



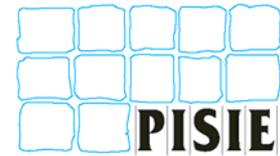
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SCHEMA PROGETTO

Codice	05-013
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Titolo	HO CHI MIN CITY TANNERIES
Data inizio	2005
Data fine	2005
Area Geografica coinvolta	Asia
Paese coinvolto	Vietnam
Area-Località di svolgimento	HCMC
Settore	concerie
Tipo di Progetto	Progetto di ingegneria per sviluppare lay out moderni id conceria
Idea Progetto	Fattibilità per la riorganizzazione degli impianti di concia
Obiettivi generali	Analizzare i modelli e aumentare la produttività
Obiettivi specifici	Disegnare nuovi modelli di produzione
Tipo di attività svolte	Progettazione
Valore del progetto	
Finanziatori	Istituto Nazionale per il Commercio Estero (Ice)
Esecutori	PISIE
Partner	
Beneficiari	
Responsabile PISIE	
Esperti coinvolti	Enrico Moriani, Umberto Sammarco

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HO CHI MINH CITY TANNING INDUSTRIES

September, October 2004

Introduction

Since 1990 Vietnamese tanning industry production has been constantly growing with an annual increase of 20% and reached 30 millions sq ft in 2003.

Even taking note of this progressive growth, production is actually very modest.

To have an idea of the exactness of this statement, it must be said that such production is realized in one year by only one Italian tannery of middle extent, occupying at most 70-80 employers.

Vietnamese footwear industry, made of about 200 productive units, produced 400 millions pairs of shoes in 2003, with an increment of 9.0% in 2002 and of 22.04% in 2001.

According to experts' valuation, even if only about 15% of the locally produced shoes (60 millions of pairs) are leather manufactured, it's a matter of using 120 million sq ft of upper leathers.

National tanning industry therefore succeeds in covering 20-25% of leather requirements destined to upper; thus in 2003 shoe industries have been obliged to import 220 millions sq ft of leather (upper materials, linings, soles) equal to a value of €400 millions.

Vietnamese Government has though elaborated a strategy that should generate an increase in shoe production of 50% by 2010; meanwhile it foretells an increase of upper leathers.

For this purpose, Vietnamese Government is investing much money (about US \$ 1.700 millions), distributed in such period, in the leather sector, representing for Vietnam the third one in order of importance.

Such objective is reachable improving technological level, mechanical equipment and workers training.

This situation, synthetically outlined, shows how the substantial internal demand of footwear leathers may offer the opportunities for the definitive development of the Vietnamese tanning industry.

To achieve these objectives, many weak points, mostly structural and distinctive of the old Vietnamese tanneries, must be faced and overcome as well as the great opportunities offered by the new industrial frameworks, peeping out in scenery of quick evolution, must be organized and rationalized.

Characteristics of Vietnamese leather industry

Vietnamese tanneries amount to about 30 units, largely located in the old tanning area in Tan Binh District, near HO CHI MINH CITY.

New productive settlements are already operating in the industrial areas around the town and others are under construction.

The few enterprises near Hanoi insignificantly contribute to the production of the sector.

Tanneries in HO CHI MINH CITY can substantially be distinguished into three groups, each one with its peculiarity.

🚧 Small enterprises of the so-called “Tannery Village” in Tan Binh District

They present on average the following characteristics:

- Covered area is included between 300 and 600 sq mt.
- Premises are crumbling and absolutely unfit for tanning production.
- Premises are located in the city centre.
- Daily production includes between 300 and 900 kilogram (400-1100 sq ft per day).
- Number of employers is included between 4 and 15.
- Daily water consumption is included between 10 and 20 cubic mt (consumption of 30 litres for 1 kilogram of leather, from hide to finished product).
- Processing cycle goes from raw material to finished product. Not all the operations are carried out in the tannery it self; some of them are made by sub-contractors.
- Articles present a quality far from developed countries standards.
- Articles range is very limited: innovation and research for fashion articles don't exist.
- Selling market is the domestic one.
- Selling prices, because of the low qualitative level of the articles, are lower than 10-20% if compared to market quotation.
- Raw materials are relatively low cost national bovine hides, suitable for buffed articles because of a sequence of faults (damages of the grain due to bugs, manual flaying).
- Machines are highly incomplete either in wet phase or in finishing. All these tanneries have neither fleshing machine nor splitting machine. Operations of setting out and vacuum are made by sub-contractors and finishing products are manually sprayed.
- The few machines they have, mostly paddles, drums, shaving machines (30 cm width), staking machines, ironing machine are obsolete.
- Waste water is not pre-treated but goes directly into the public sewers.
- Solid wastes (fleshing, shaving, buffing and trimming) don't undergo any treatment; they are not collocated into authorized dumps.

According to environment, these tanneries have to move from the city centre to a new industrial area, detected and recommended to civic authorities and called Hiep Phuoc Industrial Park, located south, 20 km far from the city centre.

All entrepreneurs understand the necessity of delocalization, but currently there are many different problems for the realization of this project.

The survival of Vietnamese tanneries is tied up to the possibility of delocalization. From that moment on, it will be possible to apply clean technologies, impossible to be used in the existing facilities, to improve products quality, to invest in new machines and to consequently improve production.

As we know, currently only one of these small enterprises (Ba Hung Tannery Factory) is building a 3.000 sq mt tannery in that industrial area as well as Binh Thien Tannery Factory has bought a 2.000 sq mt ground in the same venue

The greatest difficulties, connected to the delocalization of those small enterprises, are the following:

- Venue is not still structured to receive tanneries.
- Quantity of the water available in the industrial area seems to be insufficient to satisfy productive exigencies; most of all in future prospects, when tanning production will be clearly greater than today.
- At the moment no water waste treatment plant has been planned.
- Other possible industrial areas don't like tanneries settlement, because of their polluting impact. This aspect, that may be analyzed and solved with the application of processes of lower polluting load, will be faced later.
- Many small tanneries have no sufficient economical resources to bear delocalization expenses (ground purchase, facility building, investments for new machines purchase).
- Banks are not intended to help small tanneries, since their properties are not sufficient to cover the amount of possible loans.

As matters stand, it is obvious that delocalization won't take place by the end of 2004, deadline fixed by the City Authorities. In a meeting with managers of People's Committee of Ho Chi Minh City, Department Of Industry, after discussing the possibility of reducing pollution with the application of clean technologies during tanning process, Authorities have assured that they will do their best to encourage and help small tanneries to delocalize.

Middle enterprises located in the city centre

In this group, there are 3 private companies: **Hung Thai Tannery Factory, Dang Tu Ky Tannery Factory, Hoa Ky Tannery Factory.**

Saigon Tannery Factory, belonging to Government, also being considered a middle enterprise for its daily production (12.000 sq ft), actually is a different matter altogether.

Whereas the first three have registered a productive increase in the last years, the state tannery, having at its disposal a complete range of modern machines, a covered area of 8.500 sq mt and an exorbitant number of employees (more than 300), is going through a period of crisis and of constant business decrease.

Private enterprises in this group represent on average the following characteristics:

- Covered area of the productive structure is included between 2.000 and 5.000 sq mt.
- Facility is sufficiently suitable for tanning production.
- Its location is in the city centre.
- Daily production is included between 7.000 and 30.000 sq ft.
- Number of employees is included between 40 and 150.
- Daily water consumption is included between 200 and 550 cubic mt.
- Production cycle goes from raw material to finished product. Not all operations are carried-out inside the tannery; some of them are carried-out by sub-contractors (setting out, vacuum).

- Products present a quality far from technologically developed countries' standards.
- Products' range is very limited: innovation and the research for fashionable articles is inexistent.
- Production is sold for $\frac{3}{4}$ on the local market and for $\frac{1}{4}$ on foreign markets (generally Asiatic countries).
- Raw materials are domestic bovine hides (70%), relatively low cost, suitable for buffed articles and USA hides (30%), qualitatively superior.
- The range of machines is quite complete for what concerns wet processes but leaves much to be desired for what concerns finishing (anyway there's an automatic spray and roll-coat machines).
- Water wastes are not pre-treated but go directly to the public sewers.
- Solid wastes (fleshings, shaving, buffing, trimming) are neither treated nor placed into authorized dumps.

Obviously also these tanneries have to move from the city centre into a new industrial area. **Hung Thai Tannery Factory** and **Dang Tu Ky Tannery Factory** have almost ended the building of new facilities, visited together with their owners.

Those are all located in well structured industrial areas, different from the one suggested by the City Authorities, about 25-30 km far from HO CHI MINH CITY centre. **Dang Tu Ky Tannery Factory** has already equipped and activated the beam house and the tanning departments.

Hung Thai Tannery Factory's facilities are almost ended. These two factories will have very big structures, able to work in a few time and built on a covered area of about 20.000 sq mt with a horizontal extent, following the principles of a big and modern tannery,.

They have lots of space around the productive area, to have the opportunity of enlarging facilities and of creating a water waste treatment plant, before emptying wastes into the centralized structure.

Obviously they have to apply environment friendly production processes to reduce polluting impact. Such productive structures, if opportunely organized and equipped with modern and efficient machines, if provided with a system of leather transfer and automatic addition of products, like the Italian ones, can daily produce about 60.000/80.000 sq ft, from raw material to finished products. The owner of **Hung Thai Tannery Factory** has expressed his intention of buying Italian machines to improve at best his enterprise and is very interested in clean technologies and in water waste treatment plants in collaboration with Italian enterprises and experts.

Tanneries with foreign capital

Foreign entrepreneurs' tanneries working today in Vietnam are the following:

- **Hao Duong Tannery (Taiwan):** it daily works about 32 tons of bovine hides from raw material to wet blue.
- **Green Tech (Korea):** it daily produces 25.000 sq ft of bovine suede splits for footwear starting from wet blue.
- **Prime Asia Vietnam (Hong Kong):** it daily produces 100.000 sq ft of footwear articles with bovine hides, starting from the blue.
- **Samwoo (Korea):** no information about its activity.

- **Ton Pat Crocodile Conversation and Development** is going to begin working reptile skins.

It was possible to visit only **Hao Duong Tannery** and **Green Tech** but it was enough to have a quite precise vision on the characteristics of this type of enterprises. Even though they don't complete the whole manufacturing cycle, they can be considered big tanneries, according to Vietnamese situation, for the following reasons:

- A high production (from 1 to 3 million sq ft per month, depending on the situation).
- Wide, modern, rational industrial facilities (covered area: 15.000-20.000 sq mt).
- Water waste treatment plant; sometimes water is recycled and re-used after depuration (**Green Tech**).
- Import of raw materials from all over the world depending on market prices.
- A new and complete range of machines.
- Business relations either with their country of origin or with western countries. Sometimes semi-finished leathers are finished in another tannery of the same group in the country of origin. Group synergies are applied with consequent management saving (**Hao Dong Tannery**).

As regards to the visited tanneries, the following conclusions on their weak points are drawn:

- Quality, variety, and fashion content of articles are not comparable to the Italian ones.
- Business management is not optimal. The full capability of machines to rationalize and increase production is not exploited. For example a liming drum 4, 5 x 4, 5 mt contents in Italy 12/13 tons; in a Vietnamese one (**Hao Duong Tannery**) contents at the most 8 tons. Handling of hides and skins and addition of chemical products are made with traditional systems not suitable for a great tannery.
- The problems of total quality, above all concerning allowed limits of noxious substances on leathers (for example hexavalent chromium and formaldehyde) are ignored.
- The research for the realization of new articles and for the improvement of the existing ones leaves much to be desired.

In short, technological level is not comparable with the one achieved by middle and big Italian tanneries.

It must be said, however, that these tanneries are very important in the Vietnamese tanning reality; they will surely contribute in quickening local tanning industry development.

Development objectives of Vietnamese tanning industry

Vietnamese tanning industry will live, in the next future, a remarkable development for the above mentioned reasons, that is:

- **The strong demand of leathers from the domestic market.** Vietnamese footwear industries use about 120 millions sq ft per year, while current tanning production comes to 30 millions sq ft, without considering that footwear export will reach a strong impulse for the promotional politics (considerable investments) made by Vietnamese Government.
- The new foreign productive settlement (**Green Tech, Prime Asia Vietnam, Samwoo, Hao Duong Tannery**) and the building of big tanneries made by Vietnamese emerging enterprises (**Hung Thai Tannery, Dang Tu Ky Tannery**). Obviously, this will lead to a strong rise in the production of finished leathers.

By 2010, production of finished leathers in Vietnam is expected to reach 80 millions sq ft per year. To complete the picture, the creation, in the future, of new foreign tanning enterprises or of joint-ventures is not to be excluded; production is expected to be clearly higher compared to general expectations.

The problem of the survival of many small tanneries of the old tanning district is always alive and its solution depends on the possibility of delocalization in the new industrial park.

Industrial reorganization and related problems

All Vietnamese tanneries (small, medium, big) have the problem of facing a series of problems linked to the reorganization and to the rationalization of their productive activities.

We are talking about the necessity of **raising the technological level either respecting environment or being really competitive.**

The reduction of the polluting impact, leaving out planning and functioning of the centralized water wastes treatment plant, that must be a consortium operation, is based on the following operations:

- Application in the productive process of clean technologies, already successfully tested at industrial level by other tanning realities.
- Installation, inside the company, of plants for the recycling and the reuse of wastes and/or of polluting products.
- Pre-treatment of water wastes before they are sent to the central treatment plant.

Improvement of products' competitiveness is based on the following objectives:

- Improvement of products' quality (right relation between quality and price).
- Diversification of articles according to fashion requests.
- Improvement of internal organization and increase of productivity.
- Reduction of transformation costs.
- Creation of an efficient business network.

With an attentive analysis, it is easily realized that the application of clean technologies matches with the improvement of competitiveness. Thanks to these techniques, the use of chemical products is reducible (chemical products cost is about 15/18% of the total expenses of a tannery).

If they are used more rationally, to make them fix completely to leather, they can be used in lower quantities. Consequently, they don't lay unexhausted (ecology of process) and the pre-treatment inside the enterprise will be less complex and expensive.

With these systems it is also possible to reduce water consumption, representing a more and more important resource. Clean technologies allow as well the achievement of products corresponding to the requests of a market more and more attentive to a clean product, free from toxic substances (ecology of product). Those last requests are congenital to the modern concept of quality.

In the following pages, the most interesting subjects, just mentioned, are taken in exam.

Application of clean technologies, recycling and re-use of particularly polluting wastes

We synthetically report, as an example, the most important clean technologies, already tested in the industry and that can be surely applied to the Vietnamese tanneries:

- Liming with a reduced use of sulphide. Such agent is toxic for mankind and for environment. It is dangerous to be handled.
- The recovering of hair in continuous during filtering. This technique reduces COD's value (Chemical Oxygen Demand) of 50%, BOD (Biological Oxygen Demand) and nitrogen quantity; it drastically reduces sludge quantity resulting from depuration.
- With a simple plant, whose cost is briefly amortizable, it is possible to recycle the wastes of end liming and re-use them, opportunely reintegrated, during the following limings.
- This operation allows to drastically lower the polluting load of water waste; it allows a saving of 20% sulphide and 20% lime during the following liming.
- The use of deliming agents at low contents of ammonium salts. It allows a reduction of nitrogen quantity in water.
- The reduction of sodium chloride through pickles at low salt contents. Sodium chloride for water that doesn't have to be emptied in the sea after depuration must not exceed some concentrations. Nowadays economically practicable depuration techniques to lower salt contents within bounds allowed by law don't exist.
- High exhausting chromium tanning processes, with quantity of inexhausted chromium negligible at the end of the tanning process. Chromium is a toxic agent.
- Recycling of chromium and its reutilization during following chromium tanning processes. In this way it is possible to reduce at minimum chromium quantity in sludge deriving from water waste treatment. It allows the use of sludge for other utilizations avoiding of disposing it into authorized dumps.
- Finishing using water instead of solvents, polluting air.

