industries	x	x			x				x	x		x	x	x	x			x	x	x
17	Taj Leather Works	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x

4 THE INDUSTRIAL DISTRICT

4.1 Model For A Network In The Technological District Of Calcutta

4.1.1 Overview

History has shown how countries, that have provided cheaper labour for example, have overcome other countries, such as Taiwan and Korea, where the one main competitive factor is cheap labour. On the other hand, Italy's shoe and leather industries – and particularly the former – have continued to profit from a fifty-year long uninterrupted success.

Thus, it is useful to enlist the **factors** upon which the Italian model's competitiveness is based and the **conditions** under which the same model **can be reproduced**.

In opposition with those cheap products, the low price of which derives both from enormous volumes of outputs and very low cost production factors (labour and raw materials), those manufactured by the Italian industries are fashionable and quality products.

The flexibility and the capability of a quickly response, to the market evolution, give strategic value to a quality product, while still maintaining its cost competitiveness.

The fulcrum of these capabilities is a wide sample of synergies that emerge at all levels out of the development of a network of small and medium-sized companies that are very articulated both in terms of type of manufacturing and production phases.

The economists use to indicate this phenomenon by the word "Industrial district". More precisely, this term means "a socio-economic entity characterised by the active, combined presence of a community of people and a population of industrial companies in a circumscribed area that has specific natural and historical characteristics."

The competitiveness of the Italian districts - offering high-quality and trendy products - derives from the close interaction, between the companies belonging to the entire leather production system that have been able to maintain and continually renew their tanning, shoe and leather goods activities.

The synergies provided by the district structure not only provide "flexible specialisation," but also a further type of interdependence that characterises those companies operating in the various sectors of the industry, i.e. shoe, tanning and shoe machinery. In other words, the district structure can turn the problems of one sector into information that can be useful to another sector.

The ability to promote many forms of synergy and external economies can be attributed to the effectiveness and efficiency of the district organisation that favours:

- The increasing of the articulation of the offer, decentralisation of the processing phases and an overall increase in system flexibility;
- The common use of the infrastructure services;
- The training and the development of qualified personnel.

The structure of an industrial district can be used as a reference model for developing an industrial installation consisting of small and medium-sized companies, aiming at strengthen their capacity to interact in a synergic manner.

Targeted support interventions are required to favour the creation of a district organisation in those countries with a pulverised, de-structured productive system, even though they boast long-standing tradition, in the processing and transforming of leather.

In fact, in order to create and/or develop an industrial district, the existence of several offer factors must be verified and the characteristics of the demand must be understood.

The Italian district model can be transferred when the following “preconditions” are met: definition of the “strategic objectives”; analysis of the critical areas; identification of the instrument linking together the first two preconditions.

4.1.2 Grouping The CLC Members

The implementation of district development strategies varies considerably from one area to another. In the European most important areas, like the Italian leather districts, there are significant differences as regards the “district members in limited areas”, its organisation and the business support services offered. **All the Italian districts are “technology districts”, defined for the purpose of complementary co-operation between SMEs, leather clusters and technology poles: this form of organisation is the “a network district”**

The model of local technology districts of the referred Calcutta area results from the background analysis and evaluation of the clustering strategies in Italy and on the results of an enterprise survey carried out in three Calcutta areas (Tiljala, Tangra, Topsia). The model highlights first of all best practices that have successfully stimulated the participation of SMEs in networks and enhanced their access to technology.

Secondly, it highlights common factors underpinning the success of all districts.

There is, however, no perfect model applicable everywhere in the same way. The basic model recommended below will have to be adapted to the specific socioeconomic, political and cultural characteristics of the Calcutta area.

In addition, this model results from the analysis of best practice in leather tanning sector fields. According to the industry sector in question, field might be organised in different ways. The present model will therefore have to be adjusted to the requirements of the different technological level of the local enterprises.

4.1.3 Network Outline

Enterprises needs the network to assist them in transferring the production units, in accessing new market opportunities, and in achieving long-term competitiveness. If the network fails to deliver on these expectations, enterprises are likely to leave, especially the small ones.

Technology networks offer suppliers an adequate framework to respond to increasing industry requirements. Co-operation in local networks, both vertically and horizontally, helps enterprises to face new challenges, although these have different expectations according to their size, financial position and technological profile.

Furthermore, enterprise networks are instrumental in offering business support services and in facilitating enterprises' access to resources such as technology, qualification, internationalisation tools, etc. The CLC network should be well placed to generate the necessary contacts and to create new relationships.

In the process of establishing the CLC network, three basic issues have to be dealt with:

1. Determine the basic organisational principles in the technology district;

2. Decide on available business support services;

3. Set up a know-how management and communication structure.

4.1.4 Basic Organisational Principles

The basic organisational principles of a technology district and network are determined by answering the following questions:

Which partners are to be involved in the network? Which associations, public bodies and institutions are to be integrated?

Is a co-ordination mechanism required? If yes, who assumes the role of network co-ordinator? Which institutional organs (e.g. advisory committees) ensure the consultation of partners and a balance of interests, in order to reach synergies and added value for the members?

How shall the network and its services be financed?

4.1.5 Network Partners

It is important to integrate the whole production chain in the network, including producers, service industries and technology poles, in order to generate a flow of communication and know-how between them. Competitiveness can only be achieved by means of grouping among enterprises and institutions that have different strategic goals such as developing, introducing or applying new technologies. This is reflected in the answers to the enterprise survey carried out. Enterprises are primarily concerned with the integration of their supply chain partners: suppliers, customers and technology poles.

Usually enterprises are of the opinion that associations and public sector institutions should not be admitted as key members of the network. However, in order to guarantee the basic functions of the CLC network, such as providing access to new markets, facilitating technology

transfer and strengthening the competitiveness of the local industry, both enterprises and intermediary organisations should be involved.

The extent of the participation of such organisations must be adapted to the objectives of the network.. Associations can act as an important interface with national authorities. (i.e. The Leather Consortium of Santa Croce sull'Arno, that manages the ETP of S.ta Croce tannerie, is grouping the local municipality and the Private Tanning Association as well).

As regards public sector involvement, the main question is to which extent a local technology district should serve local economic development objectives. If the district is part of an overall local development strategy, both politicians and the public administration are responsible for co-ordinating relevant activities. In this context, political back up of a network is essential.

As regards the involvement of large manufacturers (and system suppliers), most SMEs favour their participation in the network, in order to be informed of market developments and requirements. In most technology districts in Italy, important tanners participate in the networks. Large tanneries are needed to push the upgrading operation process forward and to provide an insight to future developments, while small units find difficult to face the new investments needed to relocate the units, start up the production and implement ecological processes. .

However, the participation of large tanneries (who normally have an important role in the decision-making of the field) together in the same groupe with the SME is not always appropriate. When the representation of the collective interests of the small tanneries vis-à-vis the manufacturers is one of the network objectives, then this sub-group of the network should not include the latter. **The field organisation grouping large tanneries should be different from the organisation grouping SMES and artisans as well.**

Enterprises do not like to be in the same network as their competitors, but this might be necessary for strategic purposes. While the wider network should always leave room for competitors, close co-operation projects are the responsibility of individual enterprises. These should therefore decide on whether or not a district member needs to be included in a project or not. However, rather than a closed system, a network is an open process.

Network partnership can therefore be extended or restricted, within the same district area or outside too, in line with new challenges.

4.1.6 Network Co-ordination

In all successful technology district-networks, co-ordination is ensured by neutral moderators: local instituitons, associations, or other organisms designed by the partners themselves . Without a common, unified platform for technology networking, individual bottom-up initiatives may stay isolated from each other.

The analysis of the sample of different and complex technical needs of the local Calcutta tanning sector, demonstrates that network co-ordination is indispensable. The analysis shows that individual members of the tanning community of the Calcutta area are not usually closely inter-linked. Network co-ordination is needed to ensure the continuos flow of communication, the co-ordination of activities and the concertation of partners' interests. Moreover, the absence of co-ordination would engender transaction costs that are too high for individual partners.

The following basic co-ordination processes must be handled:

* Exchange information and communication

* Achieve a balance of interests and conflict settlement

* Create mutual trust between the network partners

* Prepare the new production units in the CLC and start up decision-making

* Build on and strengthen common interest.

The results of the survey underline that most of SMES needs the district network to support them with technical assistance, better if managed by a neutral agency.

While both large and small tanneries may have specific interests, and are divided between two sub-networks, they may not conflict with the competitionoriented goals of each district member or network partner.

As regards the moderation of the network, the balance of interests among the partners has to be continuously ensured. A culture of trust and understanding is essential for the successful development of the CLC technology network. Moreover, the network managers must be sufficiently qualified and work efficiently in terms of minimising expenses for the network partners.

In order to foster industry acceptance, traditional public sector institutions are advised to play a less visible role in the operational management of the network. Nevertheless, as outlined above, public sector support is indispensable in the setting up of the CLC district and network.

As regards the institutional status of the organisation co-ordinating the network, different models exist:

an independent association

a local economic development agency

an association, or a cluster organisation of associations

A success factor of network coordination and district management is the availability of full-time, professional staff (mostly consultants).

The network in object may be developed into self-managed organisations in the second stage of life, after the start up cycle. Network co-ordination then will be transferred from public bodies, or independent agencies, to the partners of the CLC network district themselves.

4.1.7 Financing The Network

Establishing and maintaining a network engenders substantial costs. During the start up phase of the district and network, it is necessary to invest in the setting up of the structures, first of all those designed for the environmental protection, like ETP (effluent treatment plants), and sludge recovery devices. While this investment does not generate an immediate benefit for enterprises, it may be beneficial for the area on the whole in terms of economic development and employment.

The establishment of a district network is in the collective interest, it is equivalent to the provision of a collective good. Consequently, initial expenses for the setting up of the district must be sponsored (at least partially) by a third party representing the collective or public interest (either an association representing the collectivity of the enterprises concerned or the public sector). In order to achieve successfully the target to transfer all local tanneries from the actual areas to the CLC district, initial expenses for setting up and running the network must be covered

by public funds, as enterprises show little interest, if not forced, in investing in uncertain long-term projects. The need for external resources is crucial in the start-up phase. In a second stage, once the network is well established, the participating enterprises experience a visible net benefit. It could be envisaged that the network starts with public sponsorship and afterwards public funds are gradually phased out while members are requested to contribute to the financing of network services, and the network will compensate start up expenses to the public body involved. Different membership fees are set according to the number of employees and/ or the turnover of the member in question.

The appropriate financial contribution should correspond to the services offered and should be agreed upon by the partners. **Only a small minority of the enterprises examined is now able to support the general services of transferring and upgrading the present units.**

However, a large majority of enterprises are able to contribute individually to specific services that are tailored to their individual needs.

They will therefore subscribe to useful services at an acceptable price.

4.1.8 Network Activities

The success of the network has to be geared towards bringing the greatest possible benefit to as many partners as possible. In order to fulfil this objective, it is necessary to make business support services available to individual enterprises. Most importantly, it is necessary to inform enterprises about the advantages of networking and about the availability of business support services.

The following services and activities may be provided in the network of CLC:

* Pre-feseability study, complete with the survey on the local cluster, the technical feasibility ogf CLC and the finacial plan to manage the technological district and all service structures
* Information And Engineering To Set Up The Technology District
* Constitution of the Service Centre;
* Information and engineering to set up the technology district;
* Support to co-operation projects;
* Support to training;
* Support to internationalisation;
* Market promotion.
* Know how transfer at distance through internet communication management

4.1.9 Pre-feasibility study

The first task to be assigned to the borning structure appointed to manage the network referred to the CLC district, will be a feasibility study, complete with the survey on the local

cluster, the technical feasibility ogf CLC and the finacial plan to manage the technological district and all service structures.

The study must examine directly on the field the followings aspects:

1. Assistance to the legal and financing aspects of the NETWORK, for the incorporation, management, administration and winding up of the structure.
2. analysis and sizing of the technical interventions planned by the private and public promoters for the construction of the CLC district, complete with the detailed cost of total investment of the project for the general infrastructures and the specific productive units involved.
3. Analysis and feasibiltity study of the community Effluent Treatment Plant, and the sludge and waste treatment device. Installation and management, including handling costs.
4. Analysis and feasibility study to create and start up a Service Centre, related to the network
5. Analysis and identification of the interventions of technical assistance and training of the necessary personnel to guarantee the managerial objectives.
6. Analysis of the local leather market and cluster industry.
7. Analysis of the possible financial facilities offered in Calcutta and available by the international financial organisms.
8. Analytical screening of all the management costs for start up (to 5 years).

4.1.10 Information And Engineering To Set Up The Technology District

The CLC will serve as an information and communication platform for the network partners. The most important information services are those related to the advantages of participating in a network, i.e., those regarding business opportunities and technology transfer. This requires the network to have a sound knowledge of market conditions and of new technologies (among other issues).

- The enterprises examined consider information on the following issues necessary:
- Economic trends (market requirements, products, services, etc.)
- Technological know how
- Information on latest technologies
- Information on the availability and applicability of technology
- Information on Enterprises
- Enterprise profiles to facilitate matchmaking
- Information on competitors (strengths and weaknesses)
- Information on local supply chains (which products are produced locally and which are their strengths?)
- Public funding

4.1.11 Constitution of the Service Centre

As to the "technology services" the success of the initiative depends on the ability of the companies involved to take advantage of the opportunities offered by the relocation in restructuring the processing system, in a modern and more efficient way.

As regards the second aspect, analysis of the present critical areas will define the measures to be taken for each sector of the leather system. Each relevant aspects must undergo a thorough, specific analysis, especially concerning:

- Tanning system;
- Ecological and environmental aspects connected with the tanning operations;
- Leather manufacturing sectors;
- By-products.

The last point, represented by the identification of the instrument, is particularly important because the success of the district project greatly depends on the comprehension of the role of the "instrument."

An identified instrument is a Service Centre: despite a Service Centre alone cannot generate the district culture or entrepreneurial initiative typical of the Italian districts, nonetheless it could try to play the role of "a strategic director for quality."

In this way, the Service Centre can make up for the lack of a district culture and, thus, support and supply the companies with a number of competencies they lack of.

In particular, the Service Centre's main task will be supporting the companies in acquiring the know-how relative to the "qualitative-quantitative" characteristics of the products as required by the international markets, their evolution, the adopting of innovative technologies and the training of human resources, etc.

These activities have been identified for insertion in a Centre structure to be setup in the future, with the purpose of offering all those services and opportunities for the **upgrading** of the entire sector.

4.1.12 Support To Co-Operation

The enterprise survey carried out shows that co-operation projects between different enterprises and technology poles may successfully facilitate the transfer of technology to the enterprises. There is strong evidence that co-operation projects are the single most important and successful methodology to foster enterprise upgrading and technology transfer. However, enterprises need assistance throughout the process of transferring the production units.

The survey shows that enterprises and technology poles consider necessary the following support services that facilitate the initial stages of co-operation between partners:

* Project initiation;
* Partner identification;

- Match-making services/ co-operation partner exchange;
- Establishing connections to partners;
- Organisation of the measures of technical assistance to be implemented in consultation with the enterprises;
- Allocation of tasks and responsibilities;
- Assistance in applying for supplementary public funding (aid to groups of enterprises to encourage co-operation), etc.
- Bringing together partners should not be limited to merely exchanging enterprise names. It requires analytical and methodological support as well as knowledge of different corporate cultures.

4.1.13 Support To Training

In the framework of the CLC network, training can be understood as making available a wide range of educational possibilities. These are focused on the specific needs of the sector (e.g. thematic seminars on relevant technical issues, training for professional qualifications; workshops with company representatives, inter-company learning, visits to partner enterprises, etc.). Opening internal seminars of leading enterprises to partner enterprises on a mutual basis can also be a good training opportunity.

4.1.14 Support To Internationalisation

When tanneries go abroad, they have two core objectives: profits increase by applying different cost levels from different competing areas, and growth by market extension.

The enterprise profiles of the survey show a low international share of turnover and procurement. The focus on special products and key-areas is particularly welcome for successful business expansion.

When enterprises go abroad, they usually follow two basic paths. The first is to follow a customer, and subsequently, to expand in the foreign market. The second is to approach an interesting foreign market without being led by a customer. Both approaches cannot be implemented without joint activities, the scope of which can range from loose co-operations restricted to single projects to joint ventures or even take-overs.

Basically, according to the results of the survey, enterprises expect two kinds of services to facilitate their internationalisation process. Firstly, they want more information to help them approach foreign markets (enterprise profiles, foreign technological know-how, etc). Secondly they want assistance in establishing relations with potential foreign partners. Moreover, they need information on the availability and applicability of funding opportunities.

In order to assist enterprises in their internationalisation process, it is necessary that the network participates to international events and co-operation exchanges programmes.

4.1.15 Market Promotion

The CLC network has to promote itself in order to attract new members, to create confidence and a positive attitude towards the industry in the area and, more importantly, to build a common identity. In this context, **the development of a cluster logo proves very effective in the envisaged district.**

Recommended public relations activities include the provision of information material, the positioning of the network both nationally and internationally, the presentation of the CLC on the Internet, the placing of articles in relevant newspapers, etc.

4.1.16 Know-How transfer at distance through internet communication management

The CLC network must provide the above-mentioned information and support services continuously and ensuring a high level of quality. This requires the implementation of an efficient information service based on modern information technology.

CLC network needs a communication platform where information between partners is exchanged and where the available know-how is systematised and provided to the partners. Such a platform should be easily accessible and allow the partners to retrieve information directly.

In order to systematise know-how and communication, the following questions have to be dealt with:

* Which kind of know-how is made available? First phase: information that can be easily retrieved from existing data is provided, e.g. data on consultants, experts or other enterprises; second phase: more extensive advice is given, for example on the know-how and experience of a specific research institute; third phase: access to research and analytical work is provided, including expert assessment on different issues, ranging from country reports to the use of specific technologies and advice on the most appropriate details for an investment. Regulatory issues may also be dealt with.
* Which methods are employed to ensure accuracy and timeliness of the data? During the start-up period of the network, a pool of know-how must be installed (databases, etc.). Basic information can be collected e.g. through an enterprise survey. Once the database is operational, the members of the network should be asked to update the respective data (e.g. offer and demand of co-operation requests, economic and technological profile).
* Which are the possibilities for partners to access the information pool? Regarding the different information technology standard at the level of the partner enterprises, communication in writing, by fax, telephone and e-mail should be made possible. An internet-based solution allowing for a shared workspace is also appropriate.
* Which information technology tools are essential for the successful operation of the network? The basic data regarding enterprises and co-operation projects (economic and technological profiles of local enterprises, survey of experts on certain topic, information on co-operation projects, etc.) is stored in multi-field databases (where it is possible to retrieve the necessary information in any given combination).

4.2 The District Organisation

The territorial setup of an industrial district functional in all of its components to the requirements of the leather sector, both the present and the future ones, is essential for its development.

The present analysis focuses exclusively on the urban aspects of the District.

By the above-mentioned considerations on the **mise a niveau** of the entire leather sector, we have pointed out the importance to setup an Industrial District.

In order to actuate the hypothesis made on the re-location of the leather industries and on the growth of their production, due:

- To the technological modernisation,
- To the new process organisation and
- To the synergies, which will develop among the different sectors of the district,

it is necessary to create the ideal environmental conditions that will allow the potential productive capacity offered by the new productive structure to be expressed in full.

The assessment of either the general and support services or of any other infrastructure/installations that are required to assist and facilitate the performance of the industrial activities is out of the scope of our study. Nevertheless, it is important to concentrate on the organisation of the territory.

The new district should avoid recreating not only the working conditions of the present clusters, but also their structure.

If the goal pursued by the Government of West Bengal is the accomplishment of the leather sector upgrading, and in order to recover and reward the efforts of the entrepreneurs, then the traffic bad conditions, the environment degradation, the staticity of the goods in the yards of the factories as well as the lack of an organic and efficient possibility of expansion should not be recreated in the new Centre. .

Therefore, the following **preliminary town-planning** considerations, intend to identify a district's distinctive characteristics together with the structural elements and the relevant planning to reach a modern, efficient and well-organised production centre.

To grant functionality, the District has been subdivided in compartments. Inside each compartment, a further subdivision has been made in plots (lots) of different dimensions and the possibility to group together various lots has also been considered.

Similar production activities are located in the compartments and in their central position should be positioned areas with minor services to the industry.

It has been also studied what solution would be the ideal one in terms of town organization to best fit the targets and the programs of the re-location of the leather sector activities.

The main structural elements of the territorial organization, should be:

- Hierarchical organisation of the road system
- Separation of the different production activities
- Characterization of the green and recreation areas
- Unicity of the area destined to house the general services to the District

All above-mentioned factors can configure a modern industrial district, characterized by a rational layout and proper distribution of areas.

This system is suitable for a large internal flexibility regarding the subdivision of the different compartments in single building plots.

For a more detailed analysis of the territorial order, it should be necessary to have a deep knowledge of the capacity and the composition of the leather sectors that will re-locate in the new Centre.

One discrepancy emerged during the meeting with the local tanners is the fact that, while the lots of the district are considered more adequate to their programs of industrial development, nevertheless those bayed and/or booked in the new district are small, despite an increment in the production and in the productivity is expected.

In other words, the size of the new lots is often the same or slightly larger than the existing ones.

In this way, the risk is to re-creating conditions similar to those of the present clusters, and this would represent an obstacle to the possible and hopeful upgrading of the Kolkata tanning sector.

The reasons adduced from the interviewed tanners refer unanimously to the high cost of the land originally booked to comply with the orders of the Supreme Court and to the conspicuous amount of money required to extend it.

To evaluate **the ideal area** required for the different types of tanneries and for the partial processing activities, please refer to the specific paragraph in the second part of the report.

It is important at this point, to evaluate the experience done in similar projects of other Industrial Districts and in the industries of the tanning sectors, which represent examples of very competitive realities, and take due note of their peculiarities in terms of architecture and space organization.

The modern and more efficient tanneries develop their activity or at least the larger part of the activity in **one-level** buildings, with a proper distribution of the tanning operations.

The **CAR, covered area ratio**, the ratio between the covered area of the tannery building and the total area of the lot ranges between 0,45 and a maximum of 0,6 - 0,65.

These rules are suitable for a higher internal mobilization and for future process expansion.

The outlines of the town-planning structure, which should be followed while planning the establishment of an industrial district, are then represented by the following structural steadfast:

- Gradualness of realization.
    - Subdivision of the district into functional modules connected to the relocation timing;
    - Building of of the infrastructures and networks, as per the functional modules.
    - Building plots (lots) flexibility and separation of the production compartments.
    - Flexibility in designing the lots subdivision, to allow the splitting up or the groupement of the same, upon the requests of different areas always possible at the time of the final investment;
    - Separation among the different production compartment, easily to be located and recognized.

- Hierarchical organisation of the road system.

  This organisation will allow the vehicles to enter and move within the District, without the impediments of the means of transport while entering and exiting from the production units.
    - General identification of the main road system and enlargement of the streets;
    - Functional traffic flow of private vehicles, which is to be kept separated by the traffic of the internal road system of the lots;
    - Parking and stop areas at the edge of the secondary road system.

- Groupement of the auxiliary and support activities of the productive sectors in one area.

5 GENERAL ASPECTS OF THE NEW DISTRICT

Starting from an analysis of the present situation of the sector in Kolkata and with an eye to the collected data, we can try to draft a technical profile of the new district. The goal is not only to provide the tannery system with a new site, in order to reconcile the tannery activity and the environment, but also to lay the grounds to raise the leather system of Kolkata up to competitive levels both on the domestic and international markets.

By contrast, due to the fact that the available data are very few and unreliable, the drafting of a plan of the dimensions is not an easy work.

In fact, we do not know the exact number of tanneries, which have required to be moved to the new area and how many of them have booked one lot. Furthermore, the data concerning the booked lots are not realistic either.

The fact is that a number of small factories have booked the smallest lots possible to be able to continue their activity in loco as long as possibile without any real intention to move to the new district. Furthermore, from a merely technical point of view we have noticed that the areas that have been booked are often incompatibile both with the daily output declared and with a layout allowing for the application of modern techniques and state-of-the-art production technologies.

Some profiles of industrial and craft units beat down the limits existing so far in the majority of Kolkata tanneries, though paying attention to some peculiarities being the umbilical cord with the local reality seen as a mixture of tradition, characters and climate.

Therefore, it is reasonable to expect that the total number of tanneries that will move to the new district will be far lower than the total number of the existing tanneries. Nevertheless, this will be positive for the whole system, since bigger dimensions than the existing ones are necessary to reach sufficient production volumes per unit to ensure the turnover required to cover the relocation costs.

On the other hand, the small factories working splits and trimmings should be, or better, must be preserved, since they are the umbilical cord with the local traditional craft, the importance of which is in their typical massive use of labour (manufacture of work gloves, etc.).