Those are only some examples of clean technologies.

Competitiveness of a tannery

As already said, competitiveness of a tannery is essentially based on products' quality, on their diversification, on company organization and, as a consequence, on productivity, on reduction of transformation costs and finally on an efficient business network.

- Quality of articles

To be competitive, an article must have the following requisites:

- Product's characteristics must comply with customer's requests (percent distribution of choices, grain firmness, fullness, roundness, softness, the touch of leather, brightness, thickness, plain or grained aspect, etc).
- The right relation between quality and price
- Values of mechanical-physical-chemical parameters (for example break resistance of grain, tensile strength, dry and wet rub fastness, adhesion resistance of the finishing film, perspiration resistance, chromium oxide quantity percentage in

leather, water permeability, etc) depending on the final destination of the product (footwear, upholstery, garment), must respect values imposed by international labels, following analysis methods proposed by the labels themselves.

- Values of the so called toxic substances (for example hexavalent chromium, aromatic amines, carcinogen, formaldehyde, PCP, isomers of TCP, heavy metals, TBT, O-phenilphenol) must not exceed a few parts for 1 million in the finished product. So the limits of the agents as the analytic methods used to measure them are imposed by internationally recognized labels. Also in this case limits and sometimes analysis methods can change according to product's final destination.

- **Diversification of articles**

Vietnamese tanneries produce a very limited range of products. Generally they produce a smooth, full grain or buffed leather, embossed with different thickness, a buffed pull-up, leather for linings usually dyed only in black or brown. Rarely the bigger tanneries produce Napa, dry milled, with light thickness, always dyed with 2/3 colours.

Among the checked tanneries, just one (**Green Tech**) produces suede splits for footwear in different fashionable colours.

Evidently, the new productive structures must change their tendencies.

Range of products must be increased as well as fashion trends, either for what concerns colours or for what concerns other characteristics of softness, look, sense of touch, fantasy etc.

The simplest and quickest way to acquire cultural background is hiring foreign experts, mainly Italian ones, and at the same time is setting up training courses for the preparation of employers at all levels (managers, production technicians, commercial operators, lab technicians for chemical and physical analysis, skilled workers, etc).

Knowledge and sensibility for the production of fashion products, in the space of some years, can become a heritage of the national industrial tissue.

To diversify products and above all to produce high level full grain articles, it is obviously necessary to import raw materials of a better quality than the domestic ones, anyway not sufficient to satisfy the request of the tanneries, if the production grows as foretold.

Official sources inform that annual availability of domestic bovine hides is sufficient to cover the production of about 20-25 millions sq ft

- **Improvement of company organization, rise of productivity and reduction of transformation costs**

Obviously all these aspects are strictly linked one another. An efficient company organization allows, under the same conditions, the rise of productivity and, consequently, the reduction of fixed costs. What necessary to achieve such aims is:

- The proportionate preparation of human resources (management, technical direction, lab technicians, technicians for ordinary and extraordinary maintenance, commercial network, heads of the different departments, skilled workers).
- The installation of modern machines and their rational lay out to assure the carrying out in series of the various production phases.
- The installation of transfer disposals to assure the carrying out of the various production phases without wasting either human resources or time (automated load of hides in the drums, electronic weighing of hides, automated transport of

hides to machines, planning and automatic sending to drums of quantity and temperature of water destined to the different phases of wet working, planning and automatic sending to drums of chemical products, etc).

- An application lab for the research and development (R & D) of new products and a lab for the evaluation of chemical-mechanical-physical parameters.

Essential activities for industrial reorganization

The achievement of the objective of the industrial reorganization of Vietnamese tanneries, that means the production of competitive articles respecting market and environment requirement, must base itself, as said before, on the preparation and on the exploitation of human resources, on the contemporary activity of advice of experts about products' realization, able to equip the tannery with more suitable machines, of experts of clean technologies and of technicians of water waste treatment plants.

The increase in value of human resources is practicable through the institution of:

- Training courses of tanning technology, company trade organization for future managers, trainers and researchers, about subjects that set up the fundamental aspects of the activity of a modern and competitive tanning industry (courses to be hold in Italy).

In immediately following times, it will be possible to constitute in Vietnam

- A service centre able to organize training courses for production heads, able to make applied research, able to make quality controls.

Tanning Technology and Company Organization Training Courses for future trainers and service centre's researchers.

Purpose of these courses, suitable for people with an appropriate scientific basic formation, is to have at trainers and researchers' disposal, working in the service centre, the fundamentals of chemistry of leather and of all those aspects linked to the modern conception of the tanning industry.

In particular, the following teachings are conjecturable:

- Chemical technology of leather (tanning chemistry concepts and practical application of the modern manufacturing processes, based on products quality, on their diversification, on production rationalization, on company organization, on reduction of polluting impact).
- Courses on the analytical instrumental techniques (assessment of mechanical, physical, chemical and toxicological parameters expected by the various eco-labels, quality control) and basis of research applied to leather industry (development of new technologies, clean technologies, new products, waste management technologies, valorisation of working by products).

In substance these courses are aimed to outline and to deepen modern technologies, with a particular attention to the production of various kinds of articles, to values of parameters (constituting an integrated part of product's certification), to analytic methods respecting international provisions, to clean technologies, to water waste treatment, to product's ecology and to a functional company organization.

A basis general program, completely calculating the above mentioned aspects, may be opportunely specified, enlarged and specialized according to trainers or researchers' sphere of influence.

Structuring and purposes of Service Centre.

The Service Centre, for what strictly concerns the tanning area, must carry out the following functions:

- Training courses
- Applied research
- Advices
- Quality control

Training courses

The following courses can take place:

Tanning Technology. Theoretical and practical principles during the various manufacturing phases of the different products. This course, destined to production technicians, can be structured in the following way:

Raw materials of various kinds of animals, their different origins, their defects, their preservation. Beam house: soaking and liming; mechanical phases: fleshing, splitting. Deliming, bating, pickle, chromium tanning, vegetable tanning, sammying out, shaving, various types of retannage, neutralization, dyeing, fat liquoring, various types of drying, mechanical operations of pre-finishing, finishing. Various types of finishing: by aniline, semianiline, pigmented, acrylic resins, polyurethane, lacquered, buffed)

Mechanical-physical properties of various types of articles (footwear, garment, upholstery). Chemism of most important chemical products (natural tannins, syntans, acrylic polymers, dyes, fattings, chromium salts, etc).

Notions on the new technological processes for the rationalization and improvement of environment.

Notions on the most important analytic techniques and on water waste treatment.

Notions on norms linked to mechanical-physical and toxic parameters.

This course provides for the involvement of two trainers: one with a scientific degree for the theoretic phase, one technician for the practical phase.

Applied research

This section is aimed to assist tanneries linked to Vietnamese industries and to be a point of reference for its global development. Such section of the Service Centre must perform lots of actions.

Among its competences:

- Development of new technological processes (rationalization of times, of water and chemical products' consumption, of working costs; lower environmental impact of processes).
- Development of new products, improvement of their mechanical-physical and toxic quality (problem of hexavalent chromium, etc).

- Analysis of chemical products and of new specialities (relationship between quality and price, polluting impact, chemical composition constancy).
- Consultancies on water waste treatment
- Setting up of techniques for valorisation of working by products (fleshing, shaving, buffing, etc)
- Routine controls of mechanical-physical and toxic quality of articles produced by tanneries, aimed to raise their competitiveness on the international markets.
- In the end, tannery must catalyse the improvement of the technological level of industrial tissue (training of competent experts)

To develop such functions, 4-5 people with an academic scientific knowledge are requested, who have attended the above mentioned Training Course.

At the beginning, the essential equipment for these activities is substantially the following:

- 4-5 little drums for the practical experiences provided for training courses and applied research courses. As regards to machines, the ones of local tanneries can be used.
- 2-3 horses
- 1 computerized dynamometer for the evaluation of the mechanical parameters
- 1 Veslic apparatus for dry and wet rubbing tests
- 1 elastomer for the resistance of grain to break
- 1 apparatus to value the adhesion of finishing layer spread
- 1 permeometer to value the dynamic permeability of water
- 1 flexometer for resistance testes to bending
- 1 heater for analysis test samples conditioning
- 1 high temperature heater for test samples analysis for operations of calcination
- 1 four decimal figures electronic balance
- 1 spectrophotometer in the field of visible and UV
- 1 HPLC (for High Performances Liquid Chromatography)
- Lab glassware and various types of reagents
- 1 cutting die for the sampling of leather test samples to be analyzed

Check up of Ho Chi Minh City Tanning District

The following tanneries have been visited:

- Kim Thanh Tannery Factory
- Cao Thang Tannery Factory
- Hung Thai Tannery Factory
- Tien Thanh Tannery Factory
- Hoa Ky Tannery Factory
- Ba Hung Tannery Factory
- Tran Bai Hue Tnnery Factory
- Ngau Ky Tannery Factory
- Dang Tu Ky Tannery Factory
- Tran Thanh Tannery Factory
- Anh Ky Tannery Factory
- Binh Thien Tannery Factory
- Sai Gon Tannery Factory

KIM THANH TANNERY FACTORY
99/12, Au Co Street, Ward 9, Tan Binh District
HO CHI MINH CITY

Tel: 0084 8 8657204
Fax: 0084 8 9741979
hqphong@hcm.vnn.vn

Presentation

Company set up in 1985. It currently deals with 2 tons of bovine hides per day, equal to 2.700 sq ft from raw material to crust. The semi-finished leathers are finished in another tannery belonging to the same owner. Setting out and vacuum operations are made by a sub-constructor. Both machines are made in Taiwan. Programme organized by the Italian Trade Commission provided for the visit to the productive unit, carrying out only the wet phase. The small size area and the unsuccessful location of the productive plant in the city centre, communicating with the road where a food market takes place every day, represent the most characteristic elements of company's structural precariousness. Water wastes are emptied in the public sewers, without any preventive depuration. The tanning owner has expressed his intention of transferring to the new HO CHI MINH CITY Industrial Park.

This seems to be the only way for the company to survive, as well as all "Tan Binh District" small tanneries.

Annual turnover from 2000 to 2003, also even if unpretentious, has a positive trend:

- . Year 2000 198.700 US \$
- . Year 2001 253.200 US \$
- . Year 2002 316.500 US \$
- . Year 2003 380.000 US \$

Raw material quality and type

Used raw materials are made up of bovine Vietnamese salted green hides. Middle class weight is 25 kilograms. These hides present, in a high percentage, faults due to scratches and quite deep notchings in the flesh side (manual flaying).

The last fault has no importance in this tannery, since it spontaneously renounces to obtain split.

The company has neither the fleshing nor the splitting machine. Such conditions, obviously, don't allow obtaining any split.

Therefore, following a procedure the expert has never seen before, leathers are exposed to a shaving on green salted hides before soaking and to a subsequent shaving after tannage, to let hides acquire the desired thickness. In this way the part of hide normally constituting the split, is completely destroyed during shaving.

Many other small tanneries work with the same procedures.

Such way of operating, by giving up making large profits by selling wet-blue split or by selling finished articles, because of the lack of investment in essential machines like the

fleshing and the splitting ones, let clearly know which the general level of these tanneries is.

Raw materials price is about 1 US \$ and is usually bought by 5 local small suppliers.

Produced articles and their qualitative characteristics

Articles produced in side leathers are the following:

Buffed footwear from 1,2 mm to 1,8 mm	60% of the production
Napa footwear 1,2-1,4 mm	20% of the production
Nubuck footwear 1,4-1,6 mm	10% of the production
Pull-up footwear from 1,4mm to 1,8 mm	10% of the production

According to their classification parameters, articles' quality is in the following percentages:

First quality	30%
Second quality	50%
Third quality	18%
Fourth quality	2%

First quality article is sold on average at 1, 5 US \$, while the second and the third ones respectively at 1, 35 and 1, 20 US \$.

Articles in general, most of all dyed in black, present a series of defects, going from the scarce grain-tightening (a serious problem for the shoe), to the lack of pastiness and roundness, which are the most typical properties of a well-processed leather.

We are certainly far from the European standards, also regarding look and fashion.

These last faults are to be attributed to unfit finishing techniques.

The absence of aesthetic sense and the habit and capability not to follow fashion trend are evident.

Selling markets

Finished product is destined exclusively to the regional and interregional market. The main competitors are either local small and medium tanneries or big foreign companies.

Goods are paid mostly cash on delivery.

Despite all the above mentioned inefficiencies, market trend of this small tannery is however growing.

On the other hand, the high production increase of the Vietnamese footwear industry in the last years must be underlined.

Weak points

- Structural lacks of the building (small area, location in the city centre, inconsistency in working departments' distribution).
- Inability, at present day, of introducing any step to reduce environmental impact.
- Lack of sufficient basic technological notions.

- Labour surplus (40 employees) compared to carried out production.
- Lack of machines necessary for the production line and obsolescence of operating machines.
- Non-existent quality control on finished product
- Technicians and labour training non comparable to the one of the developed countries
- Scarce tendency to invest or liquidity shortage
- Practically non-existent business network, publicity and participation to events and fairs.

Strong points:

- Great growth of Vietnamese footwear industry.
- Enterprise's intention of delocalizing in the new HO CHI MINH CITY industrial park.
- Low cost labour.
- Low cost electric energy.

Working days

Yearly working days are 312; daily working hours are normally 8, exceptional cases permitting.

General conditions of premises

Productive framework, occupying a 500 sq mt area, is not suitable for tanning manufacture. Venues are small and don't permit a rational handling of hides from one production line to the other one.

The enterprise is formed by a very small wet processing department and by a mezzanine floor where drying operations take place, carried out by hanging leathers on sticks. There's neither a ware house for raw materials nor a venue for chemical products storage.

The enterprise is near a road in the city centre. As said before, tannery has no water waste treatment plant: wastes are directly emptied in the public sewers.

There's no machine shop able to carry out machines' ordinary maintenance; there's no reliable steam generator.

Quality control

Controls during the various production phases (pH values, temperature, rotation times, etc) are not performed with care and accuracy.

As for finished product, evaluations on the most common mechanical-physical and chemical parameters characterizing footwear are neglected.

We're talking about tensile strength, break resistance of grain, percentage quantity of chromium oxide on leather, adhesion of finishing layer, etc.

Chemical products supplying

Company uses chemical products of foreign enterprises, above all Cromogenia (Spain), Smith and Zoon (Holland), ATC (France). Auxiliaries are from Italy (Dermochimica). Foreign companies are represented by Vietnamese firms.

Most of times foreign companies own storage deposits; in limited cases chemical products are sent from close countries, for example China, where the most important chemical multinationals are present with massive investments.

Water consumption

Water consumption is 50 cubic mt per day. It means that, according to daily production (2.000 kilos), each kilogram from hide to crust requires 25 litres. This relation is lower than the average, according to the above mentioned manufacturing process.

Technological innovation, research and development

It is completely inexistent. Topics that, in technologically advanced countries, belong by now to business, like clean technologies, research to reduce transformation costs, chemical products control, quality improvement according to international set of rules (control and possible elimination from leather of forbidden chemical substances) are neither taken into consideration nor acknowledged as information.

General conditions of equipment

Machines are few and inefficient. Second hand drums are low quality and don't have any automatism for temperature control.

As said before, it is remarkable that the tannery has neither a fleshing nor a splitting machine. Mechanical setting out and vacuum operations are made by a sub-constructor.