The majority of tanning industries located in Kolkata should understand that their relocation would involve technological and productive changes supported by the new structures and infrastructures. The opportunity will be offered to:

- develop more modern layouts,
- allow to preserve those traditional processes that do not hindrance the technological progress, like the air drying,
- make the necessary improvements on machinery and systems to ensure better productivity and quality results,

- use low-energy production techniques and environment-friendly methodologies (i.e. using the energy of the sun to heat the water to be used in the indispensable state-of-the-art drying systems),
- distribute the various productions that make use of different technologies among separate lines in the mixed tanneries,
- allow an easy horizontal expansion of the structures in case of production increase, which is expected, hopeful and necessary for at least 50% of the present production units,
- apply modern environment-friendly technologies allowing for the separate treatment of the sewage, which would be partially reused before being sent to the main purification plant.

5.1 Technical profiles of the new production structures

The profiles of the new plants have been drafted like they are reasonably expected to develop. The dimensions and the productive typology detailed in **table 3.0.1** have been taken in due consideration while drafting the profiles.

As far as the owners' intentions are concerned, apart from the booked lots, a positive will of moving has been noticed in the major tanneries; on the contrary, the owners of the small tanneries, where splits and trimmings of raw leather are processed, seem to be more skeptical.

The main problem of a tannery relocation is determining the minimum size and, by consequence, the **minimum investment required** to purchase lots, systems and machinery.

The fact is that while some operations of the leather processing system **can** be carried out by means of machines and systems that can be perfectly dimensioned according to the quantity of the leather to be processed on a daily basis, other operations **must** be carried out using complex machines, the heavy cost of which can be easily amortized only in case they are exploited almost to their maximum capacity for a reasonable number of hours a day.

Therefore, the minimum layout consisting in one machine per type allows for a daily output compatible with the slowest machine and meets all the output requirements below this limit.

Obviously, a financial estimate should accompany with the technical considerations stated above, in order to identify the "Break-even point" of the plant, i.e. what is the minimum output allowing for the evening out of the costs and the amortization of the investments.

Undoubtedly, this kind of analysis does not pertain to this report, which basically aims at providing a number of possible technical solutions and suggesting possible layouts to meet the various requirements of production plans of various sizes.

A table showing the average prices of the machines making up the suggested technical solutions is attached to each layout.

Production and technology plannings cannot be divided. The suggested layouts do not reflect the solutions applied in Kolkata so far, as we believe they are a technological gap with respect to the state-of-the-art production technology.

The process of drying, for instance, is often treated with superficiality and technological incoherence, because the tanners are induced by the apparently favourable climate to use natural drying. The humidity values in the atmosphere change with the seasons and, in some periods, their levels are not compatible with a correct technological progress. But this fact is often neglected.

The suggested layouts leave a wide freedom of choice and allow for the gradual introduction of the machines and systems proposed.

In order to take advantage from the favourable conditions of the climate and for energy saving reasons too, we suggest applying a series of sun panels on the roofs of the sheds. They would provide hot water to be collected in accumulators where the temperature level is kept under control and that can be used both to feed the drums and to heat the various types of dryers.

One of the significant points of Kolkata tanning system, which is observed in most of Tiljala tanneries and is anomalous for the technical and size characteristics of this area, is the processing of the splits and trimmings of raw leather.

This type of working is of a great social importance and should not disappear. In fact, thousands of people are employeed in the processing of leather and manufacturing of gloves. Nevertheless, it would be advisable to find different forms of production organization that could grant better work conditions, in terms of health, posture and environment.

The above-mentioned goals cannot be reached without the effort that the Authorities will have to make to favour the development of groups made up by small entrepreneurs and oriented towards the establishment of small cooperative firms capable of offering their employees decent salaries and a healthy work environment.

Some essential points of the productive solutions under the form of layouts are listed below.

5.2 The structures

It will be possible to build the sheds housing the tanneries according to various layouts depending on the needs, possibilities and preferences of the entrepreneurs.

Therefore, from a vertical point of view, the possibile layout may include equipment developing either on one level or two, while from a horizontal point of view, tanneries may develop into a series of sheds places side by side, or lined in a C-shaped way with a free inner area that could be used for various purposes.

5.3 The technology

The sequence of machinery described in the layouts allows for the accomplishment of the leather processing cycle, since the series of machinery included in it is sufficient to apply **different and up-to-date technologies** in the tanneries.

Depending both on the technology they wish to apply, and on the amount of money they wish to invest, each single tannery will be able decide whether to arrange for the deferred installation of a number of machines, or to install less modern machinery to carry out the same operation.

By the way, the various types of suggested layouts are valid also in case a tannery decides to carry out the soaking and paddle liming rather than in drum; it goes without saying that the dimensions and the number of the paddles will have to be proportioned to the daily production one wish to obtain.

The same is true for the splitting machines, since all layouts include both one splitting machine after the fleshing and one splitting machine after the tanning. Obviously, one of the two options may be turned down by those who wish to pelt split the whole production, or after the tanning, thus eliminating one of the two machines from the layout.

In all the proposed layouts, the leather drying department, coming next to the dyeing and re-setting, is always located in a particular area of the plant so as to allow these systems to be applied gradually without disrupting the layout of the other machines or the production flow.

Those tanneries wishing to use the method of air drying will be able to perform such operation at the second floor (in the two-level structures), in shadowed areas (as required for this particular phase), by taking advantage of the sun panel covering.

On the other hand, in the one-level structures, the essiccazione in the open air may be performed in the courtyard situated in the middle of the sheds, without changing the correct industrial path indicated in the layouts.

5.4 Energy

The processes of tanning, re-tanning and dyeing are to be performed in temperature-controlled water. Similarly, the drying of the leather is to be carried out by means of modern systems such as: “vacuum dryers”, “pole tunnels” or “toggle frame tunnels”.

In order to allow a considerable energy saving, it has been judged worthwile to take advantage of the favourable conditions of the climate and arrange for some sun panels to be installed on the roofs of the sheds and destined to the production of hot water.

5.5 The dimensioning

In view of the wide range of typologies, and lacking precise information from the interviews, some schemes have been drafted to meet various output requirements that, in case of complete tanneries, range from 3.000 kg/day to more than 12.000/kg day.

3.000 Kg/day has been assumed as the minimum value because (also in relation with the average weight of the processed leather), it is to be regarded as the minimum quantity allowing for all the machines to be used in full.

The fact of arranging for a plant capable of housing a complete layout of machine in the future is advisable even for those who presently look at this target as a goal to be achieved in a later phase because they do not wish to install the complete series of machines and prefer to carry out some working ex-house in some other plants.

Two different cases are represented by the tanneries oriented towards the establishment of production units destined to the processing of leather from raw to tanned on the one side, and those who wish to produce finished leather starting from a tanned semi-finished product (W.B.) on the other.

Two functional layouts are attached, which are ideal both for productivity purposes and simplicity of management. All enlargements will have to be arranged by modules.

Presenting a proposal for a minimum layout suitable to the huge dimensions of Tiljala is not an easy work.

An effective solution may be found in the type of structure attached, which allows applying some of the basic criteria that have to be fulfilled while moving to the new district.

The type of production unit proposed is something more than a simple family-run business: it is based on family groups organized under the form of cooperatives managing the units both financially and operatively.

By contrast, a number of small artisans of Tiljala would start working "**for the account of third parties**" and specialize in a few technological operations to be carried out in small and well-equipped workshops on behalf of other operators.

6 THE LAYOUT

Some exemples of layouts putting the above-stated general principles into practice are detailed in this chapter.

The supplied layouts are reference schemes for the tanneries: each tannery may take one of them as a reference exemple of the ideal type of tannery they wish to setup. Naturally, the schemes are to be elaborated by the tanneries with a critical attitude according to the type of technology desired on the one hand, and to the established financial plan on the other.

Please note that:

FLESHING

We have included in the map fleshing machines both for cow hides, sheepskin and goatskin. Obviously, the small-sized machine has to be eliminated from the layout by those who wish to work cow leather, which is actually the predominant type of leather in this area.

SPLITTING

All layouts include two splitting machines: one for the pelt splitting and one for the splitting in W.B. Some tanneries will probably turn down one of the two methods, though we believe that using both methods is the best way to enhance the quality of the local leather.

If one wishes to do just a small investment to apply a technology allowing for the best use of the raw material, and to make use of as little chemical products as possible aiming at the environment preservation, then THE PELT SPLITTING IS ADVISABLE.

SAMMYING AND SETTING-OUT.

Machines processing either cow hide and sheepskin and goatskin have been included in the map. Obviously, the small-sized machine has to be eliminated from the layout by those who wish to work cow leather, which is actually the predominant type of leather in this area.

As far as the sammying and resetting operations of the cow hides are concerned, two machines are included in the layouts: one sammying and one resetting machine, though state-of-the-art combined machines carrying out both operations in one time are available on the market.

In case of major tanneries, the use of COMBINED MACHINES is advisable in order to reduce:

- the time taken to carry out the operation,

- the use of labour,

- the area of the department occupied by the machines

which is double where separate machines are used.

DRYING.

Drying machines like vacuum driers, pole tunnels and frame dryers have been included in the layouts to optimize the technological process and ensure its repetitiveness.

The layouts of the C-shaped buildings and two-level plants include areas to be used for the process of air drying, though we believe that this kind of technique should be left aside when the target is a good quality product.

6.1 9012.Dwg drawing

It is the layout of a tannery processing cow and buffalo hides:

- The building is C-shaped; the covered surface is 10.150 sqmt
- A 3.500 sqmt large courtyard is situated in the internal side of the building
- The daily output foreseen goes from 9.000 to 12.000 Kg hides a day.

Since the daily output varies according to the number of drums installed, some drums have been drawn with a broken line.

Drums with a capacity of 3.000 Kg have been included for the soaking and liming, applying 24-hours cycles in a 200% bath.

The machinery installed belong to the state-of-the-art technology applied both to the various types of finished products and raw material available.

The fleshing machine included is a traditional machine with 3.000 mm working width, installed on a platform and equipped with a feeding chain.

The fleshed leather fall by force of gravity on a conveyor belt and is trimmed and conveyed to the splitting machine, in case of pelt splitting.

Besided pelt splitting, the possibility of splitting in W.B. has been also included, next to tanning and sammying, for those hides that can take advantage from this method.

Up to this point of the production process, the machines included in the layout have a considerable working width suitable to process whole hides, in order to obtain a better quality of both the grain and the split.

The size and number of re-tanning drums and dyeing depend on the market and the typology of the finished product.

Resetting and sammying combined machines; “vacuum dryer”, “pole tunnel”, “frame staking and conditioning” are included in the layout to perform sammying and drying after dyeing.

The differentiation of one part of the production to be frame-dried after the re-setting operation, which is peculiar to the processing of mellow leather destined to clothing and furnishing, is also taken in consideration.

The buffing and the dedusting operations are carried out in a separate area, to prevent the plant from being filled with the dust that this type of machines inevitably produce, even though equipped with suction and filtering systems.

Lastly, the finishing department mainly includes rotating padding machines and spraying lines followed by embossing and glazing machines.