All machines are old and second-hand ones. The owner declares his intention of buying Italian machines as soon as delocalization has finished.

Tannery manufactures leather from raw materials to semi-finished ones and has the following machines:

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Paddle	1			Vietnam
TANNAGE	Drum	2	2,5 x 2,0 m	Second hand	Vietnam
	Press for blue	1		Obsolete	Taiwan
	Shaving machine	7	0,60 m		Taiwan
RETANNAGE FAT LIQUORING	Drum	2	2,0 x 1,8 m	Second hand	Vietnam

* Setting out and vacuum operations are made by sub-constructors; leathers are dried and finished in another tannery of the same owner.

Maintenance and safety

Ordinary maintenance is made internally. Extraordinary maintenance is very difficult because Vietnam has no machine shop able to do it. In case of need, when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activities are the following:

- Delocalization in the industrial park.
- Application of clean technologies (chemical processes, recovery and recycling of most polluting wastes).
- Basic technological training.
- Improvement of the range of machines with modern and productive plants.
- Improvement of articles quality.
- Diversification and extension of finished articles range according to market and fashion trend.
- Quality control according to customer exigencies.

It is clear that the above mentioned strategy, common to about 20 small Vietnamese tanneries, is challenging. It can be implemented in a quite short time if consultants and foreign specialized experts are involved.

CAO THANG TANNING FACTORY
99/6 Au Co Street, Ward 9, Tan Binh District
HO CHI MINH CITY

Tel: 0084 8 8655514
Fax: not available

Presentation

Tannery, founded in 1988 in the old tanning Tan Binh District, extends on a 300 sq mt area with 15 employees.

It is therefore a small, crumbling structure that produces, not everyday, at the most 600 kilograms bovine salted green hides, that is about 800 sq ft. It makes the complete production cycle from raw material to finished product. Articles are destined to footwear industry, full grain and buffed and are exclusively sold on the domestic market. Productive plant is incomplete, not adequate to this kind of manufacturing cycle and is provided with obsolete machines. Either the fleshing or the splitting machine are absent, although essential for the production cycle of an enterprise. Hides are cut in side leathers and shaved before soaking. After tannage, it is obviously impossible to split leathers; therefore, hides reach the desired thickness only through shaving. Using this procedure, the by-product split is completely destroyed.

Tannery owner, Mr Quach De, coming from China, has declared that turnover grew from 2000 to 2003 in the following way:

From 2000 to 2001	+ 12%
From 2001 to 2002	+ 11%
From 2002 to 2003	+ 20%

On the other hand, having problems in providing with information, he didn't communicate yearly turnover's absolute values.

Closeness to the city centre and the complete absence of water waste treatment plant oblige this enterprise to transfer to the new HO CHI MINH CITY industrial park, on pain of a forced closing-down in the next future.

Raw materials quality

Tannery uses domestic bovine hides furnished by a small number of local suppliers. Hides present a series of faults. Class weights of hides used during manufacturing are the following:

30 – 37 kilograms	5%
25 – 30 kilograms	45%
20 – 25 kilograms	30%
15 – 20 kilograms	20%

Product articles and their qualitative characteristics

Articles range is very limited. They are principally black (a small quantity is dyed in brown) and with only one thickness (1, 4 mm.).

The greatest part of the production is made of buffed leather. The quantity of the finished article, concerning its characteristics, is unsatisfactory; it presents a series of problems linked to the loosing of the grain, to fullness and roundness' lack, to faded shade of colour, to insufficient softness.

Moreover leathers, as well as wet blue ones, present very deep wrinkles distributed all over their surface.

Superficial yield of leathers (sq mt of finished product/Kilogram. of raw materials) is on average lower than the one obtained in the European tanneries.

Percentage on product quality is distributed as follows:

First quality	7 %
Second quality	35%
Third quality	35 %
Fourth quality	23 %

Selling markets

The whole production is sold to regional and interregional shoe factories. Sold price is on average about 1, 3 US \$.

Working days

Yearly working days are 312; daily working hours are 8, exceptional cases permitting.

General conditions of premises

Covering a 300 sq mt area, tannery is not suitable for the normal tanning manufacture. Venues are cramped and unhealthy; handling of goods from one area to the following one is irrational and arduous. Raw materials warehouse, of a reduced size, covers a 25 sq mt area. Storage temperatures are too high to assure the correct preservation of hides.

Wet processing department covers about 150 sq mt, while the finishing one covers about 120 sq mt The last one, after setting out, is used also for drying operations by hanging leathers on sticks. There's no warehouse for chemical products. The building is located in the city centre. As said before, tannery has no water waste treatment plant; wastes are emptied in the public sewers.

Moreover, there's no warehouse for finished products, no machine shop to provide any ordinary maintenance, no reliable steam generator.

Raw materials

Storage raw material quantity covers at the most one working week production. As said before, in the warehouse hides are exposed to temperature higher than the ones normally expected for the correct preservation of goods.

Chemical products supplying

Quantity of chemical products, scattered anyhow in the tannery, covers the production of about one week. In this tannery chemical auxiliaries are made in Spain (Cromogenia), France (ATC), Holland (Smith and Zoon).

Technological innovation, research and development

In this contest it is hard to talk about technological innovation or even about research and development. Basic knowledge of Tanning Chemistry and essential machines to normally carry out manufacturing process are inexistent.

Aspects, normally belonging to business in technologically advanced country, like clean technologies, research to reduce transformation costs, chemical products control, quality improvement according to international set of rules (control and possible elimination from leather of forbidden chemical substances) are neither taken into consideration nor acknowledged as information.

First of all training courses for all employers, from technicians to workers, are indispensable.

Quality control

Quality control is completely absent.

Water consumption

Water consumption is about 0-20 cubic mt per day. That means that production is not daily. According to daily production (600 kilograms), each kilogram of leather from raw material up to finished product requires 35 litres of water. This relation, according to the above mentioned manufacturing process, is on average with European standards.

Weak points

- Structural lacks of the building (small dimensions, in the city centre, irrationality in working departments).
- Impossibility, in the present situation, of introducing any measure to reduce environmental impact.
- Deficiency of sufficient technological basic knowledge.
- Lack of fundamental machines for manufacturing process (present machines are obsolete)
- Inexistent quality control on finished product.

- Technicians and workers training not comparable to technologically advanced countries.
- Scarce tendency to invest or lack of liquidity (see critical lack of the fleshing and of the splitting machines with all related problems)
- Practically inexistent business network, publicity and participation to events.

Strong points

- Great growth of Vietnamese footwear industry
- Enterprise's will of delocalizing in the new HO CHI MINH CITY industrial park.
- Low cost labour.
- Low cost electric energy.

General conditions of equipment

Machines are not enough, obsolete and inefficient. Second-hand drums are low quality and have no automatism for temperature control. Lack of either fleshing or of splitting machine is relevant. There's no vacuum system. After setting out, leathers are directly dried by hanging them on wood sticks.

All machines are old and second hand. After delocalization, company has to buy almost all machines. By now machines are the following ones:

Working Phase	Machine	Q.ty	Size	Conditions	Country
SOAKING LIMING	Drum	1	2,5 x 2,0 m	Second hand	Vietnam
TANNAGE	Drum	1	2,5 x 2,0 m	Second hand	Vietnam
RETANNAGE FAT LIQUORING	Drum	1	2,0 x 1,8 m	Second hand	Vietnam
	Samming press	1	1,4 m	Second hand	Vietnam
	Shaving machine	4	1,2 m	Second hand	Taiwan
PRE-FINISHING FINISHING	Staking machine	1		Second hand	Czech Republic
	Ironing machine	1		Second hand	Taiwan
	Manual spraying	1			

* Setting out process is carried out outside and afterwards leathers are dried in the air, without any vacuum process.

Maintenance and safety

Ordinary maintenance is made internally. Problems regard the extraordinary one, since in Vietnam there are no machine shops able to carry out maintenance.

In case of need and when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activities are the following:

- Delocalization in the industrial park.
- Application of clean technologies (chemical processes, recovery and recycling of some wastes).
- Basic technological training.
- Improvement of the range of machines with modern and productive plants.
- Improvement of articles quality.
- Diversification and extension of finished articles range according to market and fashion trend.
- Technological innovation.
- Quality control according to customer exigencies.
- Improvement of production according to the new productive structure and to employers' number.

HUNG THAI TANNERY FACTORY

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Presentation

According to HO CHI MINH CITY tanning district, this tannery is considered a productive unit of big dimensions. It covers a 5.000 sq mt area with 188 employers. Actually, in spite of the high number of employers, it is a middle-small tannery. Precisely it produces 20.000 sq ft bovine hides per day, corresponding to a production of about 15.000 kilograms of raw material. It occasionally deals also with buffalo hides. It is buying modern machines to improve production.

It is in the city centre. A new productive structure is under construction in an industrial area where other enterprises are, about 20 km far from the current premises; as soon as it is ready, tannery will move. The new settlement, whose works are going well, covers an area of 17.000 sq mt with the possibility of having some space in front of it. Mr Ly Nyan, company's owner, with whom I visited the new premises, has understood very well that Vietnam, for the great growth of footwear industry, needs modern and rational settlements with great productive capabilities and able to carry out clean technologies and water waste pre-treatment, before water goes to the centralized treatment plant. In this connection, he has asked for the collaboration of Italian technicians to set environmental low impact processes, for manufacturers of recovery and recycling of end process wastes and for enterprises specialized in building and/or furnishing purification plant components. The new factory, equipped with an adequate set of machines (Mr Ly Nyan is interested in buying Italian machines), has a productive potentiality of 70.0000- 80.000 sq ft per day. The existing tannery, 20% of production is full grain while the remaining 80% is more or less buffed, depending on natural faults.

Turnover from 2000 to 2003, in US \$, constantly growing year after year, has doubled:

Year 2000	US \$ 295.000
Year 2001	US \$ 409.000
Year 2003	US \$ 534.000
Year 2004	US \$ 623.000

Raw material quality and type

Tannery uses 50% domestic salted green bovine hides and 50% hides from USA. USA hides are of a superior quality and are mechanically flayed, while Vietnamese ones present the usual faults we have seen in other Vietnamese tanneries. On average they work 20-23 kilograms hides and occasionally also buffalo ones.

Produced articles and their characteristics

20% of production is made of full grain upper of middle softness. 50% is slightly buffed and 30% is strongly buffed and embossed, depending on natural faults of leathers.

These articles are produced with a thickness of 0,8 mm up to 2,2 mm. Occasionally Napa (a very soft article) for uppers, springy leathers for belts, 3.5 mm thick, nubuck, pull up and also suede splits.

Articles are produced only in three colours: black (in bigger quantity), white and brown.

Finished product's quality is the following one:

First quality	20 %
Second quality	50 %
Third quality	30%

1 sq ft of first quality article costs US \$, 1, 7 of second quality US \$, 1, 5 of nubuck US \$ 2, 0 and of suede split US \$ 0, 56.

Quality of produced articles, in the three different colours and with different thickness is quite good according to Vietnamese market. Yet considering quality with more attention, as noticed by the same owner of the tannery, leather presents a series of nuisances, deriving from an inadequate command of production techniques. There's no ability in varying articles, no sensibility and no fantasy in realizing fashionable articles, naturally happening in the Italian tanneries. Company's owner has understood this gap and wishes his technicians to attend training courses and to have more contacts with foreign technicians.

Selling markets

70% of the produced articles are sold in the domestic (regional and interregional) market and the remaining 30% is exported to Taiwan.

Working days

Yearly working days are 312; daily working hours are 8, exceptional cases permitting.

General conditions of premises

Covering a 5.000 sq mt area, tannery is made of two different productive departments; far a few meters each other. One department carries out beam house, tannage, dyeing, fat liquoring and drying. The other one carries out finishing processes. Venues are substantially suitable to tanning manufacturing cycle.

Raw material storehouse covers a 150 sq mt area and faces directly a factory building used for wet processing.

Having no refrigerating system, stocking temperatures are too high to correctly preserve raw materials.

Wet processing department covers a 3.000 sq mt area.

Drying department lies on a mezzanine. The other productive department includes either finishing or chemical products' storehouse, offices and a finished products' storehouse covering a 1.500 sq mt overall area.

Premises are all located near the city centre. Tannery has no water wastes treatment plant; wastes are directly emptied in the public sewers.

Raw materials

Stocked raw materials quantity covers the production of 2/3 working weeks.

As said before, during stocking leathers suffer temperatures higher than the ones normally expected for a safe preservation of hides and skins.

Chemical products supplying

Chemical products are mostly imported. They must therefore stock substantial quantities to cover some months. Chemical suppliers are BASF, Bayer, ICI and Stahl. No Italian auxiliaries are used.

Technological innovation, research and development

Yet being a very important tannery in the industrial Vietnamese situation, it doesn't have any modern technology, either referring to chemical products or referring to machines, which favours quality improvement, a better working organization and a reduction of transformation costs.

Technicians don't have any high training degree in leather techniques. With activity moving to the new industrial park, tannery will have the possibility, as owner said, of acquiring a higher technological degree, beginning from the application of clean technologies.

The new tannery, opportunely equipped with modern plants, will become a model enterprise in Vietnam in the next future; an example to be followed for Vietnamese tanning industry development.

At present, nevertheless, research and the reduction of transformation costs for chemical products' control, according to international provisions (control and possible elimination from leathers of forbidden chemical substances), are neither considered nor acknowledged. In the next future Training Courses are indispensable for technicians and workers.

Quality control

Quality control on finished product, completely inadequate, limits itself to some dynamometrical resistance tests.

Even the simplest tests aren't performed, like, for example, resistance to contraction in water at 100 °C of leather after chromium tannage.

Water consumption

Water consumption is about 500 cubic mt per day: that means 35 litres for each kilograms of processed leather, from hide to finished product.

Such consumption, according to the above mentioned processes, is in accordance with European standard.

Weak points

- Factory structural lack (productive structures separated one another, located in the city centre, irrationality in the lay out of the different departments).
- Difficulties, at present, of introducing any shrewdness to reduce environmental impact.
- Lack of sufficient technological and basic organizational notions.
- Necessity of expanding number of customers on the domestic market.
- Necessity of enlarging and updating machines to briefly improve production to 35.000 sq ft per day.
- Inexistent quality control on finished product.
- Technicians' and labours' training not comparable to the one of the developed countries.
- Propaganda and participation to events to be intensified.

Strong points

- Great growth of Vietnamese footwear industry.
- The certain delocalization in the new tannery (big, modern and rational) under construction in HO CHI MINH CITY industrial park.
- A good image.
- Available funds and liquidity.
- Low cost labour.
- Low cost energy.

Human resources

Company organization chart is structured as follows:

- General manager (the owner)
- Technical manager
- Sales manager
- Marketing head
- Trade manager
- Accounting manager
- Head of plants maintenance
- Heads of production department: N. 7
- Beam house, tanning, post-tanning workers: N. 45
- Drying, pre-finishing workers: N. 60
- Finishing workers: N. 70

Total employers: 189

According to production, it's a totally disproportionate number of people. However, it is to say that wage before-tax is US \$ 74 per month.

General conditions of premises

Range of machines (although some of them are second hand and reconditioned) is quite complete if compared to other Vietnamese tanneries.

Drums, made in Vietnam, have no devices to control temperature.

There are many machines made in Italy. At time of delocalization, company must surely complete the number of its machines to set production to potentiality of the new tannery.

Owner declares his intention of contacting most of all Italian manufacturers.