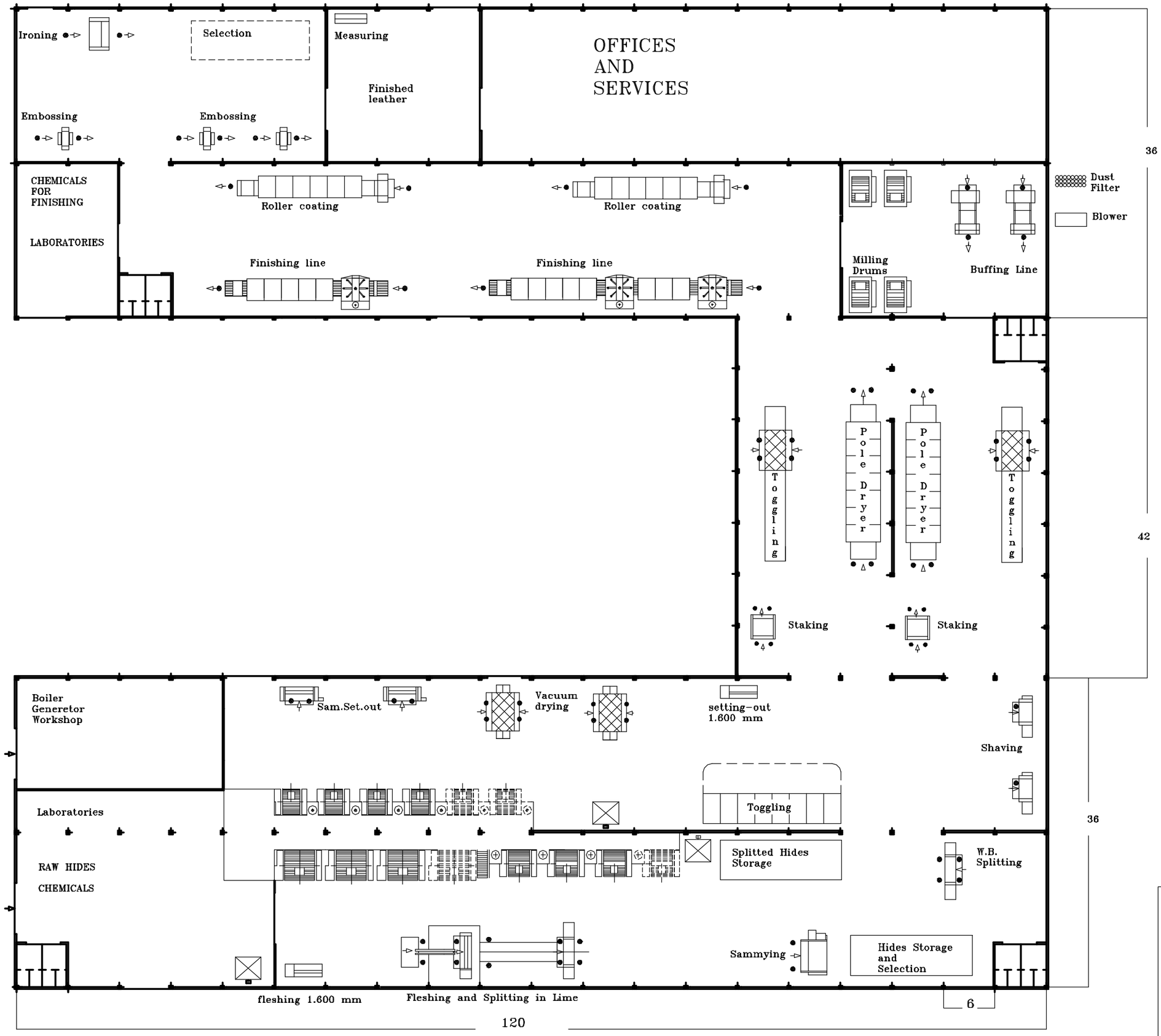
The stocking and the varnish-preparing department as well as one cabin for the testing manual spraying are installed in a separate area equipped with fire prevention systems in case varnishes with inflammable organic solvents are used

Even though a particular type of leather requires to be cut in side leather after the splitting in W.B. or the sammying, it is nevertheless advisable to install machines with a considerable working width, since they offer a number of advantages, i.e.:

- They allow the transversal treatment of the side leathers so as to get as much area gain as possible.
- They allow exploiting the maximum output capacity of machines like spraying machines, tunnels, and through-feed presses.

The following equipment is housed in the last department:

- The table of selection, which should be well-lighted
- The surface measuring machine
- The stocking of finished leather.



9012.dwg

Cow and buffalo tannery

Total surface 10,150 sqm

Daily capacity over 12,000 Kg

Table 9012 Goats Skins, Buffalo and Caw Hides Tannery
Daily Production 12.000 Kg - Average 10,00 Kg - 1.200 Hides

PRODUCTION UNITS	Unitary Capacity			N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000x 3.500 mm Soaking, Dehairing and Liming. 200 % 24 h		3.000		4	24	12.000	4 x 30	4 x 12.000	5	4 x 80.000
Feeder of Fleshing Machine				1			3		3	16.000
Fleshing Machine W.W. 2.400 - 2.700 mm			160	1	8	1280	75		4	115.000
Trimming Conveyor				1			4		2	12.000
Splitting Machine W.W. 2.300 - 2.400 mm			160	1	8	1280	25		6	140.000
Extractor and conveyors				1						20.000
Weight of Fleshed Hides (Kg)	80%	9.600								
Weight of Splitted Grain Side	75% 7.200 Whole Hides 1200									
Weight of Splits	25% 2.400 Splits 600									
Wooden Drums (DxL) 3.000 x 2.500 mm Deliming, Bathing, Pickling, Tanning 100 % 24 h Grain Side		3.100		3	8	9.300	3 x 25	3 x 18.000	4	3 x 65.000
100% 24 h Splits		3.100		1	8	3.100	25	18.000		65.000
Sammying W.W. 2.400 mm.			165	1	8	1.320	25		6	86.000
MAX Production from 1,200 Hides W.B.	Sides = 800 (2 x 400 Hides) Hides = 800 Splits = 400									
Shaving Mc. 1.800 W.W.			130	2	8	2.080	2 x 75		4	2 x 85.000
Weight of Shaved Sides & Hides	76% 5.472									
Weight of Shaved Splits	76% 1.824									

PRODUCTION UNITS		Unitary Capacity		N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000 x 2.000 mm Neutralising, Dyeing, Fat-liquoring 200 % 8h Sides		1.600		4	8	6.400	80	68.000	6	4 x 56.000
Splits		1.600		2	8	3.200		2 x 17.000		2 x 56.000
Automatic Water Feeder 1000 L / 1'				2						2 x 18.000
Automatic Chemicals Feeder				1						48.000
Sammying and Setting-out WW. 2.400 mm.			120	2	8	1.920	2 x 22		5	2x 100.000
Vacuum Dryer 4.000 x 2.500 3 Plates.			120	2	8	1.920	2 x 22	2 x 72.000	10	2 x 110.000
Pole Dryer and Conditioner 7 El.			160	2	12	3.840	2 x 15	2 x 40.000	4	2x 95.000
Staking WW. 2.400 mm.			240	2	8	3.840	2 x 18		6	2x 70.000
Toggling WW. 1.800 mm.			160	2	10	3.200	2 x 30	2 x 60.000	8	2x 140.000
Buffing and Dusting WW. 1.800 mm.			240	2	8	3.840	2 x 55		6	2x 80.000
Coating WW. 1.800 mm.			240	2	8	3.840	2 x 3	2 x 50.000	6	2x 95.000
Embossing Platen Press 1.370 x 1.000 mm.			80	3	8	1.920	3 x 22		2	3x 90.000
Finishing Line1 Cabins WW. 2200 mm.			240	1	8	1.920		140.000	3	100.000
Finishing Line 2 Cabins WW. 2200 mm.			300	1	8	2.400	26	140.000	5	165.000
Rotary Iron. Emboss. Mc. WW. 3.000 mm			180	1	8	1.440	35		3	68.000
Milling Drums (D X L) 3.000 x 2.000 mm				4	8		4 x 11		2	4 x 37.000
Surface Measuring Mc. WW. 2.100 mm.			250	1	8	2.000	3		2	27.000
Fleshing Machine (for Goats) W.W. 1.600 mm			240	1	8	1.920	30		2	37.000
Sammying and Setting-out WW. 1.600 mm.		(Goats)	180	1	8	1.440	22		2	37.000
TOTAL Electrical power Installed							**1138**			
TOTAL Thermal power Required								**946.000**		
TOTAL Workers									**106**	
TOTAL Cost of Machinery										**3.791.000**

TANNERY 9012

TOTAL Workers	106
Transports	6
Laboratories	4
Raw Hides and Chemicals Storage	10
Maintenance	8
Administration	8
Vigilance	6
Secretary's Office	6
Selling Department	4
Department Assistants	6
Technology Manager	1
General Manager	1
TOTAL Employers	**166**

6.2 3060SF.Dwg drawing

It is the layout of a tannery processing cow, buffalo and goat hides:

- The building is rectangular, with parallel and contiguous spans with a covered surface of 6.480 Sqmt.
- The estimated output capacity ranges from 3.000 to 6.000 Kg of hides a day.

Since the daily output varies according to the number of drums installed, some drums have been drawn with a broken line.

Drums with a capacity of 3.000 Kg have been included for the soaking and liming, applying 24-hours cycles in a 200% bath.

The machinery installed belong to the state-of-the-art technology applied both to the various types of finished products and raw material available.

The fleshing machine included is a traditional machine with 3.000 mm working width, installed on the floor. Another fleshing machine with a small working width is installed on the floor next to the first one for the processing of goat hides.

Besides a pelt splitting machine, the possibility of splitting in W.B. has been also included, next to tanning and sammying, for those hides that can take advantage from this method.

Up to this point of the production process, the machines included in the layout have a considerable working width suitable to process whole hides, in order to obtain a better area gain of both the grain and the split.

The size and number of retanning drums and dyeing depend on the market and the typology of the finished product.

“Resetting and sammying combined machines”, “vacuum dryer”, “pole tunnel”, “frame staking and conditioning” are included in the layout to perform sammying and drying after dyeing”.

The differentiation of one part of the production to be frame-dried after re-setting, which is peculiar to the processing of mellow leather destined to clothing and furnishing, is also taken in consideration.

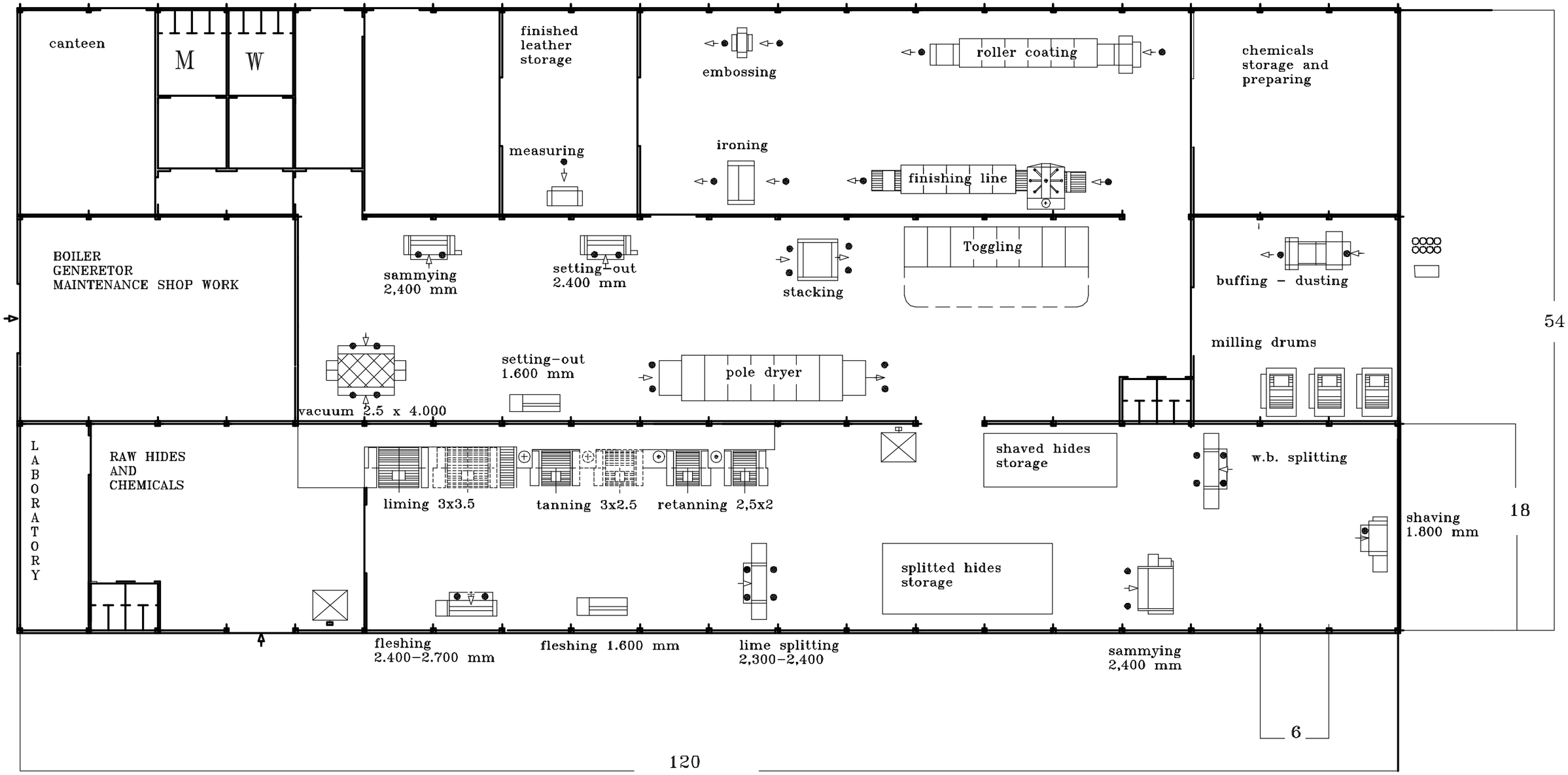
The buffing and the dedusting operations are carried out in a separate area, to prevent the plant from being filled with the dust that this type of machines inevitably produce, even though they are equipped with suction and filtering systems.

Lastly, the finishing department mainly includes rotating padding machines and spraying lines followed by embossing and glazing machines.

The stocking and the varnish-preparing departments as well as one testing manual spraying cabin are installed in a separate area equipped with fire prevention systems in case varnishes with inflammable organic solvents are used

The following equipment is housed in the last department:

- The table of selection, which should be well-lighted
- The surface measuring machine
- the stocking of finished leather.



3060SF.dwg

Cow, buffalo and goats tannery

Surface 6,480 sqm - One floor

Daily capacity 3,000 - 6,000 Kg

Table 3060SF Goats Skins, Buffalo and Caw Hides Tannery
Daily Production 6.000 Kg - Average 10,00 Kg - 600 Hides

PRODUCTION UNITS	Unitary Capacity			N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000x 3.500 mm Soaking, Dehairing and Liming. 200 % 24 h		3.000		2	24	6.000	2 x 30	2 x 12.000	3	2 x 80.000
Fleshing Machine W.W. 2.400 - 2.700 mm			120	1	6	720	75		4	115.000
Splitting Machine W.W. 2.300 - 2.400 mm			120	1	6	720	25		6	140.000
Weight of Fleshed Hides (Kg)	80% 4.800									
Weight of Splitted Grain Side	75% 3.600 Whole Hides 600									
Weight of Splits	25% 1.200 Splits 300									
Wooden Drums (DxL) 3.000 x 2.500 mm Deliming, Bathing, Pickling, Tanning 100 % 24 h Grain Side		3.100		2	8	6.200	2 x 25	2 x 18.000	3	2 x 65.000
Sammying W.W. 2.400 mm.			165	1	8	1.320	25		2	86.000
MAX Production from 600 Hides W.B.	Sides =600 (2x300 Hides) Hides = 300 Splits = 300									
Shaving Mc. 1.800 W.W.			160	1	8	1.280	75		2	85.000
Weight of Shaved Sides & Hides	76% 2.736									
Weight of Shaved Splits	76% 912									

PRODUCTION UNITS		Unitary Capacity		N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000 x 2.000 mm Neutralising, Dyeing, Fat-liquoring 200 % 8h Sides		1.600		4	8	6.400	4 x 20	4 x 17.000	3	4 x 56.000
Splits		1.600		2	8	3.200		2 x 17.000		2 x 56.000
Automatic Water Feeder 1000 L / 1'				2						2 x 18.000
Sammying and Setting-out WW. 2.400 mm.			120	1	8	960	22		2	100.000
Vacuum Dryer 4.000 x 2.500 3 Plates.			120	1	8	960	22	72.000	5	110.000
Pole Dryer and Conditioner 7 El.			160	1	12	1.920	15	40.000	2	95.000
Staking WW. 2.400 mm.			240	1	8	1.920	18		3	70.000
Toggling WW. 1.800 mm.			160	1	10	1.600	30	60.000	3	140.000
Buffing and Dusting WW. 1.800 mm.			240	1	8	1.920	55		3	80.000
Coating WW. 1.800 mm.			240	1	8	1.920	3	50.000	3	95.000
Embossing Platen Press 1.370 x 1.000 mm.			80	1	8	640	22		2	90.000
Finishing Line1 Cabins WW. 2200 mm.			240	1	8	1.920		140.000	3	100.000
Rotary Iron. Emboss. Mc. WW. 3.000 mm			180	1	8	1.440	35		2	68.000
Milling Drums (D X L) 3.000 x 2.000 mm				2	8		2 x 11		1	2 x 37.000
Surface Measuring Mc. WW. 2.100 mm.			250	1	8	2.000	3		2	27.000
Fleshing Machine (for Goats) W.W. 1.600 mm			240	1	8	1.920	30		2	37.000
Sammying and Setting-out WW. 1.600 mm.		(Goats)	180	1	8	1.440	22		2	37.000
Splitting Machine W.W. 2.300 - 2.400 mm			180	1	8	1.440	25		6	140.000
TOTAL Electrical power Installed							**714**			
TOTAL Thermal power Required								**524.000**		
TOTAL Workers									**64**	
TOTAL Cost of Machinery										**2.351.000**

TANNERY 3060SF

TOTAL Workers	64
Transports	4
Laboratories	2
Raw Hides and Chemicals Storage	8
Maintenance	4
Administration	6
Vigilance	4
Secretary's Office	4
Selling Department	3
Department Assistants	3
Technology Manager	1
General Manager	1
TOTAL Employers	**104**

6.3 3060TF.Dwg drawing

It is the layout of a tannery processing cow, buffalo and goat hides:

- This rectangular building is structured on two levels, with parallel and contiguous spans with a covered surface of 4.320 Sqmt.
- The estimated output capacity ranges from 3.000 to 6.000 Kg of hides a day. The technological line is similar to the layout #3060SF, except for the fact that the *light* departments (i.e. drying, polishing and finishing departments) are located on the upper level.

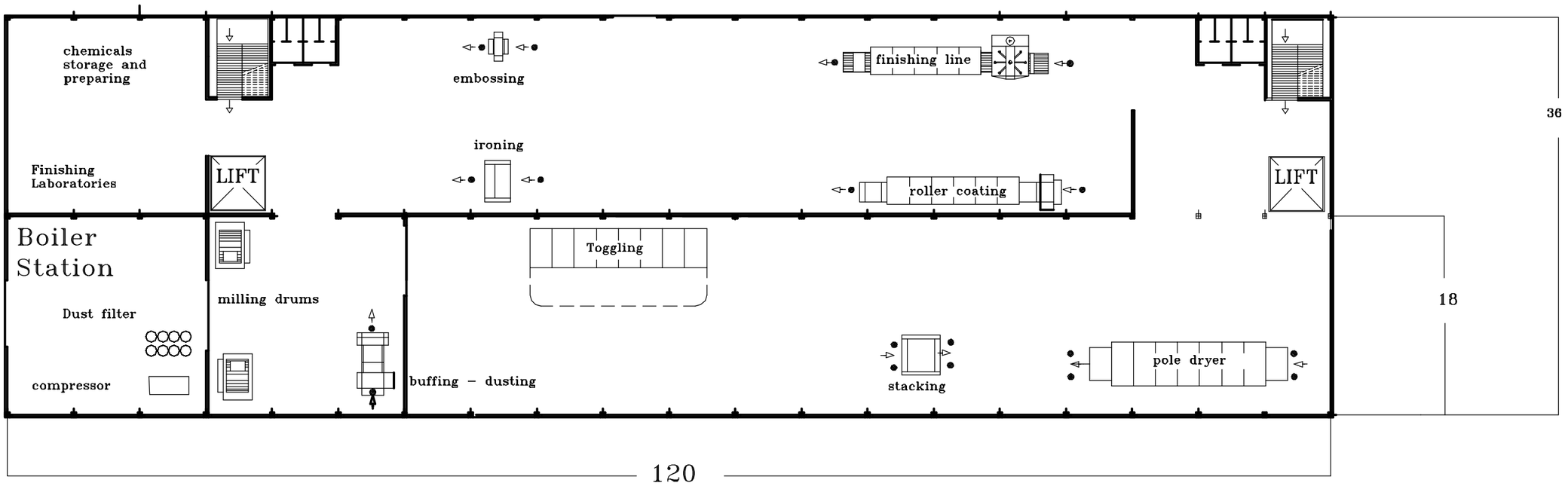
Two elevators will be positioned at both ends of the building and next to the stairs to facilitate the handling of the leathers.

The main advantages offered by this kind of layout are: the smaller surface required and the possibility of performing, in an early stage, the natural air drying, since the leather can be duly positioned in a shadowed and ventilated area free of dust without changing the natural flow of the leather being processed.

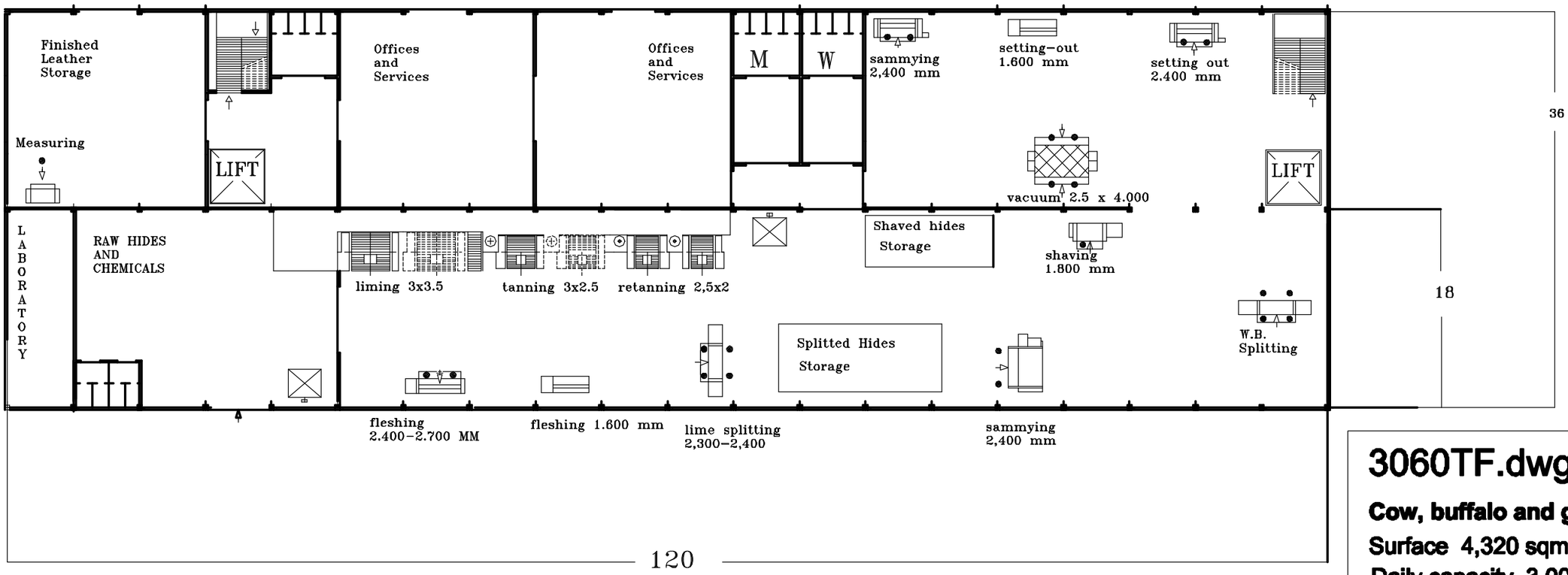
A further considerable advantage deriving from the fact that the covered area is wider is the large space that can be destined either to build offices and facilities or to be used for a more structured expansion of the activity in the future.

The daily output varies according to the number of drums installed. Some have been drawn by a broken line and by their position they indicate the possible direction of future installations.

FIRST FLOOR



GROUND FLOOR



3060TF.dwg

Cow, buffalo and goats tannery

Surface 4,320 sqm - Two floors

Daily capacity 3,000 - 6,000 Kg

Table 3060TF Goats Skins, Buffalo and Caw Hides Tannery
Daily Production 6.000 Kg - Average 10,00 Kg - 600 Hides

PRODUCTION UNITS	Unitary Capacity			N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000x 3.500 mm Soaking, Dehairing and Liming. 200 % 24 h		3.000		2	24	6.000	2 x 30	2 x 12.000	3	2 x 80.000
Fleshing Machine W.W. 2.400 - 2.700 mm			120	1	6	720	75		4	115.000
Splitting Machine W.W. 2.300 - 2.400 mm			120	1	6	720	25		6	140.000
Weight of Fleshed Hides (Kg)	80% 4.800									
Weight of Splitted Grain Side	75% 3.600 Whole Hides 600									
Weight of Splits	25% 1.200 Splits 300									
Wooden Drums (DxL) 3.000 x 2.500 mm Deliming, Bathing, Pickling, Tanning 100 % 24 h Grain Side		3.100		2	8	6.200	2 x 25	2 x 18.000	3	2 x 65.000
Sammying W.W. 2.400 mm.			165	1	8	1.320	25		2	86.000
MAX Production from 600 Hides W.B.	Sides =600 (2x300 Hides) Hides = 300 Splits = 300									
Shaving Mc. 1.800 W.W.			160	1	8	1.280	75		2	85.000
Weight of Shaved Sides & Hides	76% 2.736									
Weight of Shaved Splits	76% 912									