Present equipment appears as follows:

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Paddle	8			Vietnam
	Drum	6	3,0 x 3,5 m	Good	Vietnam
	Fleshing machine	1	3,0 m	New	Czech Rep.
	Fleshing machine	2	3,0 m	Old	Czech Rep.
	Splitting machine for pelt	3	2,7 m	New	Czech Rep.
TANNAGE	Drum	6	3,0 x 3,0 m	Good	Vietnam
	Felt press	1	3,0 m	New	Italy (3P)
	Splitting machine	1	3,0 m	New	Italy (Mosconi)
	Shaving machine	3	1,7 m	Reconditioned	Italy (Rizzi)
DYEING FAT LIQUORING	Drum	12	2,5 x 2,2 m	Good	Vietnam
	Over head	2	3,0 m	New	Italy (Rizzi)
	Vacuum	2	3 levels	Reconditioned	Italy (Cartigliano)
PRE-FINISHING FINISHING	Staking machine	1	2,3 m	Reconditioned	Italy (Cartigliano)
	Staking machine	1	2,3 m	Reconditioned	Italy (Baggio)
	Buffing machine	1	2,1 m	New	Italy (Ficini)
	Buffing machine	1	1,7 m	New	Czech Rep.
	Brushing machine	3	1,8 m	New	Italy (Baggio)
	Automatic spraying machine	1	1 booth 13 m	New	Thailand
	Roll coater	1	2,1 m	New	Italy (Gemata)
	Roll coater	1	1,8 m	New	Italy (Cartigliano)
	Embossing press	3	850 tons	Reconditioned	Italy
Ironing machine	1		New	Italy (Mostardini)	
Measuring machine	2		New	Vietnam	

Maintenance and safety

Ordinary maintenance is made internally. Problems regard the extraordinary one, since in Vietnam there are no machine shops able to carry out maintenance.

In case of need and when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activity are the following:

- Delocalization in the industrial park.
- Application of clean technologies (chemical processes, recovery and recycling of most polluting wastes).
- Basic technological training.
- Improvement of the number of machines with modern and productive plants.
- Improvement of articles quality.
- Diversification and extension of finished articles range according to market and fashion trend.
- Technological innovation.
- Quality control according to market requests.
- Improvement of production according to the new productive structure and to employers' number.

Company's owner has explicitly asked for the cooperation of Italian experts to achieve the above mentioned targets. He is moreover intentioned in contacting Italian manufacturers of tanning machines and producers of water wastes treatment plants.

TIEN THANH TANNING FACTORY

**38/16 Au Co Street, Ward 9, Tan Binh District
HO CHI MINH CITY**

Tel: 0084 8 8603442

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Presentation

It is a very small tannery, covering a 180 sq mt area and employing 5 workers. It is in the city centre and empties its wastes directly in the public sewers.

With its crumbling premises, this tannery accurately represents, in its main characteristics, many Tan Binh District tanneries.

Delocalization project, brought about by Vietnamese Government, chiefly concerns this kind of companies; Government wants to make such project be feasible encouraging these small entrepreneurs with tax concessions and different financial helps.

Mr. Quoc Vy, company's owner, is intended to transfer its activity to the new industrial park, expressly structured for small enterprises.

At present, daily production consists in 700 kilograms bovine hides, equivalent to about 900 sq ft leathers for footwear, low quality embossed.

Actually, manufacturing cycle is formed by beam house, tannage and dyeing, while drying and finishing are made by sub-constructors.

Therefore company has a limited number of very old, obsolete and really worn out equipments.

There's neither fleshing nor splitting machine. Hides are shaved before soaking. Such method obviously doesn't produce any split.

Raw material quality

Tannery uses low quality domestic salted green hides, manually flayed, characterized by many natural faults due above all to scratches and worm-holes. Flesh side presents deep notching caused by flaying. Middle class weight is 22-25 kilograms. Raw material poor quality is documented as follows:

First quality	0%
Second quality	60%
Third quality	30%
Fourth quality	10%

Raw material suppliers are very limited (2).

Produced articles and their qualitative characteristics

Tannery produces a low quality article. It is leather hardly embossed to disguise faults and is dyed in black. Selling price, related to quality, doesn't exceed 1, 2 US \$/sq ft

Sales market

Finished leathers are sold on the domestic market and are paid at delivery. Finished leather sales are generally growing in Vietnam, but are static in this tannery.

Working days

Yearly working days are 280; daily working hours are normally 8, exceptional cases permitting.

General conditions of premises

Premises, covering a 180 sq mt area, are inappropriate to usual tanning production. Venues are cramped and unhealthy; handling of goods from one department to the other one is irrational and laborious. Raw materials are stocked anyhow in the working areas. Stocking temperatures are too high to assure the correct preservation of materials. Wet department covers a 150 sq mt area. Here soaking, tannage, retannage and dyeing take place.

Chemical products have no warehouse. Premises are close to a road in the city centre. Finished products have no warehouse. There's no machine shop able to carry out machines' ordinary maintenance; there's no reliable steam generator.

Chemical products supplying

Chemical products, scattered anywhere in the tannery, covers the production of one week. Chemical products are made in Italy (Silvachimica), France (ATC), Germany (BASF), Switzerland (Clariant), Holland (Smith and Zoon).

Technological innovation, research and development

In this contest it is hard to talk about technological innovation or even about research and development. Basic knowledge of Tanning Chemistry and essential machines to normally carry out manufacturing processes are inexistent.

Aspects, normally belonging to business in technologically advanced countries, like clean technologies, research to reduce transformation costs, chemical products control, quality improvement according to international set of rules (control and possible elimination from leather of forbidden chemical substances) are neither taken into consideration nor acknowledged as information.

First of all training courses for all employers, from technicians to workers, are indispensable.

Water consumption

Water consumption is about 25-30 cubic mt per day: that means 35-40 litres for one kilogram of processed leather, from raw material to finished product.

Weak points

- Factory structural lack (small dimensions, located in the city centre, crumbling venues).
- Difficulties, at present, of introducing any shrewdness to reduce environmental impact.
- Lack of basic notions.
- Inexistent quality control on finished product.
- Lack of liquidity.

Strong points

- Vietnamese footwear industry in great expansion.
- Owner's intention to move to the new HO CHI MINH CITY industrial park.

General conditions of equipment

Tannery has only three worn out Vietnamese drums, where beam house, tannage and dyeing operations are carried out. It also has three small shaving machines with 30 cm opening. To carry out the above mentioned operations, there's neither fleshing or splitting machine nor press. Drying and finishing are carried out by sub-constructors.

Maintenance and safety

Ordinary maintenance is not carried out, due to the small number of machines. Safety at the workplace and at machines presents very serious deficiencies. Personal protection devices and proper signs of danger are absent. Working place structure and shortage of space cannot grant the essential safety conditions.

Conclusions

The following operations are suggested:

- Delocalization in the industrial area.
- Updating and increase of the number of machines.
- Basic technological training.
- Application of clean technologies (chemical processes and recovery and recycling of most polluting wastes).
- Improvement of articles quality and their diversification and extension according to market and fashion trends.

- Quality control according to customer exigencies.
- Production increase according to new manufacturing structure efficiency.

HOA KY TANNERY FACTORY

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Presentation

According to present Vietnamese tanning situation, this enterprise can be considered a middle one.

It actually extends on a 2000 sq mt covered area, with 35 employers. However premises, where the whole tanning production cycle from raw material to finished product is carried out, are quite new, well designed and present characteristics suitable to a tannery.

Company is quite appropriately equipped, has efficient machines, even if largely second hand or reconditioned ones and without any fleshing machine. Mechanical operations like setting out and vacuum are made by sub-constructors; afterwards leathers come back to tannery to be dried and finished. Activity set up in 1994. Daily production, about 6.000 sq ft bovine hides destined to uppers and linings, corresponds to about 4.500 kilograms.

Seeing the growing demand of finished leather, enterprise sets itself to gradually improve production up to double it in quite short times. For the last 4 years (from 2000 to 2003) production has been quite significantly increasing. According to Mr. Cam Chanh Hung, owner of the company, prospects for the next future are very promising, basing on many market trends. Such prospects induce him building a new tannery in the new industrial park Hiep Phuoc in HO CHI MINH CITY. The new settlement, with a clearly superior productive potentiality, will be equipped with modern machines and facilities.

The present productive structure is in the city centre and empties wastes directly in the public sewers, without pre-treating them.

Raw material quality and type

Tannery uses Vietnamese and Cambodian salted green bovine hides. The first ones are better than the second ones. However hides are manually flayed. Cuts on the flesh side, typical of such flaying system, compromise split, deriving from splitting operations after chromium tannage. Middle class weight is included between 25 and 28 kilograms, while quality is expressed as follows:

First quality	20%
Second quality	50%
Third quality	30%
Fourth quality	0%

Raw material price swings, according to quality, from 0, 75 to 0, 94 US \$. Raw material is bought from a very limited number of local suppliers. Generally it is paid cash at delivery.

Produced articles and their qualitative characteristics

80% of produced leathers are destined to uppers, 20% to linings. Footwear articles can be classified as follows:

Full grain (various thicknesses)	1,2-1,4 mm, 1,4-1,6 mm, 1,6-1,8 mm, 1,8-2,0 mm
Corrected grain	1,2-1,4 mm, 1,4-1,6 mm, 1,6-1,8 mm, 1,8-2,0 mm
Buffed and embossed	1,2-1,4 mm, 1,4-1,6 mm, 1,6-1,8 mm, 1,8-2,0 mm
Fat liquored Nubuck	1,4-1,6 mm, 1,6-1,8 mm
Pigmented and suede splits	various thicknesses

Full grain, owing to low quality raw material, doesn't exceed 10-15% of the whole production.

Articles, in a very limited range and dyed mostly in black, present a series of qualitative limits.

The most significant among them are the inability of diversifying articles and the lack of sensibility, taste and fantasy of setting up new products able to satisfy fashion requests. Basic technical training is besides very inadequate.

Selling markets

Leathers are chiefly sold on the domestic market. A small quantity is exported to Taiwan.

Working days

Yearly working days are 350; daily working hours are 8, exceptional cases permitting.

General conditions of premises

Tannery covers in all a 2.000 sq mt area. It has a wet processing department (beam house, tannage, retannage and dyeing) of 500 sq mt, where raw materials are stocked. A second shed, 1.350 sq mt., is used for mechanical operations subsequent to tannage (sammying, shaving, splitting), drying (staking, toggling) and finishing (ironing). Connected to this shed, there's a 150 sq mt. department, where buffing and brushing operations take place. Upstair, drying (on wood sticks) and finishing operations take place. Vacuum and setting out are made by sub-constructors. It is easy to comprehend how handling of leathers, due to an irrational lay out of machines, is costly and uneconomical. There's no chemical products' warehouse; they lay anyhow in the different departments.

Raw materials

Quantity of stocked raw material covers to the utmost the production of 2/3 working weeks. During stocking, hides are exposed to temperature higher than the ones normally expected for the correct preservation of materials.

Chemical products supplying

Chemical products chiefly used in the tannery are from BASF, Stahl, Smith and Zoon, Clariant, ATC and from some Italian companies like Silvachimica and Soda. Auxiliaries come from local agencies with storerooms, representing the above mentioned companies. Quantitatively consistent products come from branches generally present in close countries (China, Thailand).

Technological innovation, research and development

Tannery has no modern chemical technologies allowing quality improvement, transformation costs' reduction and a lower environmental impact of water wastes. Technicians don't have a sufficient training on leather techniques.

Moving activity to the new industrial park, tannery will surely have greater possibilities of acquiring a higher technological level. At present, however, research for transformation costs' reduction, for chemical products' control, for quality improvement according to international set of rules (control and possible elimination from leather of forbidden chemical substances) are neither taken into consideration nor acknowledged as information.

Quality control

Quality control on finished product is completely inexistent. Not even the simplest tests are performed.

Acquisition of modern technological background must necessarily pass through the training of technical management and managers.

Water consumption

Water consumption is about 200 cubic mt per day, which is about 43 litres for each kilogram of leather, from raw material to finished product. It is a rather high consumption according to produced leathers and to the characteristics of production cycle.

Weak points

- Structural lacks of the building (located in the city centre)
- Irrationality in the lay out of machines
- Low quality articles
- Limited range of articles
- Deficiency of sufficient technological and basic organizational knowledge.
- Difficulty, in the present situation, of introducing any measure to reduce environmental impact.
- Widen number of customers on the domestic market
- Necessity of widen and modernize number of machines to improve production according to enterprise's intentions.
- Inexistent quality control on finished product.
- Inadequate preparation of technicians and labour

Strong points

- Great growth of Vietnamese footwear industry.
- Good image.
- Availability of liquidity.
- Low cost labour.
- Low cost energy.

Human resources

Company organization chart is structured as follows:

- General and trade manager (the owner)
- Technical manager
- Accounting manager
- Wet operations manager (beam house, tannage, retannage, dyeing)
- Pre-finishing manager
- Finishing manager
- Head of plants maintenance: N. 2
- Wet department workers: N. 7
- Pre-finishing workers: N. 11
- Finishing workers: N. 9

Total employers: 35

It's a totally disproportionate number of people according to European tanneries standard. However, it is to say that before-tax wage is 74 US \$ per month.

General conditions of equipment

Machines, some of which from Italy, are all second hand, reconditioned. Number of machines, even though modest and outdated, is however considerably more complete and efficient than other Tan Binh District enterprises.

Tannery has no fleshing machine. Recently tannery has bought a second hand automatic spraying machine with one booth (Carlessi), in phase of installation.

Drums, made in Vietnam, have no devices to control temperature.

Present equipment appears as follows:

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Paddle	2			Vietnam
TANNAGE	Drum	2	3,0x3,5 m	Good	Vietnam
	Rotary press	1	1,5 m	Reconditioned	Czech Republic
	Splitting machine	1	1,8 m	Reconditioned	Taiwan
	Shaving machine	2	1,5 m		China
		1	2,0 m	Reconditioned	Italy (Poletto)
		1	0,6 m		Taiwan
DYEING FAT LIQUORING	Drum	2	2,0 x 1,8 m		Vietnam
PRE-FINISHING	Staking machine	1	2,4 m		Italy (Baggio)
	Band toggling machine	1			Taiwan
	Buffing machine	1	1,0 m	Obsolete	China
	Brushing machine			Obsolete	Vietnam
FINISHING	Spraying machine	2			
	Automatic spraying (in phase of installation)	1	1 booth	Reconditioned	Italy (Carlessi)
	Roll coater (in phase of installation)	1	2,2 m	Reconditioned	Italy (Rollmac)
	Measuring machine	1			Vietnam
	Embossing and ironing press	2	850 tons		Japan

* Vacuum and setting out operations are made by sub-constructors.

Maintenance and safety

Ordinary maintenance is made internally. As for extraordinary one, when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for improvement and development of business activity are the following:

- Delocalization in the industrial park.
- Improvement of the range of machines with modern and productive plants.
- Basic technological training.
- Improvement of articles quality.
- Diversification and extension of finished articles range according to market and fashion trend.
- Application of clean technologies (chemical processes, recovery and recycling of some wastes).
- Technological innovation.
- Quality control according to market requests.
- Improvement of production according to the new productive structure and to employers' number.

BA HUNG TANNERY FACTORY

**38/17 Au Co St., W. 9, D. Tan Binh
HO CHI MINH CITY**

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Presentation

Tannery presents the same problems of other small tanneries of Tan Binh District. It covers a 400 sq mt area, with 12 employers and carries out the whole manufacturing cycle of bovine hides for footwear from raw material to finished product.

Vacuum, setting out and drying operations are made by sub-constructors.

It produces about 1300 sq ft per day, corresponding to a daily production of 1.000 kilograms.

In short, aspects characterizing tannery are the following:

- Located in the city centre.
- No water waste treatment plant.
- Obsolete and limited range of machines (there's neither a fleshing nor a splitting machine).
- Crumbling premises, inadequate for tanning processes.