PRODUCTION UNITS		Unitary Capacity		N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000 x 2.000 mm Neutralising, Dyeing, Fat-liquoring 200 % 8h Sides		1.600		4	8	6.400	4 x 20	4 x 17.000	3	4 x 56.000
Splits		1.600		2	8	3.200		2 x 17.000		2 x 56.000
Automatic Water Feeder 1000 L / 1'				2						2 x 18.000
Sammying and Setting-out WW. 2.400 mm.			120	1	8	960	22		2	100.000
Vacuum Dryer 4.000 x 2.500 3 Plates.			120	1	8	960	22	72.000	5	110.000
Pole Dryer and Conditioner 7 El.			160	1	12	1.920	15	40.000	2	95.000
Staking WW. 2.400 mm.			240	1	8	1.920	18		3	70.000
Toggling WW. 1.800 mm.			160	1	10	1.600	30	60.000	3	140.000
Buffing and Dusting WW. 1.800 mm.			240	1	8	1.920	55		3	80.000
Coating WW. 1.800 mm.			240	1	8	1.920	3	50.000	3	95.000
Embossing Platen Press 1.370 x 1.000 mm.			80	1	8	640	22		2	90.000
Finishing Line1 Cabins WW. 2200 mm.			240	1	8	1.920		140.000	3	100.000
Rotary Iron. Emboss. Mc. WW. 3.000 mm			180	1	8	1.440	35		2	68.000
Milling Drums (D X L) 3.000 x 2.000 mm				2	8		2 x 11		1	2 x 37.000
Surface Measuring Mc. WW. 2.100 mm.			250	1	8	2.000	3		2	27.000
Fleshing Machine (for Goats) W.W. 1.600 mm			240	1	8	1.920	30		2	37.000
Sammying and Setting-out WW. 1.600 mm.		(Goats)	180	1	8	1.440	22		2	37.000
Splitting Machine W.W. 2.300 - 2.400 mm			180	1	8	1.440	25		6	140.000
TOTAL Electrical power Installed							**714**			
TOTAL Thermal power Required								**524.000**		
TOTAL Workers									**64**	
TOTAL Cost of Machinery										**2.351.000**

TANNERY 3060TF

TOTAL Workers	64
Transports	4
Laboratories	2
Raw Hides and Chemicals Storage	8
Maintenance	4
Administration	6
Vigilance	4
Secretary's Office	4
Selling Department	3
Department Assistants	3
Technology Manager	1
General Manager	1
TOTAL Employers	**104**

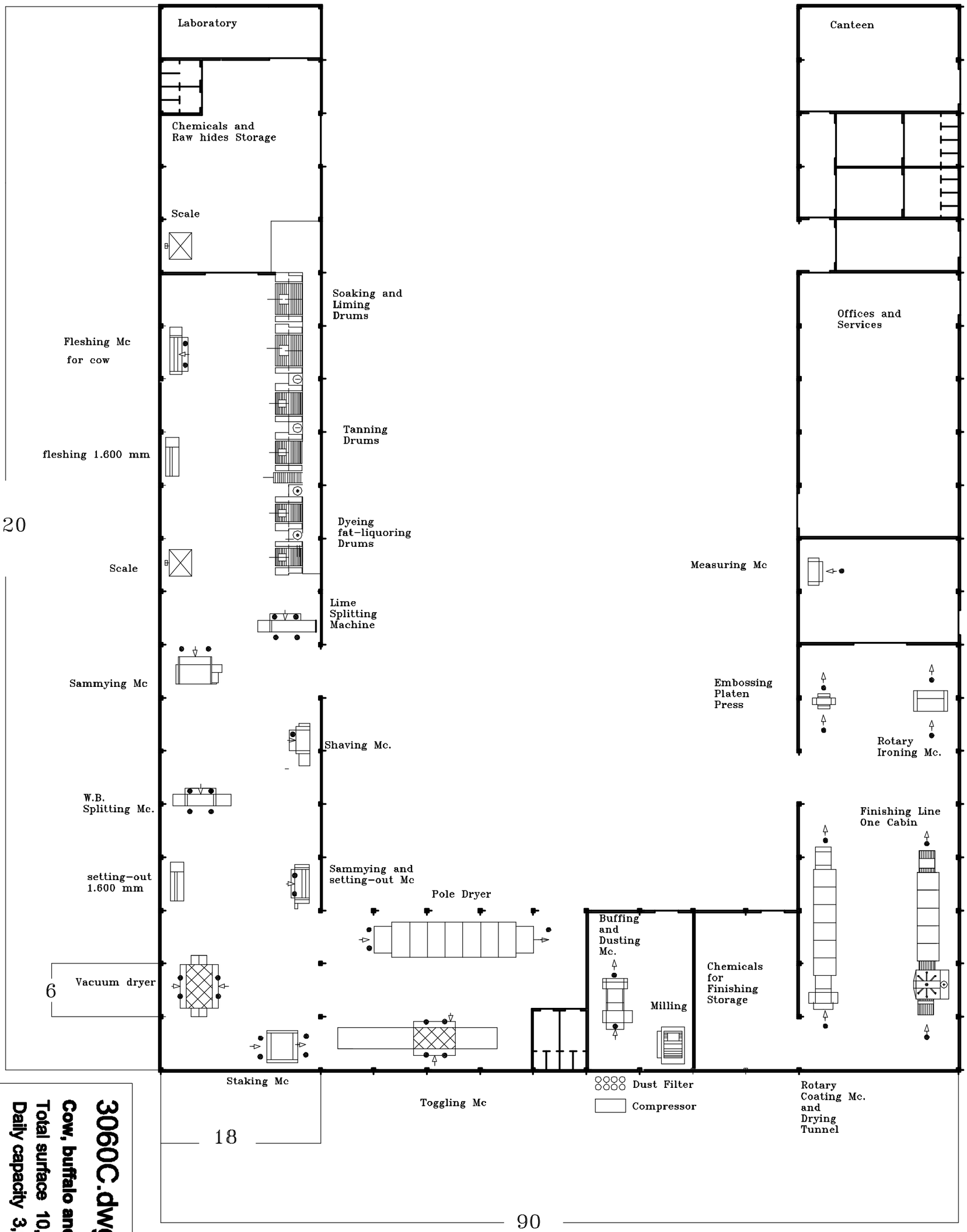
6.4 3060C.Dwg drawing

It is the layout of a tannery processing cow, buffalo and goat hides:

- The building is C-shaped; the covered surface is 5.300 sqmt and a 5.500 sqmt large courtyard is situated inside the building. The overall surface is 10.800 sqmt.
- The expected daily output goes from 3.000 to 6.000 Kg hides a day and the technological line is similar to the layouts #3060SF and #3060TF, with the exception that a wide open area is planned in the middle of the sheds, which allows for the whole structure to be considerably enlarged in the future.

Meanwhile, the open area can be used to perform the air drying, thus reducing the investments in machinery and systems.

For all other aspects, refer to the points detailed in the two layouts hereabove.



3060C.dwg

Cow, buffalo and goats tannery

Total surface 10,800 sqm

Daily capacity 3,000 - 6,000 Kg

Table 3060C Goats Skins, Buffalo and Caw Hides Tannery
Daily Production 6.000 Kg - Average 10,00 Kg - 600 Hides

PRODUCTION UNITS	Unitary Capacity			N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000x 3.500 mm Soaking, Dehairing and Liming. 200 % 24 h		3.000		2	24	6.000	2 x 30	2 x 12.000	3	2 x 80.000
Fleshing Machine W.W. 2.400 - 2.700 mm			120	1	6	720	75		4	115.000
Splitting Machine W.W. 2.300 - 2.400 mm			120	1	6	720	25		6	140.000
Weight of Fleshed Hides (Kg)	80% 4.800									
Weight of Splitted Grain Side	75% 3.600 Whole Hides 600									
Weight of Splits	25% 1.200 Splits 300									
Wooden Drums (DxL) 3.000 x 2.500 mm Deliming, Bathing, Pickling, Tanning 100 % 24 h Grain Side		3.100		2	8	6.200	2 x 25	2 x 18.000	3	2 x 65.000
Sammying W.W. 2.400 mm.			165	1	8	1.320	25		2	86.000
MAX Production from 600 Hides W.B.	Sides =600 (2x300 Hides) Hides = 300 Splits = 300									
Shaving Mc. 1.800 W.W.			160	1	8	1.280	75		2	85.000
Weight of Shaved Sides & Hides	76% 2.736									
Weight of Shaved Splits	76% 912									

PRODUCTION UNITS		Unitary Capacity		N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000 x 2.000 mm Neutralising, Dyeing, Fat-liquoring 200 % 8h Sides		1.600		4	8	6.400	4 x 20	4 x 17.000	3	4 x 56.000
Splits		1.600		2	8	3.200		2 x 17.000		2 x 56.000
Automatic Water Feeder 1000 L / 1'				2						2 x 18.000
Sammying and Setting-out WW. 2.400 mm.			120	1	8	960	22		2	100.000
Vacuum Dryer 4.000 x 2.500 3 Plates.			120	1	8	960	22	72.000	5	110.000
Pole Dryer and Conditioner 7 El.			160	1	12	1.920	15	40.000	2	95.000
Staking WW. 2.400 mm.			240	1	8	1.920	18		3	70.000
Toggling WW. 1.800 mm.			160	1	10	1.600	30	60.000	3	140.000
Buffing and Dusting WW. 1.800 mm.			240	1	8	1.920	55		3	80.000
Coating WW. 1.800 mm.			240	1	8	1.920	3	50.000	3	95.000
Embossing Platen Press 1.370 x 1.000 mm.			80	1	8	640	22		2	90.000
Finishing Line1 Cabins WW. 2200 mm.			240	1	8	1.920		140.000	3	100.000
Rotary Iron. Emboss. Mc. WW. 3.000 mm			180	1	8	1.440	35		2	68.000
Milling Drums (D X L) 3.000 x 2.000 mm				2	8		2 x 11		1	2 x 37.000
Surface Measuring Mc. WW. 2.100 mm.			250	1	8	2.000	3		2	27.000
Fleshing Machine (for Goats) W.W. 1.600 mm			240	1	8	1.920	30		2	37.000
Sammying and Setting-out WW. 1.600 mm.		(Goats)	180	1	8	1.440	22		2	37.000
Splitting Machine W.W. 2.300 - 2.400 mm			180	1	8	1.440	25		6	140.000
TOTAL Electrical power Installed							**714**			
TOTAL Thermal power Required								**524.000**		
TOTAL Workers									**64**	
TOTAL Cost of Machinery										**2.351.000**

TANNERY 3060C

TOTAL Workers	64
Transports	4
Laboratories	2
Raw Hides and Chemicals Storage	8
Maintenance	4
Administration	6
Vigilance	4
Secretary's Office	4
Selling Department	3
Department Assistants	3
Technology Manager	1
General Manager	1
TOTAL Employers	**104**

6.5 3000.Dwg drawing

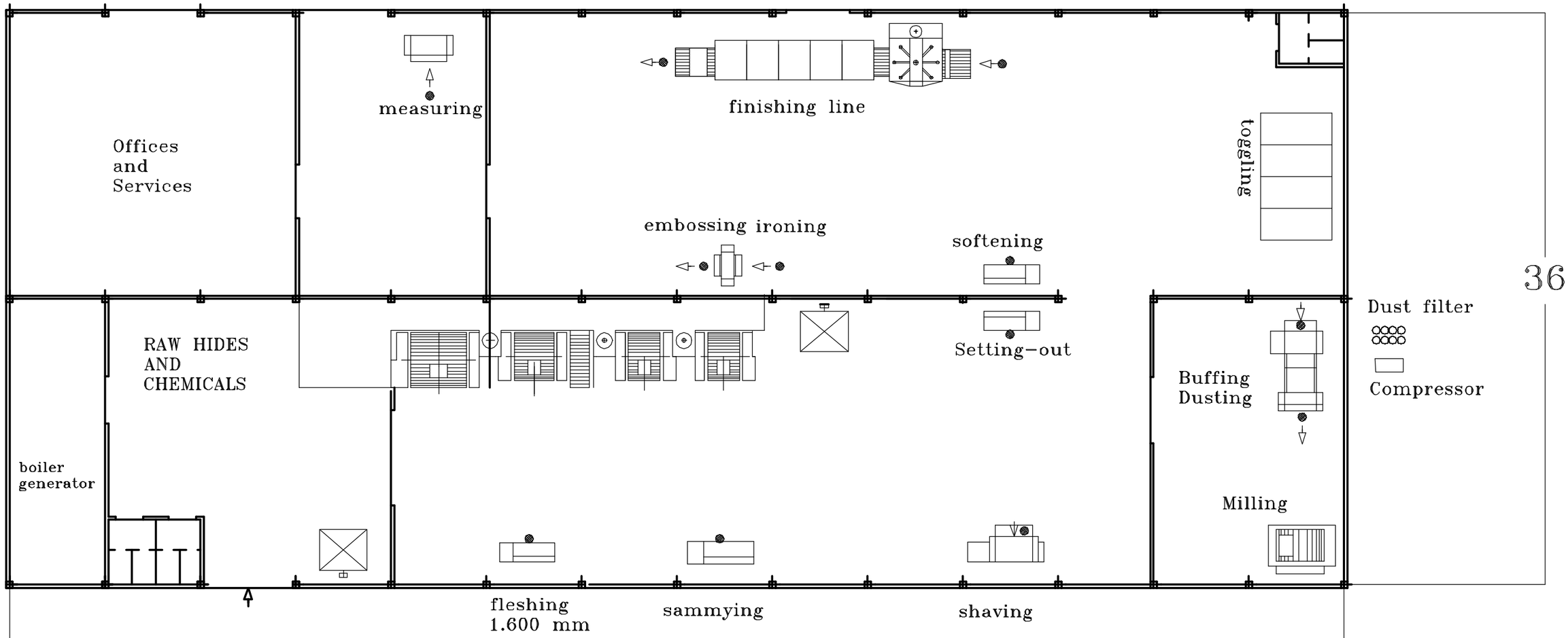
It is the layout of a tannery processing small pieces of leather, trimmings of cow hides and splits.