In spite of such serious limits, enterprise has registered in the last years a notable increase of its business. From 2000 to 2003 it gradually increased its production up to double it. It is clear that tannery will have to move to the new industrial area in HO CHI MINH CITY. Company's owner, Mr Lin Hung Di, is deeply convinced of it, so much so that he is building a new 3.000 sq mt tannery in Hiep Phuoc Industrial Park, in which he intends to install new machines. Enterprise reveals vitality, showed also by recent investments to buy some new machines.

Raw materials quality

Tannery only uses domestic salted green hides and skins, whose class weight is included between 25 and 28 kilos.

Average purchase price is 0,95 US \$.

Selection provides on average the following data:

First quality	0%
Second quality	70%
Third quality	30%
Fourth quality	0%

Tannery produces a buffed article, so that natural faults of leather like scratches or the presence of superficial damages due to bugs have a relative importance.

Produced articles and their qualitative characteristics

Tannery only produces a buffed, embossed article for footwear in three colours (above all black), to all thicknesses between 1, 5 and 2, 0 mm.

Qualitative defects are the following:

- Insufficient grain tightness, above all where leather is flabbier.
- Lack of roundness and softness.
- Presence of wrinkles all over leather's surface.
- Unsatisfactory look for finishing.
- Split, an important element for the economy of a tannery, is not derived because tannery doesn't carry out splitting operation. Lack of innovation and of initiative to enlarge articles range is to be underlined. It is absurd for a tannery to produce one single article.

Selling markets

Finished product is sold to many customers on the domestic market to an average price of 1, 3 US \$. Either raw material purchase or finished products selling are regulated by deferred payments.

Working days

Yearly working days are 300; daily working hours are normally 8, exceptional cases permitting.

General conditions of premises

Venues are not suitable for the normal tanning manufacture; handling of goods from one area to the following one is irrational and arduous. Storage temperatures are too high to assure the correct preservation of hides.

There's no warehouse for chemical products. The building is located in the city centre. There's no water waste treatment plant; wastes are emptied in the public sewers. There's no warehouse for finished products, no machine shop to provide any ordinary maintenance, no reliable steam generator.

Quality control

Quality control is completely absent.

Chemical products supplying

Quantity of chemical products covers the production of about one week.

Technological innovation, research and development

In this context it is hard to talk about technological innovation or even about research and development. Basic knowledge of Tanning Chemistry and essential machines to normally carry out manufacturing process are inexistent.

Aspects, normally belonging to business in technologically advanced country, like clean technologies, research to reduce transformation costs, chemical products control, quality improvement according to international set of rules (control and possible elimination from leather of forbidden chemical substances) are neither taken into consideration nor acknowledged as information.

First of all training courses for all employers, from technicians to workers, are indispensable.

Weak points

- Structural lacks of the building (small dimensions, in the city centre, irrationality in working departments).
- Impossibility, in the present situation, of introducing any measure to reduce environmental impact.
- Deficiency of sufficient technological basic knowledge.
- Lack of fundamental machines for manufacturing process
- Inexistent quality control on finished product.
- Technicians and workers training not comparable to technologically advanced countries.
- Scarce tendency to invest or lack of liquidity
- Practically inexistent business network, publicity and participation to events.

Strong points

- Great growth of Vietnamese footwear industry
- Enterprise's intention of delocalizing in the new HO CHI MINH CITY industrial park.
- Low cost labour.
- Low cost electric energy.

Maintenance and safety

Ordinary maintenance is made internally. As for extraordinary one, when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

General conditions of equipment

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Drum	2	3,0 x 2,5 m	New	Vietnam
TANNAGE	Drum	1	3,0 x 2,5 m	New	Vietnam
	Shaving machine	3	30 cm	Worn out	China
RETANNAGE FAT LIQUORING	Drum	2	2,2 x 2,0 m	Worn out	Vietnam
PRE-FINISHING FINISHING	Staking machine	1	2,0 m	Reconditioned	Italy (3P)
	Staking machine	1	1,8m	Reconditioned	Czech Republic
	Buffing machine	1	1,8m	New	Taiwan
	Spraying machine	1			
	Press	1	850 tons		Italy

* Vacuum and setting out operations are made by sub-constructors.

Suggestions for improvement

Gradual phases for the improvement and the development of business activity are the following:

- Delocalization in the industrial park
- Improvement of the number of machines with modern and productive plants
- Basic technological training
- Improvement of articles quality
- Diversification and extension of finished articles range according to market and fashion trend.
- Application of clean technologies (chemical processes, recovery and recycling of some wastes)
- Quality control.
- Improvement of production according to the new productive structure and to employers' number.

TRAN BAI HUE TANNERY FACTORY

**36/10 Au Co St., W. 9, D. Tan Binh
HO CHI MINH CITY**

Tel: 0084 8 8657406

Fax: not available

Presentation

It is a very small tannery located in the city centre, covering a 200 sq mt area. It has a very limited production, equal to 300 kilograms of bovine hides per day. Besides, production is not daily. There are 5 employers. Equipment is made of two drums, 3, 0 m x 3, 0 m and of one shaving machine with an opening of 40 cm.

It will be hard, or even impossible for the tannery to deal with delocalization and all charges it involves.

Raw material quality

Tannery uses domestic salted green hides, whose class weight is included between 25 and 28 kilos.

Selection provides on average the following data:

First quality	0%
Second quality	50%
Third quality	30%
Fourth quality	20%

Produced articles and their qualitative characteristics

Tannery only uses a buffed and embossed article for footwear in two colours (above all black) with all thicknesses between 1, 5 and 2, 0 mm.

Qualitative defects are many-faceted, from loosed grain to the presence of wrinkles all over the surface of leather.

Talking about technological innovation, research and development, quality control is not proper.

Selling price

Finished product is sold to a few customers on the domestic market to an average price of 0, 9 US \$. Either raw material purchase or finished products selling are regulated by deferred payments.

Working days

Yearly working days are 260; daily working hours are normally 8, exceptional cases permitting.

The unsuitable equipment of the tannery was analyzed in the foreword.

Prospects for the future

General structure, machines, production let us think that tannery has no possibility of dealing with problems linked to delocalization.

NGAU KY TANNERY FACTORY

**39/5 Au Co St., W. 9, D. Tan Binh
HO CHI MINH CITY**

Tel: 0084 8 8653791

Fax: not available

Presentation

Tannery was founded in 1990. It covers a 500 sq mt. area with 11 employers. Its production is about 1.400 sq ft per day, equal to 1.100 kilograms. It is located in the city centre and has no water wastes treatment plant; wastes are emptied directly in the public sewers.

As for many Vietnamese tanneries, machines range is incomplete. There is neither the splitting nor the fleshing machine and machines are almost obsolete. Premises are not suitable for tanning manufacturing. In spite of such serious limits, enterprise has registered a notable increase of its business. Company's owner intention is to move to the new industrial park.

Raw material quality

Tannery only uses domestic salted green hides of a fairly good quality, whose class weight is about 25. Average purchase price is about 1, 0 US \$.

Selection provides on average the following data:

First quality	15%
Second quality	20%
Third quality	30%
Fourth quality	35%

Leather, suitable for the production of full grain, is derived from first quality product and from one part of the second one

Produced articles and their qualitative characteristics

Tannery produces the following articles, all destined to footwear:

Full grain	mm 1,6/1,8	20-30%
Embossed full grain	mm 1,8/2,0	40%
Buffed	mm 1,4/1,6	30-40%

Articles, that can be smooth or dry milled, are produced in several colours, depending on market characteristics.

Qualitative characteristics of the articles, according to local average, are fairly good.

Split, an important element for the economy of a tannery, is not derived because company doesn't carry out any splitting operation (it has no splitting machine). Once more the narrowness of articles' range must be underlined.

Selling prices

Finished product is sold to many customers only on the domestic market, to an average price of 1, 5 US \$. Either raw material purchase or finished products selling are regulated by deferred payments.

Working days

Yearly working days are 300; daily working hours are normally 8, exceptional cases permitting.

General conditions of premises

Venues are not suitable for the normal tanning manufacture; handling of goods from one area to the following one is irrational and arduous. Storage temperatures are too high to assure the correct preservation of hides.

There's no warehouse for chemical products. The building is located in the city centre. There's no water waste treatment plant; wastes are emptied in the public sewers. There's no warehouse for finished products, no machine shop to provide any ordinary maintenance, no reliable steam generator.

Quality control

Quality control is completely absent.

Chemical products supplying

Quantity of chemical products covers the production of about one week.

Technological innovation, research and development

In this contest it is hard to talk about technological innovation or even about research and development. Basic knowledge of Tanning Chemistry and essential machines to normally carry out manufacturing process are inexistent.

Aspects, normally belonging to business in technologically advanced country, like clean technologies, research to reduce transformation costs, chemical products control, quality improvement according to international set of rules (control and possible elimination from leather of forbidden chemical substances) are neither taken into consideration nor acknowledged as information.

First of all training courses for all employers, from technicians to workers, are indispensable.

Weak points

- Structural lacks of the building (small dimensions, in the city centre, irrationality in working departments).
- Impossibility, in the present situation, of introducing any measure to reduce environmental impact.
- Deficiency of sufficient technological basic knowledge.
- Lack of fundamental machines for manufacturing process
- Inexistent quality control on finished product.
- Technicians and workers training not comparable to technologically advanced countries.
- Scarce tendency to invest or lack of liquidity
- Practically inexistent business network, publicity and participation to events.

Strong points

- Great growth of Vietnamese footwear industry
- Enterprise's intention of delocalizing in the new HO CHI MINH CITY industrial park.
- Low cost labour.
- Low cost electric energy.

Water consumption

Water consumption is about 40 cubic mt per day: that means 37 litres for one kilogram of processed leather, from hide to finished product.

Chemical products supplying

Chemical products come from European enterprises: Smith and Zoon (Holland), Clariant (Switzerland), ATC (France), Stahl (Holland), BASF (Germany), Alpa (Italy).

General conditions of equipment

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Paddle	1			Vietnam
	Drum	1	2,5x2,0 m		Vietnam
TANNAGE	Drum	3	2,5x2,0 m		
	Shaving machine	7	30 cm	Worn out	China
	Press	1	1,2 m		Taiwan
RETANNAGE FAT LIQUORING	Drum	3	2,2x2,0 m	Worn out	Vietnam
DRYING	Setting out	1	2,2 m	Reconditioned	Italy
	Vacuum	1	3 levels	Reconditioned	Holland
PRE-FINISHING	Staking machine	1	2,0 m	Reconditioned	Unknown
FINISHING	Buffing machine	1	60 cm	Worn out	Taiwan
	Press	1	850 tons	Reconditioned	Korea
	Manual spraying	1			

Maintenance and safety

Ordinary maintenance is made internally. Extraordinary maintenance is very difficult because Vietnam has no machine shop able to do it. In case of need, when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activities are the following:

- Delocalization in the industrial park
- Improvement of the number of machines with modern and productive plants
- Basic technological training
- Improvement of articles quality
- Diversification and extension of finished articles range according to market and fashion trend.
- Application of clean technologies (chemical processes, recovery and recycling of most polluting wastes)
- Quality control
- Production increase according to the new productive structure and with the number of employers.

DANG TU KY TANNER FACTORY

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Presentation

As for the Vietnamese tanning situation, this is considered a big enterprise. It produces about 30.000 sq ft per day, equal to 21-22 tons. It covers a 1.600 sq mt area, with 60 employers. During the last four years, production trend has positively grown. Export grew from 15% in 2000 to 30% in 2003. It is then an emerging tannery. It is located in the city centre. That's the reason why it is moving to an industrial park about 40 km far from the city centre.

The new productive structure is almost ready; as the expert noticed during his visit, beam house and tannage department have already began working.

The new productive plant covers a 22.000 sq mt area, with some space available in front of it. With a completely horizontal extension, tannery, once structured with adequate machines (it is already negotiating the purchase of many machines), will have a big productive capability (70/80.000 sq ft per day). Company's owner, Mr. Dang Quoc Cuong, who accompanied the expert during his visit, has expressed his intention of furnishing his enterprise with modern and rational plants, with a great productive capability.

He is moreover conscious of the necessity of applying clean technologies and of pre-treating water wastes, before they go to the centralized purification plant.

Mr. Dang Quoc Cuong is inclined to ask for the cooperation of Italian experts to set up low impact environmental processes and to contact constructors of recovery and recycling plants, as well as enterprises specialized in building and/or furnishing components for treatment plants.

Raw material quality and type

70% are domestic salted green hides; the remaining 30% comes from USA. The last ones are of a higher quality and are mechanically flayed, while Vietnamese ones present the same defects as other Vietnamese tanneries.

Side leather surface is on average distributed as follows:

from 20 to 30 sq ft	10 %
from 15 to 20 sq ft	15 %
from 11 to 16 sq ft	25 %
from 10 to 14 sq ft	50 %

Selection, based on defects, gives the following percentages:

First quality	40%
Second quality	25%
Third quality	25%
Fourth quality	10%

Produced articles and their qualitative characteristics

40-50% of the production is made by full grain, middle softness uppers; 20-30% is made by nubuck articles and 20-40% by buffed articles, more or less imitation grain embossed or with a bigger grain.

Tannery also produces buffed box. These articles are produced in all thicknesses from 0, 8 mm to 2, 2 mm. Splits are sold in wet-blue.

Finished product's quality is fairly good for this market, also being articles' range limited.

Finally sensibility and fantasy to realize articles able to follow fashion trend is weak.

Selling market

70% of the produced articles are sold to the domestic (regional and interregional) market, while 30% are exported to Taiwan and to other Asian countries.

Working days

Yearly working days are 350; daily working hours are normally 8, exceptional cases permitting.

General conditions of premises

Tannery covers in all a 1.600 sq mt area. Working place is substantially suitable for tanning manufacturing cycle, even if there are many separated and irrationally located departments.

There's no specific warehouse for hides; they are stoked in the wet department, to room temperature, taking chances of damaging their quality.

Beam house, tannage, retannage, setting out and vacuum operations take place in separated departments on the ground floor, while drying and finishing take place on the first floor. Tannery has no water wastes treatment plant; they are emptied in the public sewers.

Raw materials

Quality of stocked hides covers at the most the production of 2-3 working weeks. As said before, hides are exposed to much higher temperatures than the ones normally provided for their safe preservation.

Chemical products supplying

Chemical products are mostly bought abroad. Therefore tannery must stock big quantities to cover production times. Most used products are made by BASF, Bayer, ICI and Stahl. There are no auxiliaries made in Italy. Chemical products are stocked anyhow in the tannery.

Technological innovation, research and development

Even though being an important tannery in the industrial Vietnamese situation, there are no modern technologies neither from a chemical point of view nor from a plant engineering point of view, allowing to improve quality, to better working organization and to reduce transformation costs.

Technicians are not adequately trained in leather techniques. Moving activity to the new industrial park, tannery will have the possibility of buying a higher technological level, beginning from clean technologies, as declared by company owner.

The future tannery, opportunely equipped with modern plants, can represent, in the next future, a Vietnamese "model enterprise", an example to be followed for the development of the tanning industry.

At present, however, the research for transformation costs, for chemical products' control, for quality improvement according to international provisions (control and possible elimination of forbidden chemical substances from leathers), are neither considered nor acknowledged as information.

Training courses for employers of all levels (from technicians to workers) are to be considered essential.

Quality control

Quality control on finished product is definitely inadequate.

Water consumption

Water consumption is about 600-700 cubic mt per day, equal to 35 litres of water for each kilogram of processed leather, from raw material to finished product.

Weak points

- Factory structural lack (located in the city centre, irrationality in lay out of processing department).
- Difficulties, at present, of introducing any shrewdness to reduce environmental impact.
- Lack of basic technological and organizational notions.
- Improve number of domestic customers.
- Necessity of improving and organizing the range of machines.
- Inexistent quality control on finished product.
- Training courses for technicians and labour not comparable to the one of developed countries.

- Propaganda and participation to events to be intensified.

Strong points

- Great growth of Vietnamese footwear industry
- Certain delocalization in the new tannery (big, modern and rational), under construction, in the new industrial park in HO CHI MINH CITY.
- Good image
- Liquidity availability
- Low cost labour
- Low cost energy

Human resources

Company organization chart is structured as follows:

- General manager (the owner)
- Technical manager
- Sales manager
- Marketing manager
- Trade manager
- Accounting manager
- Head of plants maintenance
- Heads of production department: N. 3
- Beam house, tannage, post-tannage, pre-finishing, finishing: N. 60

Total employers: N. 70

General conditions of premises

The range of machines, according to productive exigencies and compared to other Vietnamese tanneries, is quite complete. Drums, made in Vietnam, have no automatic devices for temperature control. There are many machines made in Italy.

At time of delocalization, company must surely complete its machines to upgrade production to potentialities of the new enterprise. Company owner confirms his intention of contacting above all Italian manufacturers of machines.

Present equipment appears as follows:

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Drum	2	3,5 x 3,0 m	Good	Vietnam
	Fleshing machine	1	2,80 m	Good	Czech Rep.
	Pelt splitting machine	1	3,0 m	Good	Czech Rep.
TANNAGE	Drums	5	3,0 x 3,0 m	Good	Vietnam
	Sammying machine	1	3,0 m	Good	Taiwan
	Shaving machine Shaving machine	1 1	1,30 m 2,20 m	New Good	Taiwan Taiwan
RE-TANNAGE FAT LIQUORING	Drums	6	2,80 x 2,5 m	Good	Vietnam
	Splitting machine in blue	1	2,80 m	Good	Taiwan
DRYING	Setting out	2	3,0 m	Good	Taiwan
	Vacuum	1	2 levels	Reconditioned	Italy (Cartigliano)
		1	2 levels	Reconditioned	Italy (Escomar)
PRE- FINISHING FINISHING	Staking machine	1	3,0 m	Good	Taiwan
	Band toggling machine	1		Good	Taiwan
	Automatic spraying	1	1 booth	Good	Taiwan
	Roll coater for impregnation	1	2,8 m	Good	Taiwan
	Roll coater	1	3,0 m	Good	Rep. of Korea
	Roll coater	2	3,0 m	New	Italy (Gemata)
	Milling drum	2			Vietnam
	Measuring machine	1			Taiwan
	Ironing machine	3	850 tons		Taiwan

Maintenance and safety

Ordinary maintenance is made internally. Problems regard the extraordinary one, since in Vietnam there are no machine shops able to carry out maintenance.

In case of need and when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activity are the following:

- Delocalization in the industrial park
- Application of clean technologies (chemical processes, recovery and recycling of some wastes)
- Basic technological training
- Improvement of the range of machines with modern and productive plants
- Improvement of articles quality
- Diversification and extension of finished articles range according to market and fashion trend.
- Technological innovation.
- Quality control according to market requests.
- Improvement of production according to the new productive structure and to employers' number.

TRAN THANH TANNERY FACTORY

**127/16/2B Au Co S t., W. 14, D. 11
HO CHI MINH CITY**

Tel: 0084 8 8650240

Fax: not available

Presentation

Tannery set up in 1989. It is a small company, located in the city centre and producing 1.200 sqft per day. It deals with bovine hides for footwear, from raw material to finished product, even if many processes are made by sub-constructors.

The owner has expressed his intention of moving to the new industrial park, where he intends to build a 2.000 sq mt tannery.

A gradual but slow improvement of positive trend has been registered during the last years.

In 2003 tannery has realized a turnover of about US \$ 400.000. It is a modest amount. Tannery covers a 500 sq mt area with 20 employers. Fleshing, splitting, setting out and vacuum operations are made by sub-constructors.

The range of machines is very limited. Splits are commercialized in pelt. The range of articles is very limited. Technical level is such that, going on in the analysis of the company, we will omit aspects linked to innovation, quality control, research and development.

Used raw materials and produced articles

For its production, tannery uses Vietnamese bovine hides, presenting faults due to scratches and quite deep notchings in the flesh side (manual flaying).

Price of hides is about US \$ 0, 9 per kilogram, while selling market is US \$ 1, 25 per sq ft.

Range of articles is substantially structured as follows:

30% full grain

50% embossed buffed

20% nubuck

Articles, with different thicknesses, are dyed in two colours: black and brown. They present many faults due to wrong processing cycles.

Selling markets

Finished product is sold to many customers only on the domestic market. Either hides purchase or finished products selling are regulated by deferred payments.

Conditions of premises

The same problems common to the other Tan Binh District tanneries, have been noticed. Venues are not suitable for tanning production cycle.

Water consumption

Daily water consumption is 50 cubic meters, equal to 50 litres of water for each kilogram of processed leather, from hide to finished product. It is an exaggerate consumption.

Chemical products supplying

Chemical products are mostly supplied by Stahl (for finishing) and BASF (for wet processing).

General conditions of equipment

Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING	Paddle	1			Vietnam
TANNAGE	Drum	1	3,0 x 3,0 m	Second hand	Vietnam
	Shaving machine	4	0,30 m	Worn out	Taiwan
	Press	1	2,5 m	Second hand	Czech Rep.
RE-TANNAGE FAT LIQUORING	Drum	2	2,2 x 2,0 m		Vietnam
FINISHING	Manual spraying	1			
	Ironing press	1		Obsolete	Thailand

* Fleshing, splitting, setting out and vacuum operations are made by sub-constructors.

Maintenance and safety

Ordinary maintenance is made internally. Extraordinary maintenance is very difficult because Vietnam has no machine shop able to do it. In case of need, when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activities are the following:

- Delocalization in the industrial park.
- Improvement of the range of machines with modern and productive plants.
- Basic technological training.
- Improvement of articles quality.
- Diversification and extension of finished articles range according to market and fashion trend.
- Application of clean technologies (chemical processes, recovery and recycling of some wastes).
- Quality control.

AHN KY TANNERY FACTORY

**98/7 Au Co S t., W.9, D. Tan Binh
HO CHI MINH CITY**

Tel: 0084 8 8650864

Fax: not available

Presentation

Activity set up in 1982. It seems to be a handicraft shop more than a firm; it just covers a 250 sq mt area, with 10 employers and processes 300 kilograms bovine hides for footwear, from hide to finished product. As gathered by the trifling number of machines, most production is made externally.

Mr. Dang Giap, company owner, intends to close its activity in the impossibility of moving to the new industrial park.

Anyway its main characteristics are here synthetically defined.

Raw materials and produced articles

Raw materials are domestic salted green bovine hides, average weight 25 kilograms. Only one article is produced, dyed exclusively in black. Average price of purchase is US \$ 1, 0 per kilogram; average selling price is US \$ 1, 3.

General conditions of premises

Premises, crumbling and unhealthy, are structured by a small wet processing department and by a mezzanine, where dyed leathers are dried in the open air and manually sprayed.

Equipment

<i>Machine</i>	<i>Q.ty</i>	<i>Size</i>	<i>Condition</i>	<i>Country</i>
Drum	1	3.0 x 2.5 m	Worn out	Vietnam
Small drum	3	0,6 m	Worn out	Vietnam
Shaving machine	1		Worn out	Taiwan
Measuring machine	1			Vietnam
Manual spraying	1			

Conclusions

Tannery is destined to close.

SAIGON LEATHER COMPANY

**139 Xo Viet Nghe Tinh Street, Ward 17, Binh Thanh District
HO CHI MINH CIT**

Tel: 0084 8 8405732

Fax: 0084 8 8405733

leasgo@hcm.vnn.vn

Presentation

Tannery belongs to a government enterprise, comprehending a shoe factory as well. It is made of two productive units, covering an overall area of 8.500 sq mt. Units are located in two different venues: the first one carries out manufacturing processes from hides to wet blue, the second one from wet blue to finished product. Present production is 12.000 sq ft bovine hides for footwear per day.

Total number of employers is 372. Activity set up in 1993. Since 2000 turnover has been drastically lowering, as shown by the following data:

2000	2.700.000	US \$
2001	1.400.000	US \$
2002	1.700.000	US \$
2003	1.000.000	US \$

Considering the high number of workers, the good structure of the plants and the adequate equipment of machines, we are facing a very negative general trend.

Its causes are determined by a series of inefficiencies, first of all the inability of competing with the private Vietnamese tanneries. However, company has elaborated a delocalization project of the productive plants to the new industrial park.

It was not possible to visit beam house and tannage department, because of some restoration works (as said by vice general manager). Therefore the following report refers to tannage, dyeing, fat liquoring, drying and finishing.

Raw materials

Tannery uses Vietnamese and American bovine hides, depending on markets requests (type of article to be produced, type of customers) and depending on prices of hides.

Produced articles

Range of articles is the following:

Full grain Napa either smooth or milled	1,1 / 1,2 mm
Full grain, middle softness	1,4 / 2,0 mm
Nubuck	Various
Embossed, either full grain or buffed	various
Buffed box	Various
Suede split	various
Linings	

All these articles are produced in different colours and nuances.

Quality is not satisfactory for a series of faults.

Most common faults are the following ones:

- Inadequate grain tightness and lack of roundness concerning smooth articles
- Inadequate softness and irregular grain of Napa
- Lack of brightness for suede splits.

Selling markets

Articles are sold above all on the domestic market; a small quantity (5-6%) is exported to Australia and China. Full grain has a quotation of US \$ 1, 5, while split is sold at US \$ 0, 55 per sq ft.

Working days

Yearly working days are 312; daily working hours are normally 8, exceptional cases permitting.

General conditions of premises

Premises, with a horizontal extension, are structured in a rational way. One department carries out wet operations with appropriate machines; another very spacious department carries out pre-finishing and finishing operations. Working areas, suitable for tanning manufacturing cycle, have a very high ceiling and are sufficiently lighted.

Wet-blue is stocked near the department where the first mechanical phases of the tanning process take place (sammying, splitting, shaving). Chemical products are stocked in the provided warehouse. Machine shop, power station and finished products' warehouse are rationally located in the productive plant.

Raw materials

Wet-blue quantity covers at the most the production of 5/6 working weeks.

Chemical products supplying

Chemical products are mostly imported from outside. Company must therefore supply with a consistent amount of them to cover some months of production. The most used products are from BASF, Bayer, ICI and Stahl.

Technological innovation, research and development

At present, research for the improvement of the produced articles and the setting up of new articles to satisfy market requests are not applied. There's no control on constancy of chemical products' composition; comparative tests for the research of new products with the best connection between quality and price are not performed.

Quality control

Quality control on finished product, definitely not enough, is limited to some tests of dynamometric resistance.

Water consumption

Water consumption is about 150 cubic meters per day, that is 15 litres for each kilogram of leather, from wet-blue to the finished product. Such consumption, relatively to the above mentioned working cycle, is in line with European standards.

Weak points

- Location in the city centre.
- Very low productivity.
- Scarce flexibility of management.
- Very high number of workers.
- Low competitiveness.
- No water waste treatment plant.
- Lack of basic technological and organizational notions.
- Too limited number of produced articles.
- Inexistent quality control on finished product.
- Training courses for technicians and labour not comparable to the one of developed countries.
- Propaganda and participation to events to be intensified.

Strong points

- Great growth of Vietnamese footwear industry.
- Certain delocalization in the new tannery (big, modern and rational), under construction in the new industrial park in HO CHI MINH CITY.

- Low cost labour.
- Low cost energy.

Human resources

Company organization chart (referred only to this productive plant) is structured as follows:

- General manager
- Technical manager
- Sales manager
- Marketing manager
- Trade manager
- Accounting manager
- Head of plants maintenance
- Heads of production department: N. 10
- Workers: N. 200

Total employers: N. 217

It's a disproportionate number of employers, related to the realized production

General conditions of equipment

Range of machines, all from Italy, is quite complete and is structured as follows:

Working Phase	Machine	Q.ty	Size	Condition	Country
RETANNAGE FAT LIQUORING	Wet-blue splitting machine	1	3,0 m	Good	Italy (Rizzi)
	Shaving machine	3	2,8 m	Good	Italy (Rizzi)
	Drum	4	3,0 x 2,5 m	Good	Italy
	Setting out	2	3,0 m	Good	Italy (Rizzi)
	Setting out	2			Italy
	Little drums for trials	7			
PRE-FINISHING FINISHING	Dryer	1		Good	Italy (Incoma)
	Staking machine	1	2,5 m	Good	Italy (Baggio)
	Polishing machine	1	2,5 m	Good	Italy (Ficini)
	Ironing machine	2	850 tons	Good	Italy (Tomboni)
	Rotopress	1	2,0 m	Good	Italy
	Buffing machine	2	3,0 m	Good	Italy (Ficini)
	Automatic spraying	2	1 booth	Good	Italy
	Roll coater with tunnel	1	3m	Good	Italy (Incoma)
	Measuring machine	1			Vietnam

Production goes from the wet-blue to the finished product.

Maintenance and safety

Ordinary maintenance is made internally. Problems regard the extraordinary one, since in Vietnam there are no machine shops able to carry out maintenance.

In case of need and when breakdown is not easy to be repaired, technician must come from machine's country of origin and machine can be out of order for a long time.

Safety at the workplace and at machines is hardly inadequate. Personal protection devices and proper signs of danger are absent.

Suggestions for improvement

Gradual phases for the improvement and the development of business activity are the following:

- Delocalization in the industrial park
- Improvement of finished products' quality

- Improvement of productivity
- Reorganization of management
- Application of clean technologies (chemical processes, recovery and recycling of some wastes)
- Basic technological training
- Diversification and extension of finished articles range according to market and fashion trend.
- Technological innovation.
- Quality control according to market requests.

BINH THIEU TANNERY FACTORY

**127/36 Au Co S t., W. 14, D. 11
HO CHI MINH CITY**

Tel: 0084 8 8652758

Fax: 0084 8 9746053

Presentation

Tannery set up in 1987, but it began its real activity only two years ago.

It produces either chromium leathers, destined to oiled nubuck, or vegetable tanned leather for soles.

It uses 1.000 kilograms bovine leathers per day. Premises cover a 300 sq mt area, with 18 employers.

Characteristics and weak points are the same of the other small Vietnamese tanneries.

In particular, tannery carries out soaking in pit, liming in pit and vegetable tannage. Most operations are carried out by sub-constructors. Tannery carries out beam house (hides are neither fleshed nor splitted), tannage (chromium and vegetable), shaving, retannage, dyeing, fat liquoring and manual spraying of finished products. Setting out, vacuum, drying, staking, buffing (for nubuck), ironing are made by sub-constructors. As said, tannery has a very reduced number of machines.

Raw material

Tannery uses domestic salted green bovine hides. Purchase price is US \$ 1 per kilogram.

Produced articles

- Chromium oiled nubuck: 1, 4-1, 6 mm
- Leather for soles

Qualitative defects of produced articles are common to other Vietnamese small tanneries.

Selling markets

Products are sold on the domestic market. Selling price of nubuck is US \$ 1, 40 per sq ft, (first quality); US \$ 1, 25 per sq ft (second quality). Leather for soles is sold at US \$1, 60 per sq ft (a quite strange situation, since soles are usually sold by weight and not by surface).

Water consumption

Tannery uses 50 cubic meters per day, equal to 50 litres for each kilogram of hide. It is not a high consumption, since tannery produces soles, which need a greater quantity of water.