- The building is rectangular, with parallel and contiguous spans with a covered surface of 3.000 Sqmt.
- The estimated output capacity is 3.000 Kg of hides a day.

Obviously, the target of 3000 kg is to be referred to the processing of raw leather applying 24-hours cycles in a drum with a capacity of 3.000 kg in a 200% bath.

As far as the splits in W.B. are concerned, the output target depends on a series of unpredictable events, which are not only connected to the quantity and size of the resetting and dyeing drums but also to the type of finishing to be applied to the splits. In the future, in fact, the latter may be not only destined to the production of work gloves, but also of clothing items.

This type of structure can also be run by a cooperative (or by any type of association of operators), since it not only allows the processing of splits or small pieces of leather, but also the working on behalf of third parties.



36

84

3000.dwg

Tannery for splits and small peaces

Surface 3,000 sqm

Daily capacity 3,000 Kg

Table 3000 Splits and Small Pieces Tannery
Daily Production 3.000 Kg

PRODUCTION UNITS	Unitary Capacity		N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
	Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000x 3.500 mm Soaking, Dehairing and Liming. 200 % 24 h	3.000		1	24	3.000	30	12.000	2	80.000
Fleshing Machine W.W. 1.600 mm		240	1	8	1.920	30		2	37.000
Wooden Drums (DxL) 3.000 x 2.500 mm Deliming, Bathing, Pickling, Tanning 100 % 24 h Grain Side	3.100		1	8	3.100	25	18.000	2	65.000
Rotary Sammying W.W. 1.600 mm.		165	1	8	1.320	25		2	37.000
Shaving Mc. 1.800 W.W.		160	1	8	1.280	75		2	85.000
Wooden Drums (DxL) 3.000 x 2.000 mm Neutralising, Dyeing, Fat-liquoring 200 % 8h Sides & Splits	1.600		2	8	3.200	2 x 20	2 x 17.000	2	2 x 56.000
Sammying and Setting-out WW. 1.600 mm.	(Goats)	180	1	8	1.440	22		1	37.000
Rotary Staking WW. 1.600 mm.		240	1	8	1.920	18		1	37.000
Toggling 1.800 x 2.400 mm		160	1	10	1.600	30	60.000	3	37.000
Buffing and Dusting WW. 1.800 mm.		240	1	8	1.920	55		2	80.000
Embossing Platen Press 1.370 x 1.000 mm.		80	1	8	640	22		2	90.000
Finishing Line1 Cabins WW. 2200 mm.		240	1	8	1.920		140.000	3	100.000
Milling Drums (D X L) 3.000 x 2.000 mm			1	8		11		1	37.000
Surface Measuring Mc. WW. 2.100 mm.		250	1	8	2.000	3		2	27.000
TOTAL Electrical power Installed						**386**			
TOTAL Thermal power Required							**264.000**		
TOTAL Workers								**27**	
TOTAL Cost of Machinery									**861.000**

TANNERY 3000

TOTAL Workers	27
Transports	2
Laboratories	1
Raw Hides and Chemicals Storage	4
Maintenance	2
Administration	2
Vigilance	2
Secretary's Office	2
Selling Department	1
Department Assistants	1
Technology Manager	1
General Manager	1
TOTAL Employers	**46**

6.6 3090WB.Dwg drawing

It is the layout of a tannery processing cow, buffalo and goats hides, both raw and tanned.

- The building is rectangular, with parallel and contiguous spans with a covered surface of 2.800 Sqmt.
- The estimated output capacity ranges from 3.000 Kg to 9.000 Kg of hides a day.

Since the daily output varies according to the number of drums installed, some drums have been drawn with a broken line.

Drums with a capacity of 3.000 Kg have been included for the soaking and liming, applying 24-hours cycles in a 200% bath.

The machinery installed belongs to the state-of-the-art technology applied both to the various types of finished products and raw material available.

The machinery installed belongs to the state-of-the-art technology, in line with the features of good quality and satisfactory output that should characterize such structures.

The fleshing machine included is a traditional machine with 3.000 mm working width installed on a platform and equipped with a feeding chain.

The fleshed leather fall by force of gravity on a conveyor belt and is trimmed and conveyed to the splitting machine, in case of pelt splitting.

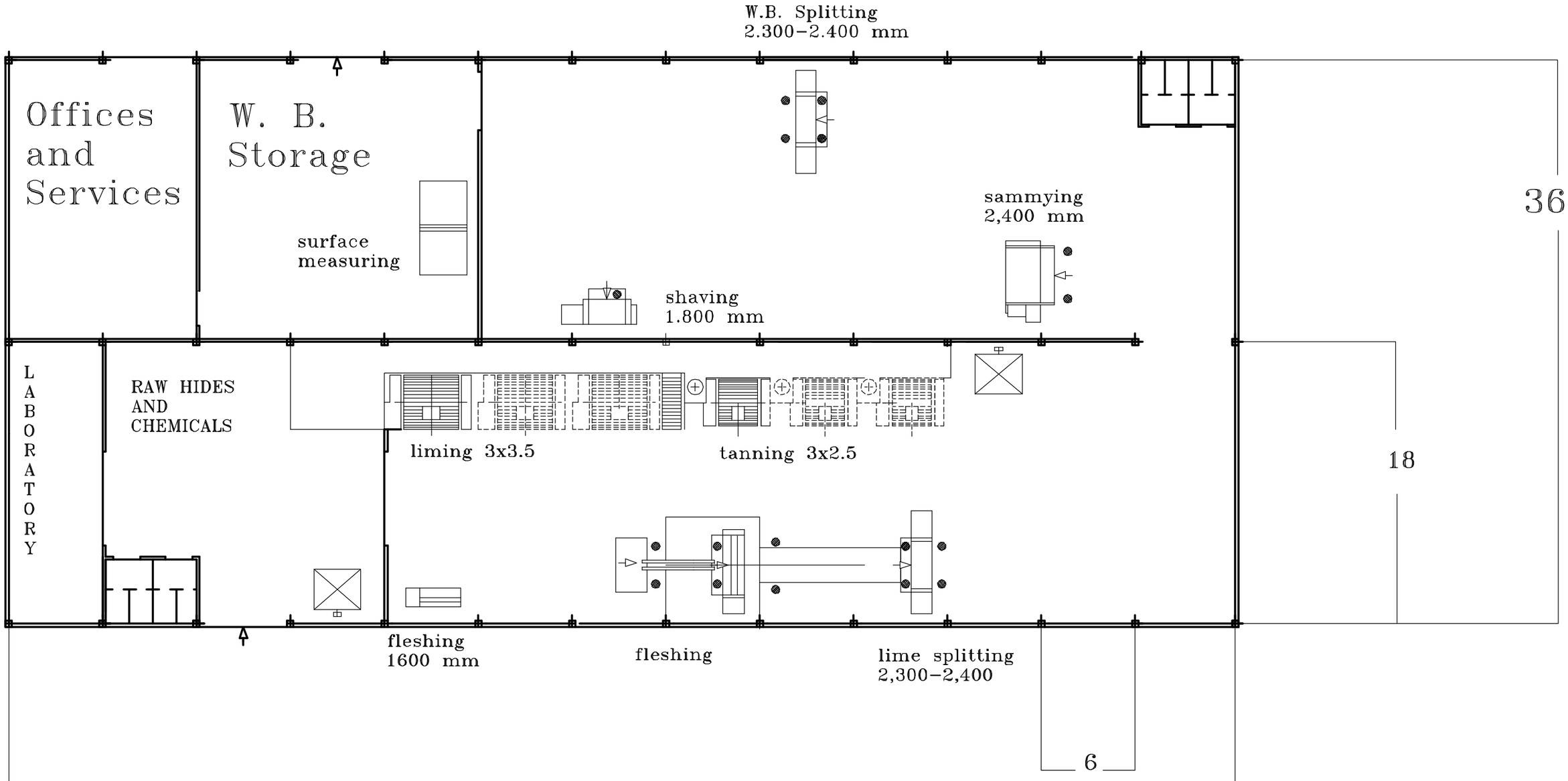
Another fleshing machine with small working width is installed on the floor next to the first one for the processing of goat hides.

Besides a pelt splitting machine, the possibility of splitting in W.B. has been also included, next to tanning and sammying, for those hides that can take advantage from this method.

Up to this point of the production process, the machines included in the layout have a considerable working width suitable to process whole hides, in order to obtain a better quality of both the grain and the split.

This kind of structure offers the advantage of processing a large number of hides a day, thus obtaining a high yield when the machines are used at their full capacity.

The modest financial investment required to setup this kind of structure can be within reach of an association of small entrepreneurs. Besides, other tanners might use these machines to process their own leather, thus reducing the financial engagement required to set up structures destined to finishing operations.



3090WB.dwg

Cow, goats and buffalo tannery to W.B.

Surface 2,800 sqm

Daily capacity from 3,000 to 9,000 Kg

Table 3090 Goats Skins, Buffalo and Caw Hides Tannery from Row to W.B.
Daily Production 9.000 Kg - Average 10,00 Kg - 900 Hides

PRODUCTION UNITS	Unitary Capacity			N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
		Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000x 3.500 mm Soaking, Dehairing and Liming. 200 % 24 h		3.000		3	24	9.000	3 x 30	3 x 12.000	4	3 x 80.000
Feeder of Fleshing Machine				1			3		1	16.000
Fleshing Machine W.W. 2.400 - 2.700 mm			120	1	6	720	75		2	115.000
Trimming Conveyor				1			4		2	12.000
Splitting Machine W.W. 2.300 - 2.400 mm			120	1	6	720	25		4	140.000
Extractor and conveyors				1						20.000
Weight of Fleshed Hides (Kg)	80% 7.200									
Weight of Splitted Grain Side	75% 5.400 Whole Hides 900									
Weight of Splits	25% 1.800 Splits 400									
Wooden Drums (DxL) 3.000 x 2.500 mm Deliming, Bathing, Pickling, Tanning 100 % 24 h Grain Side		3.100		3	8	9.300	3 x 25	3 x 17.000	4	3 x 65.000
Automatic Water Feeder 1000 L / 1'				2						2 x 18.000
Sammying W.W. 2.400 mm.			165	1	8	1.320	25		4	86.000
MAX Production from 900 Hides W.B.	Sides = 600 (2 x 300 Hides) Hides = 600 Splits = 400									
Shaving Mc. 1.800 W.W.			120	1	8	960	75		2	85.000
Fleshing Machine (for Goats) W.W. 1.600 mm			240	1	8	1.920	30		2	37.000
Splitting Machine W.W. 2.400 mm			180	1	8	1.440	25		4	140.000
Surface Measuring Mc. WW. 3.000 mm.			250	1	8	2.000	3		4	27.000
TOTAL Electrical power Installed							**430**			
TOTAL Thermal power Required								**90.000**		
TOTAL Workers									**33**	
TOTAL Cost of Machinery										**1.149.000**

TANNERY 3090WB

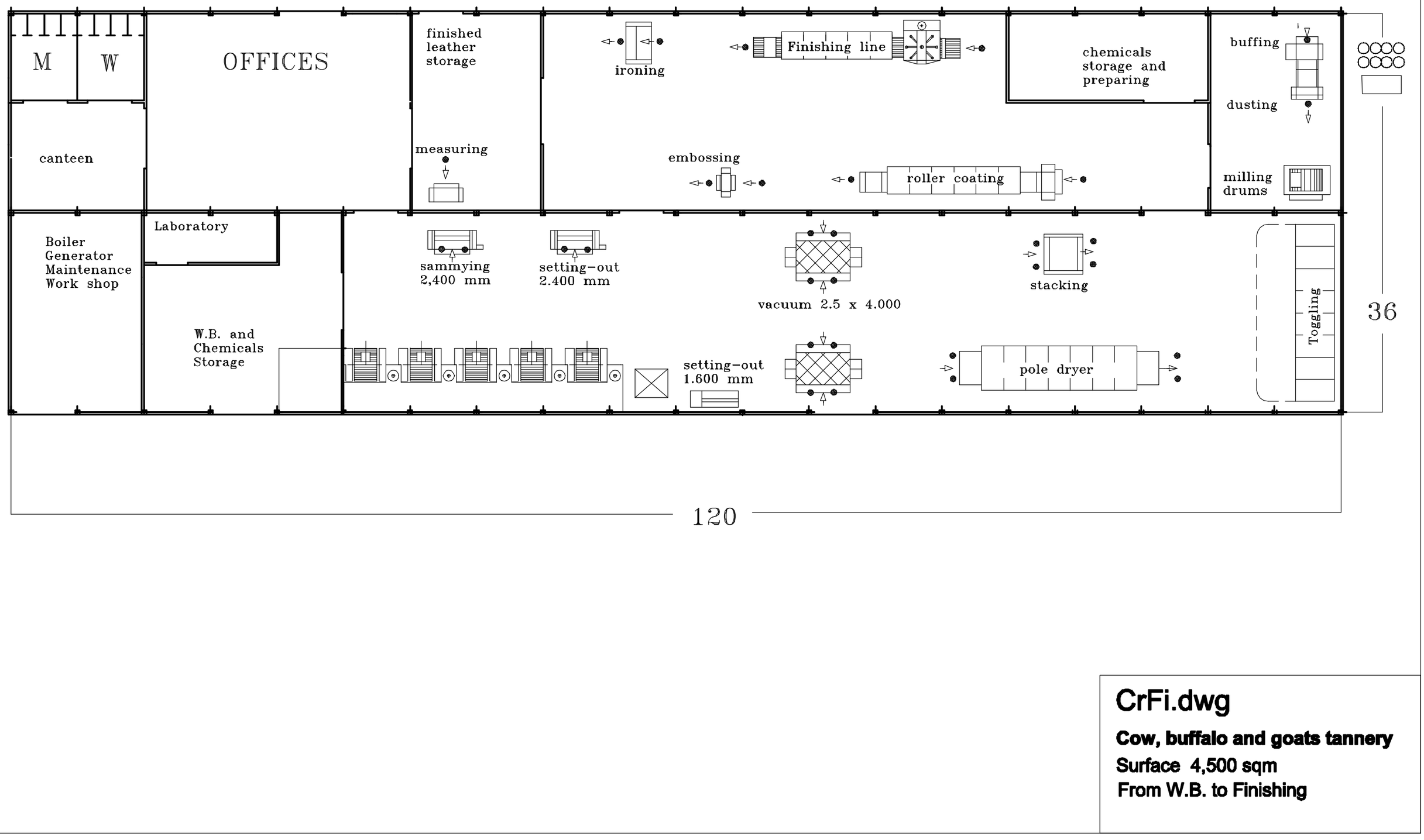
TOTAL Workers	33
Transports	2
Laboratories	1
Raw Hides and Chemicals Storage	6
Maintenance	2
Administration	2
Vigilance	2
Secretary's Office	1
Selling Department	1
Department Assistants	-
Technology Manager	1
General Manager	1
TOTAL Employers	**52**

6.7 CrFi.Dwg drawing

This structure allows the tanneries to enter the finished-leather market, without having to invest money on the machinery and systems destined to the wet processing, starting from the leather in crust.

This kind of structure can be operative only by the setting up of those structures detailed in the drawing # 3090W.B.

This particular scheme represents a modern concept of the tanning industry and is applied in all those countries where the tanning industry has witnessed a massive development together with the entire LEATHER sector.



CrFi.dwg

Cow, buffalo and goats tannery

Surface 4,500 sqm

From W.B. to Finishing

Table CrFi From W.B. to Finishing Tannery
Daily Production 8.000 Kg

PRODUCTION UNITS	Unitary Capacity		N° of Mach.	Worked Hours Daily	Product. Daily	Total Electrical Power	Total Thermic Power	Work.	Total Cost
	Kg / Day	Pc / h	n°	h	Kg / Day	kW	Kcal / h	n°	U.S. $
Wooden Drums (DxL) 3.000 x 2.000 mm Neutralising, Dyeing, Fat-liquoring 200 % 8h Sides	1.600		5	8	8.000	100	5 x 17.000	6	5 x 56.000
Automatic Water Feeder 1000 L / 1'			2						2 x 18.000
Automatic Chemicals Feeder			1						48.000
Sammying and Setting-out WW. 2.400 mm.		120	2	8	1.920	2 x 22		5	2 x 100.000
Vacuum Dryer 4.000 x 2.500 3 Plates.		120	2	8	1.920	2 x 22	2 x 72.000	10	2 x 110.000
Pole Dryer and Conditioner 7 El.		160	1	12	1.920	15	40.000	4	95.000
Staking WW. 2.400 mm.		240	1	8	1.920	18		2	70.000
Toggling WW. 1.800 mm.		160	1	10	1.600	30	60.000	6	140.000
Buffing and Dusting WW. 1.800 mm.		240	1	8	1.920	55		2	80.000
Coating WW. 1.800 mm.		240	1	8	1.920	3	50.000	2	95.000
Embossing Platen Press 1.370 x 1.000 mm.		80	1	8	640	22		2	90.000
Finishing Line1 Cabins WW. 2200 mm.		240	1	8	1.920		140.000	3	100.000
Rotary Iron. Emboss. Mc. WW. 3.000 mm		180	1	8	1.440	35		3	68.000
Milling Drums (D X L) 3.000 x 2.000 mm			1	8		11		1	37.000
Surface Measuring Mc. WW. 2.100 mm.		250	1	8	2.000	3		2	27.000
Sammying and Setting-out WW. 1.600 mm.	(Goats)	180	1	8	1.440	22		2	37.000
TOTAL Electrical power Installed						**402**			
TOTAL Thermal power Required							**519.000**		
TOTAL Workers								**50**	
TOTAL Cost of Machinery									**1.708.000**

TANNERY CrFi

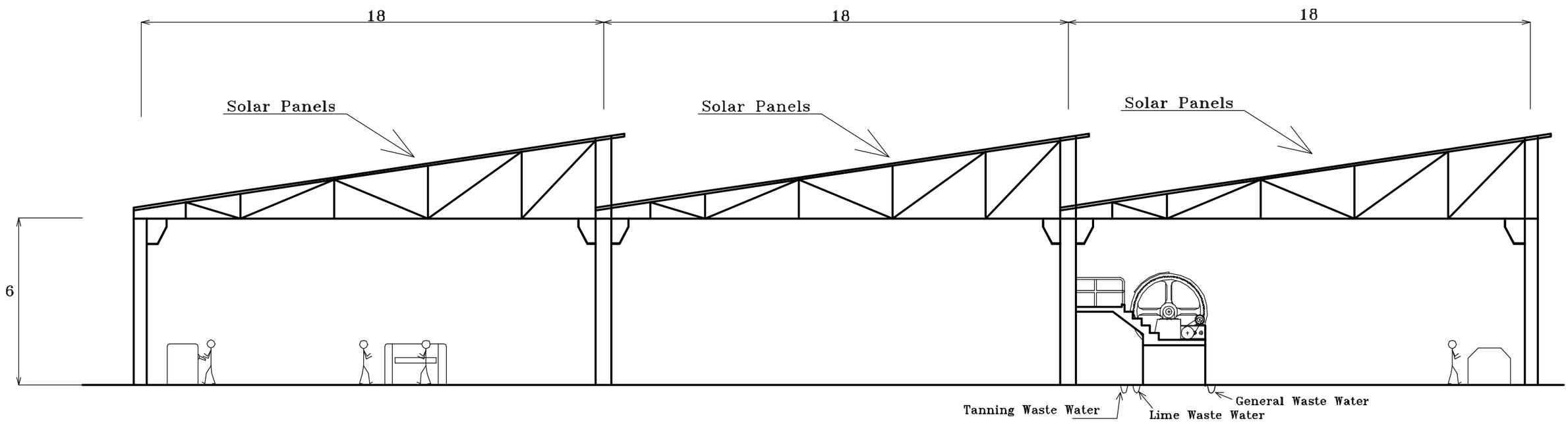
TOTAL Workers	50
Transports	1
Laboratories	2
Raw Hides and Chemicals Storage	4
Maintenance	2
Administration	2
Vigilance	4
Secretary's Office	2
Selling Department	2
Department Assistants	1
Technology Manager	1
General Manager	1
TOTAL Employers	**72**

6.8 SF.Dwg section drawing

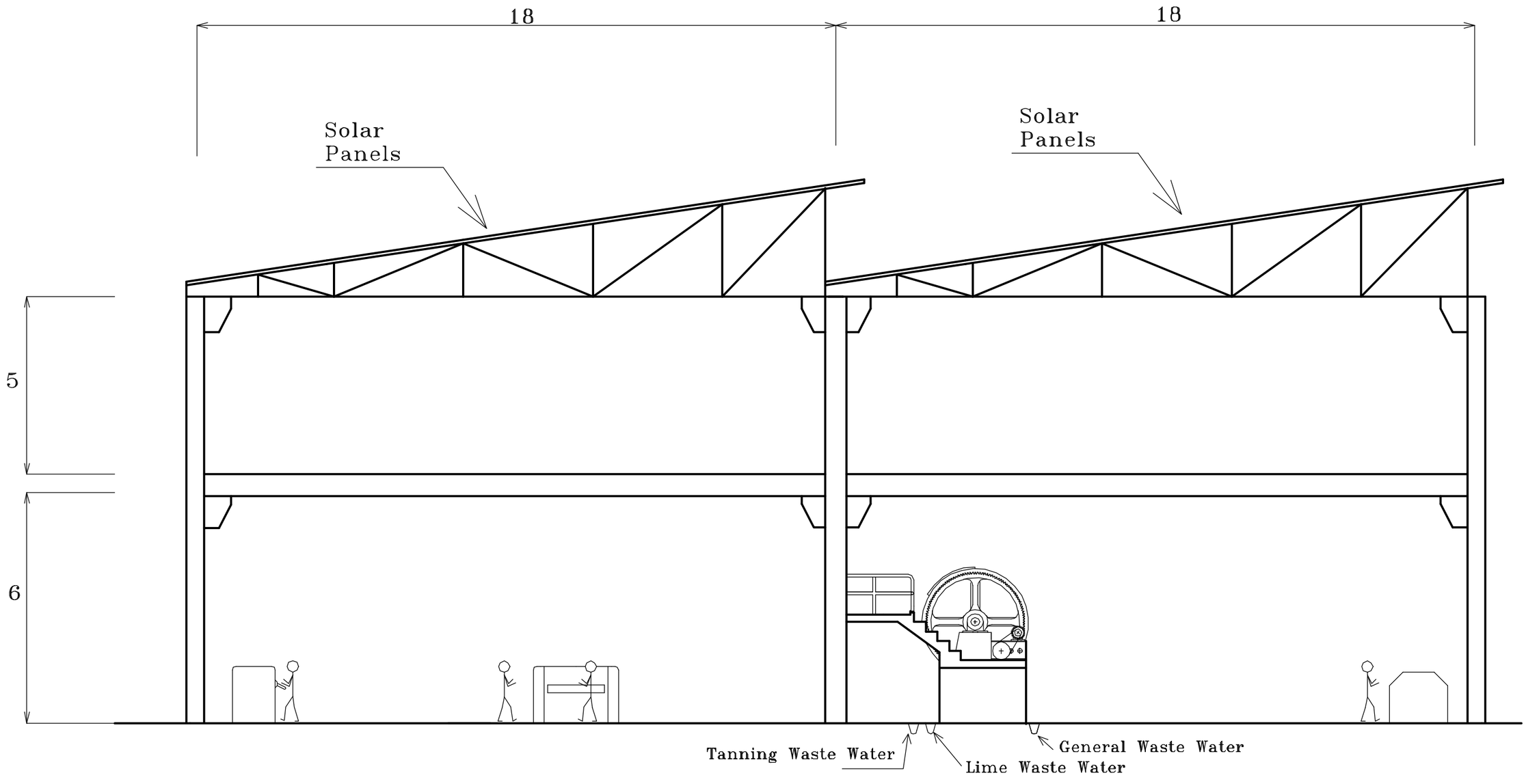
This drawing includes generic details of the structure of the industrial shed housing those tanneries, the layout of which is developed on one level.

6.9 TF.Dwg section drawing

This drawing includes generic details of the structure of the industrial shed housing those tanneries, the layout of which is developed on two levels,



SectionSF.dwg
One floor Tannery



Section TF.dwg

Two floors Tannery