Working days

312 days per year.

General conditions of equipment

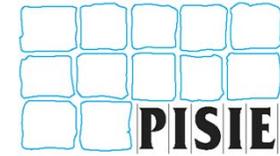
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Working Phase	Machine	Q.ty	Size	Condition	Country
SOAKING LIMING VEGETABLE TANNAGE	Pits	3			
	Drums	2	3,0 x 2,5 m	Worn out	Vietnam
	Shaving machine	3	0,40 m	Worn out	Taiwan
RETANNAGE FAT LIQUORING DYEING	Drums	2	2,0 x 1,8 m	Worn out	Vietnam
FINISHING	Manual spraying	1			
	Measuring machine	1			Vietnam

Suggestions for improvement

Gradual phases for the improvement and the development of business activity are the following:

- Delocalization in the industrial park.
- Application of clean technologies (chemical processes, recovery and recycling of some wastes).
- Basic technological training.
- Improvement of the number of machines.
- Improvement of articles quality.
- Diversification and extension of finished articles range according to market and fashion trend.
- Technological innovation.
- Quality control
- Improvement of production.



HO CHI MINH TANNING INDUSTRY PARK

Ho Chi Minh, 21th March 2005

LEGEND

	Tanneries
	Tanneries expansion
	Shoes factories
	Shoes factories expansion
	Leathergoods factories
	Maintenance workshops
	Components laboratories
	Stores for: - Spareparts - Chemical products - Raw material By product units
	Effluen treatment plant
	Shipping-yard Bus terminal
	Fire station custom area
	Tecnological service centre
	Main service centre: - Bank offices - Post offices - First aids - Shopping mall etc.
	Parking and streets
	Green area
	Sidewalk

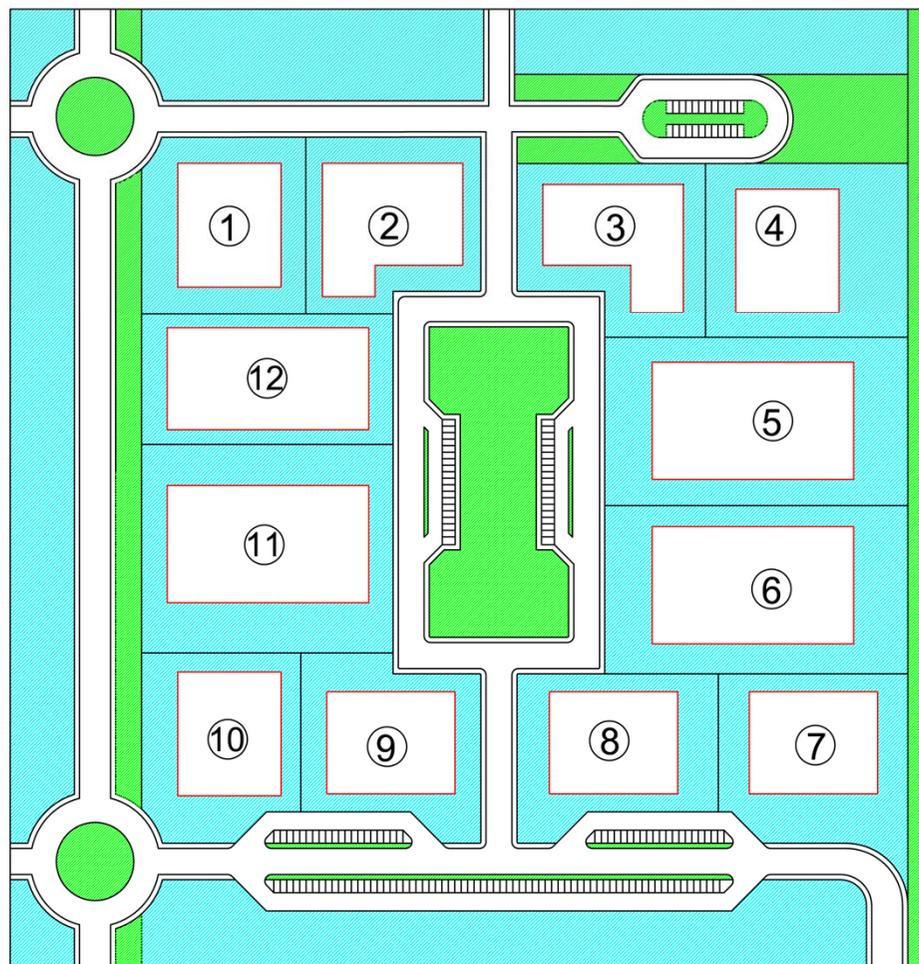
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VIETNAM

LEATHER DISTRICT LAYOUT

Marzo/2005

Hypothesis of a shoes factories sector



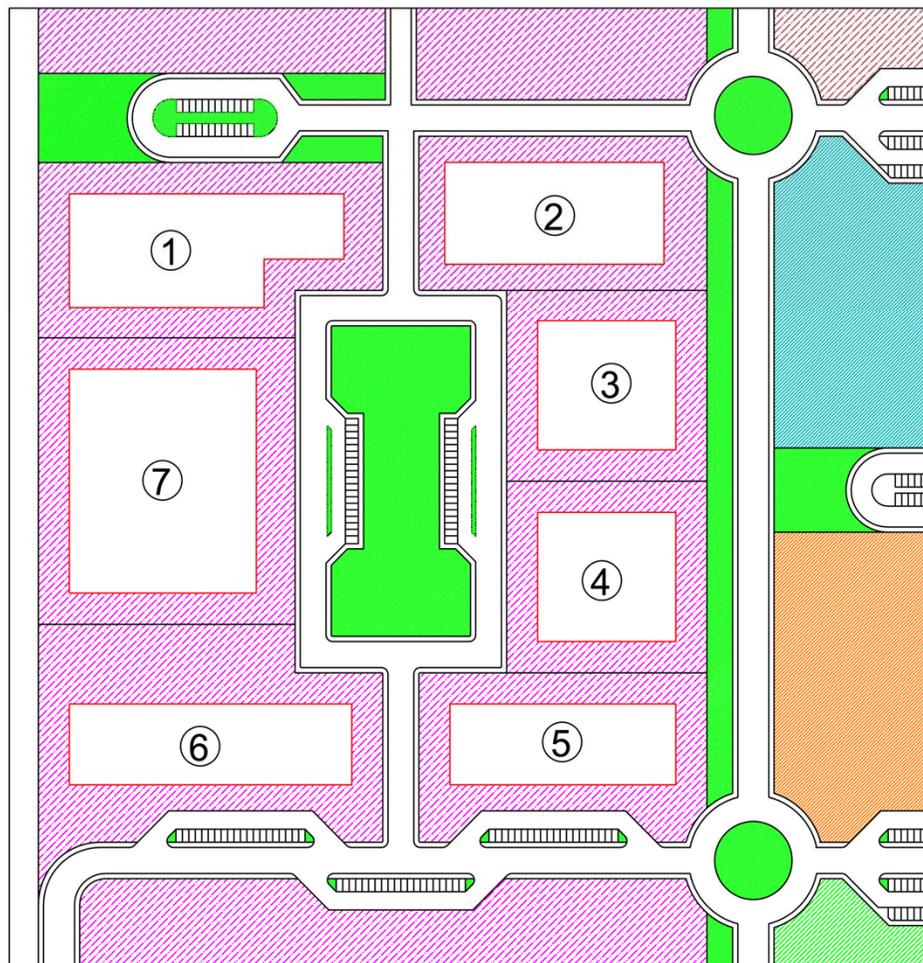
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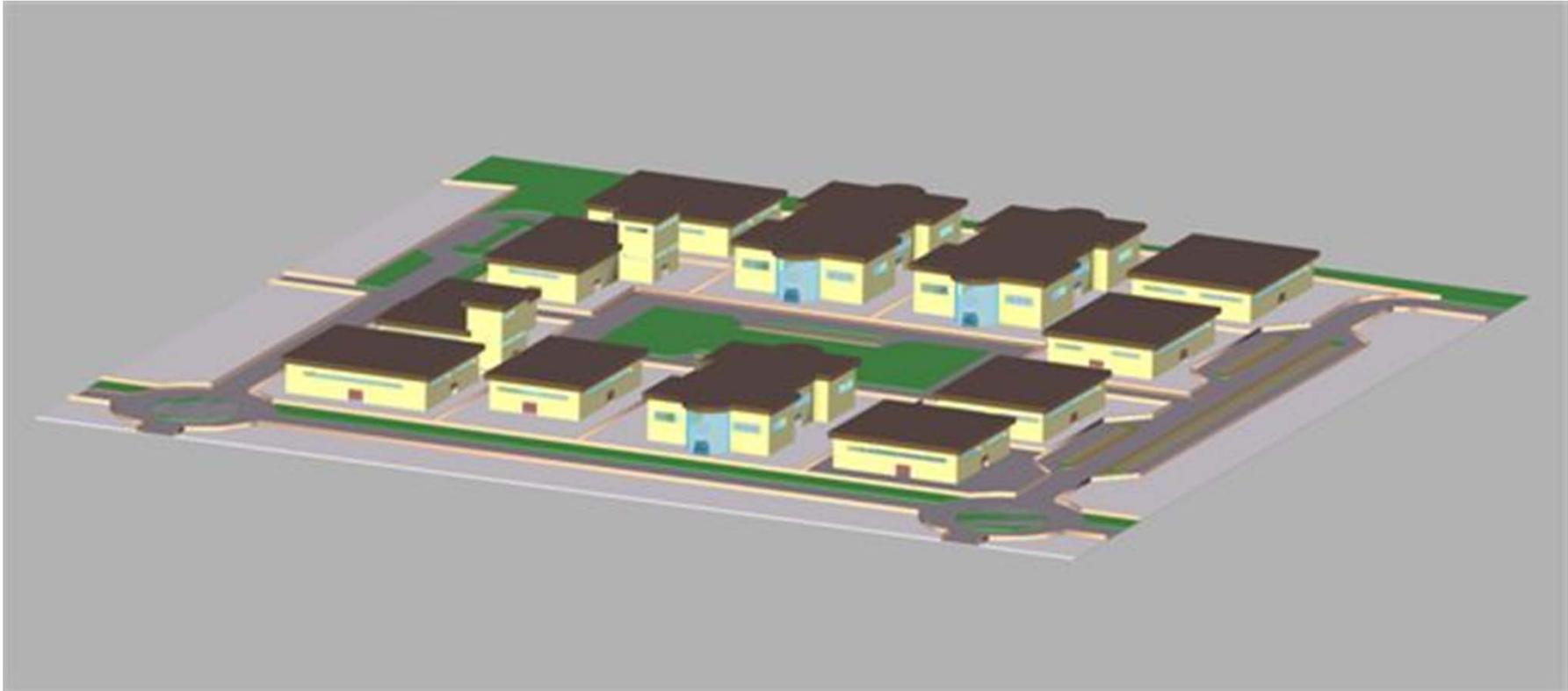
VIETNAM

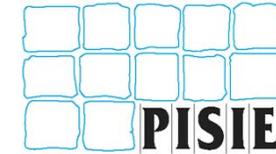
LEATHER DISTRICT LAYOUT

Marzo/2005

Hypothesis of a tanneries sector







**THE RAZIONALIZATION OF
ENVIRONMENTAL IMPACT IN
LEATHER PROCESSING THROUGH
CLEAN TECHNOLOGIES**

Ho Chi Minh, 21th March 2005

Bovine Hides' constituents

1 Ton salted green bovine hides	250 Kg Collagen (hide)
	100 Kg Hide rejects
	80 Kg Hair
	400 Kg Water
	170 Kg Polluting wastes (for example: hydrolyzed proteins, salts, fats)

Clean technologies standards

- **Reduction of water consumption**
- **Recycling of some baths and their recovery during processing**
- **Use of non toxic chemical products with low environmental impact**
- **Application of processes with a high level of chemical products' exhaustion**
- **Reduction of solid wastes, their recovery and their possible reuse in other sectors**

Typology of polluting substances and their source during manufacturing processes

Main chemical wastes

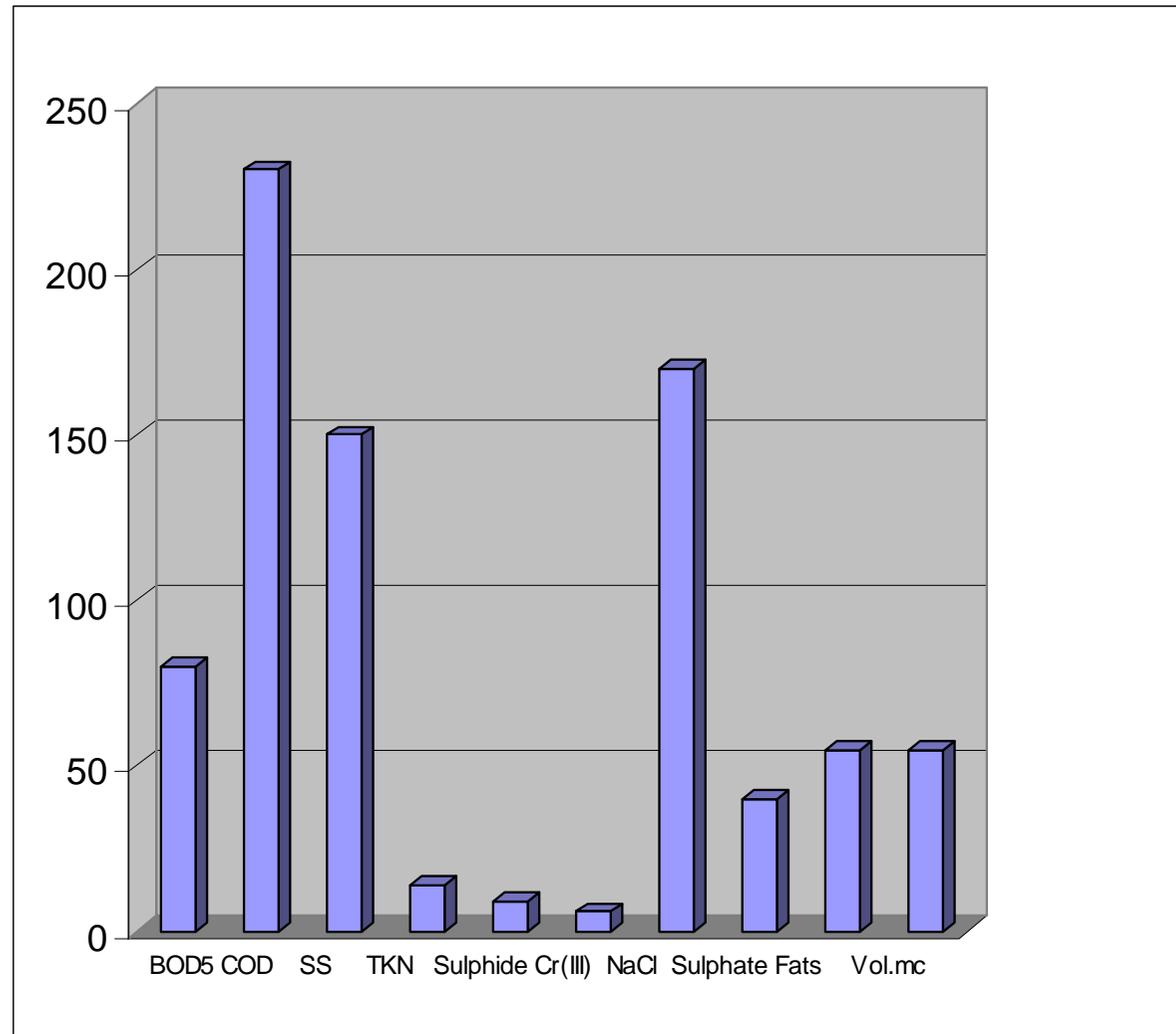
Solid/air wastes

Salt (manual removal)	Raw hides	
Salt (TDS) albumines, dirt, bacteria	Soaking	
Sulfides, lime, proteins fats	Unhairing, liming	H ₂ S
	Lime fleshing	Fleshings and trimmings
Ammonia, N, enzymatic products	Deliming, bating	
Salt, chrome and acids Vegetable tanning agents, sulfate	Pickling, tanning	
	Chrome splitting Shaving	Shavings (chrome) Trimmins (chrome)
Veg. extracts, Syntans Chromium, salt (sulfate) Acrylic polimers, dyestuffs, fats	Retanning, dyeing Fatliquoring	
	Drying	
	Buffing, trimming	Leather trimmings dust
Liquid finishing residues, solvents	Finishing Trimming	

**Polluting flow for one ton salted green bovine hide
(chromium kips, retannage with natural tannins
according to traditional technology without hair
recovery/bath recycling)**

Parameters	Unit: Kg
Bio-chemical oxygen demand (BOD ₅)	75-90
Bio-chemical oxygen demand (COD)	200-260
Suspended solids (SS)	140-150
Total nitrogen (TKN)	12-15
Sulphide	8-10
Chromium (III)	4-7
Sodium chloride	150-200
Sulphate	30-50
Fats	50-60
Effluent volume	50-60 m ³

Parameters of pollution produced by the whole manufacturing cycle



Optimization of manufacturing chemical processes

- **Liming, simultaneously providing for a use of low quantities of sulphide, hair recovery and baths recycling.**
- **Deliming with low contents of ammonium Salts delimiting agents**
- **Pickling with the use of small quantities of Salt**
- **High exhausting chromium tannage and end tannage chromium recovery (sulphate reduction)**
- **Water finishing, with a reduced use of organic solvents**

Sulphide Disadvantages

- **Possible development of sulphydric acid (toxic gas)**
- **In river courses, fish poisoning**
- **In high concentrations, the inhibition of bacteria biodegradable capability during biological depuration of water wastes**
- **Formation of big quantities of sludge during chemical-physical depuration**

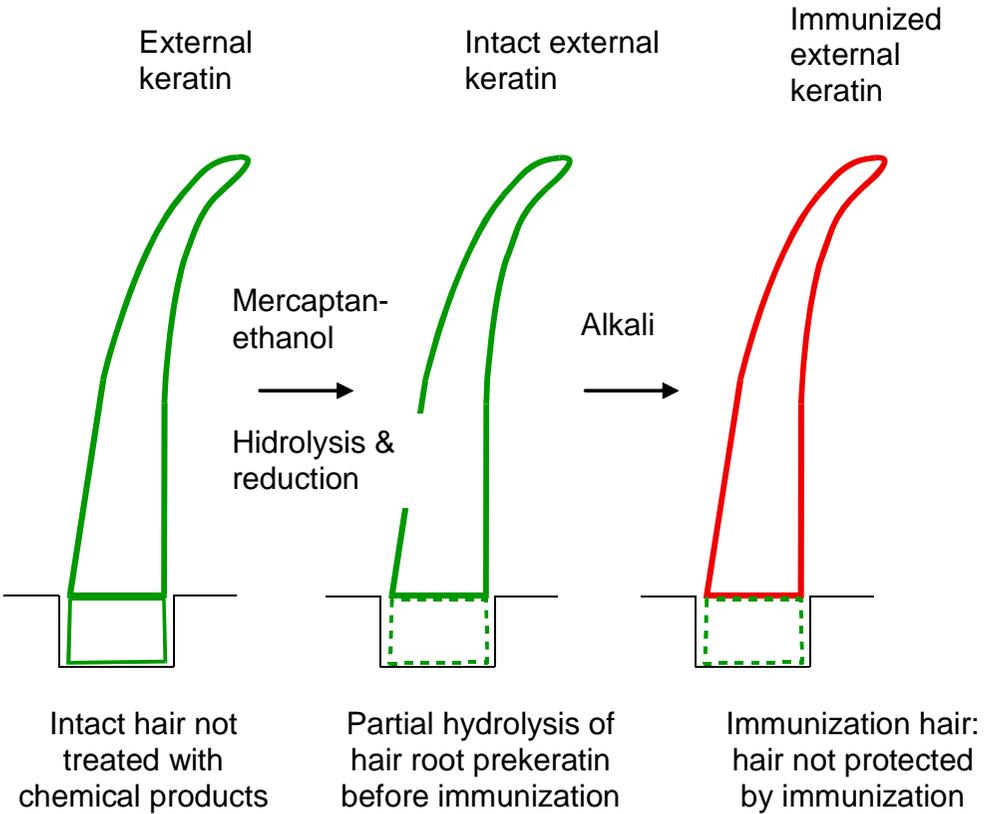
Advantages of mercaptans

- **Complete oxidation in the air: formation of non-polluting chemical compounds**
- **No sulphydric acid production after contact with acids**

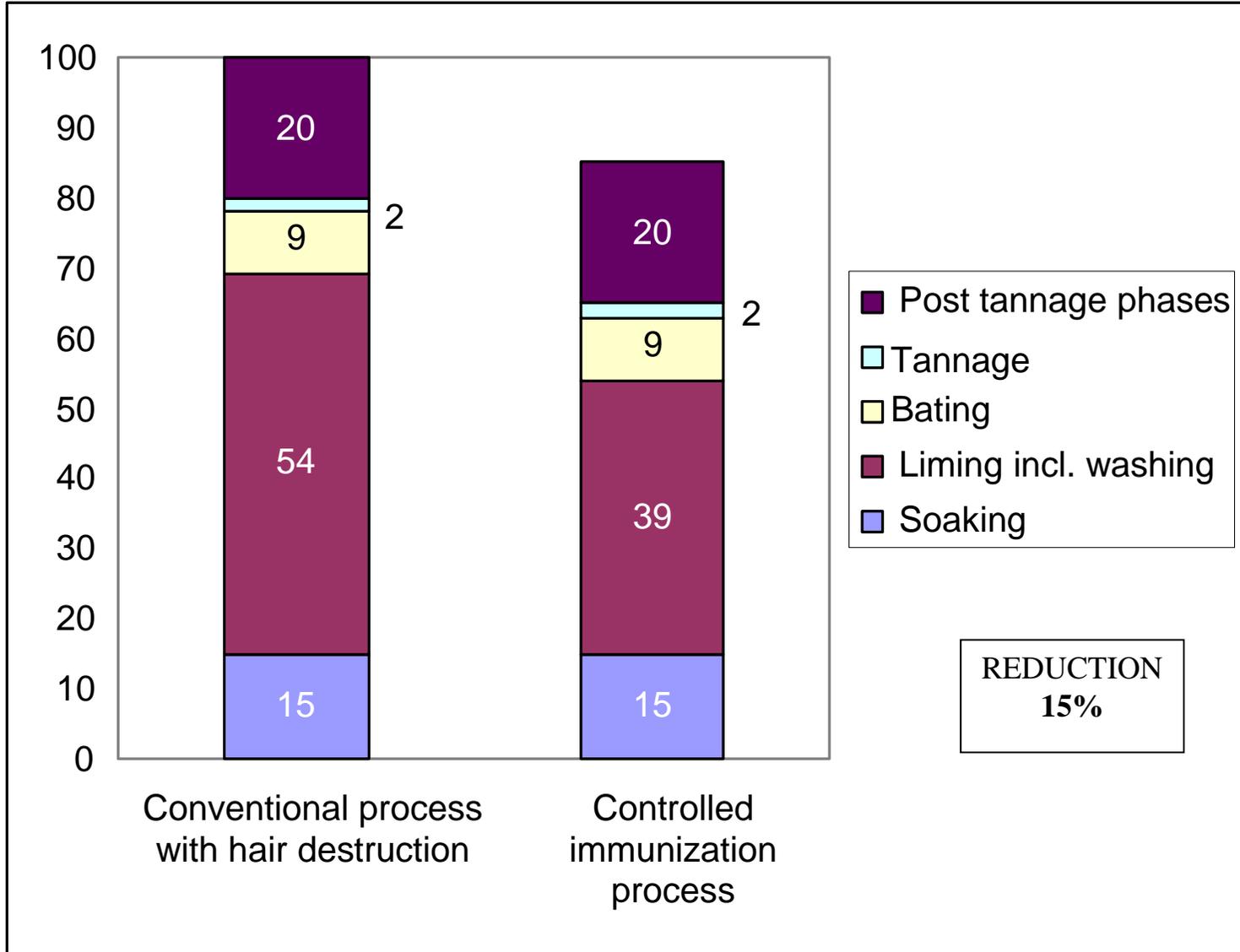
Hair recovery advantages

- **Reduction of COD**
- **Reduction of TKN**
- **Reduction of sedimentable solids (SS) and therefore of depuration sludge**

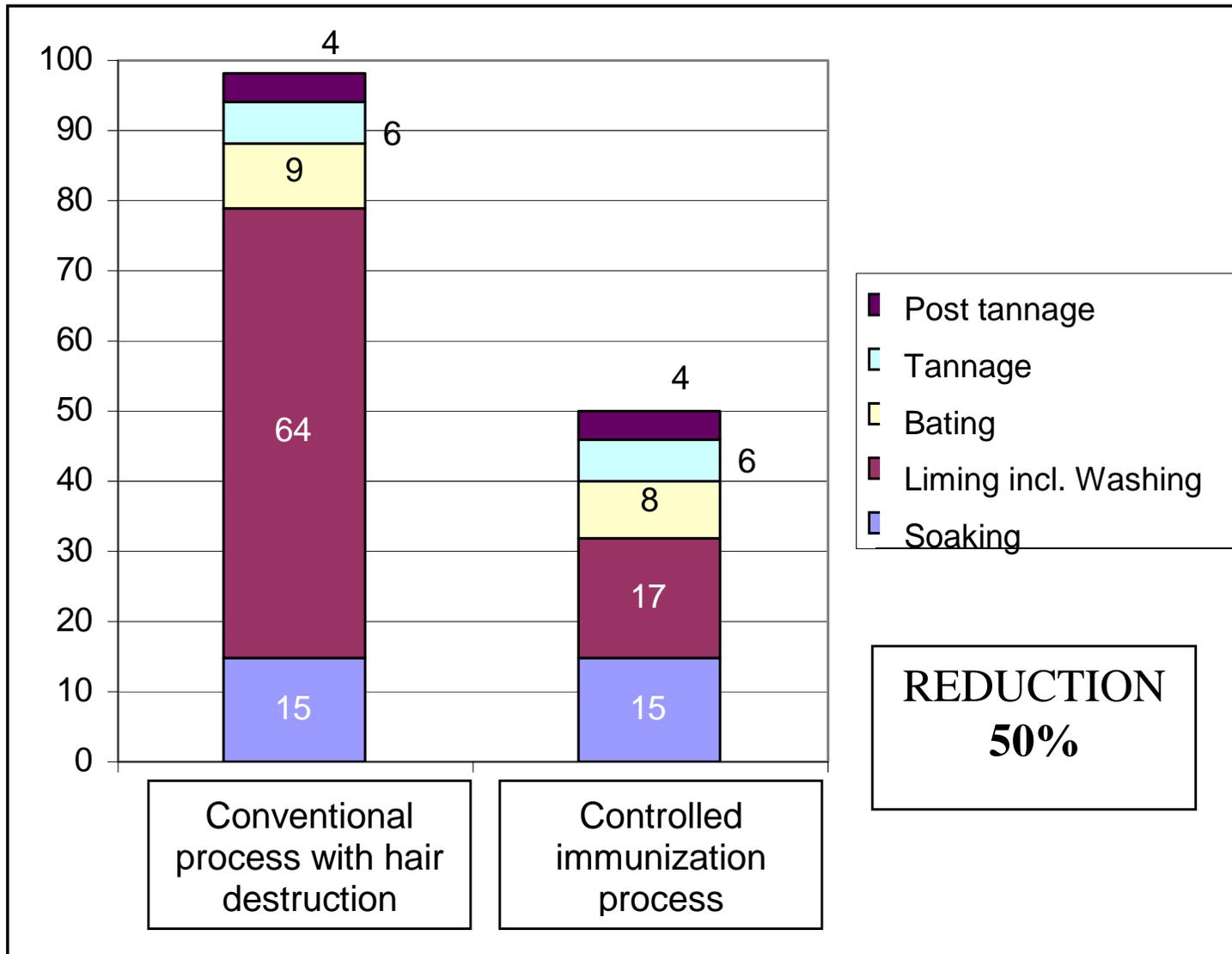
Controlled immunization principles



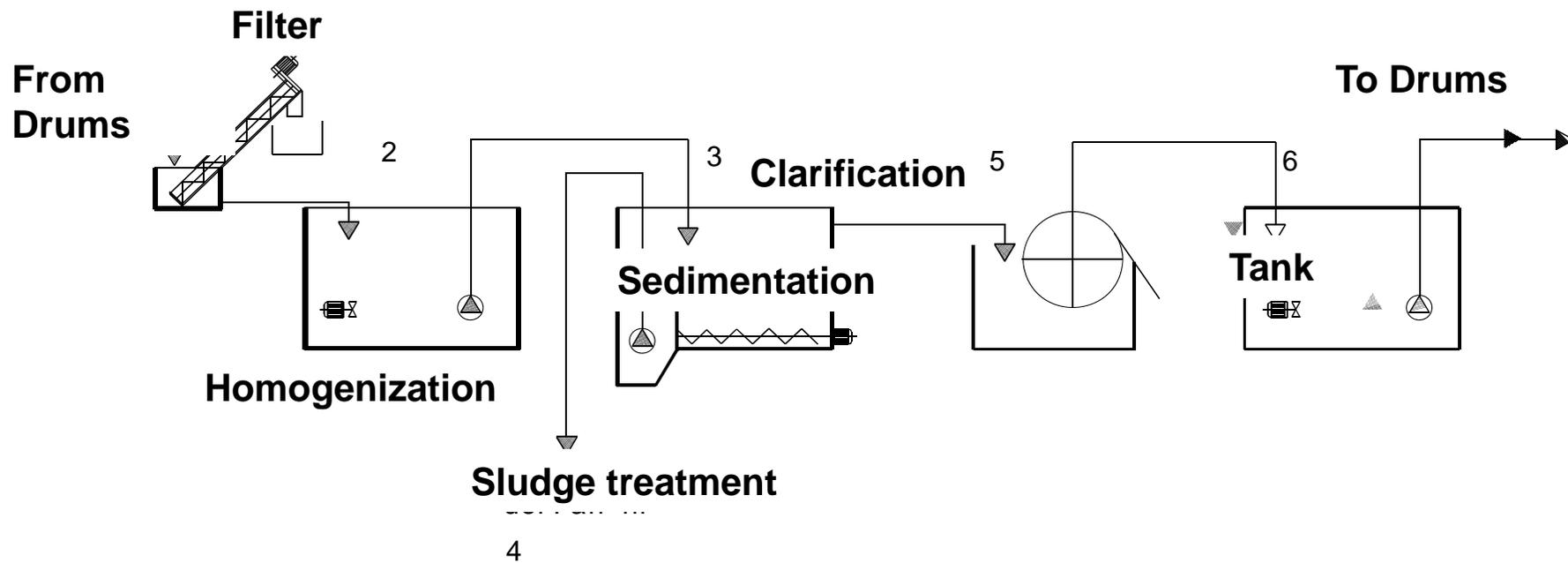
COD in tanning effluents (parti massa)



Sedimentable solids in effluents (parti massa)



Liming bath recovery plant



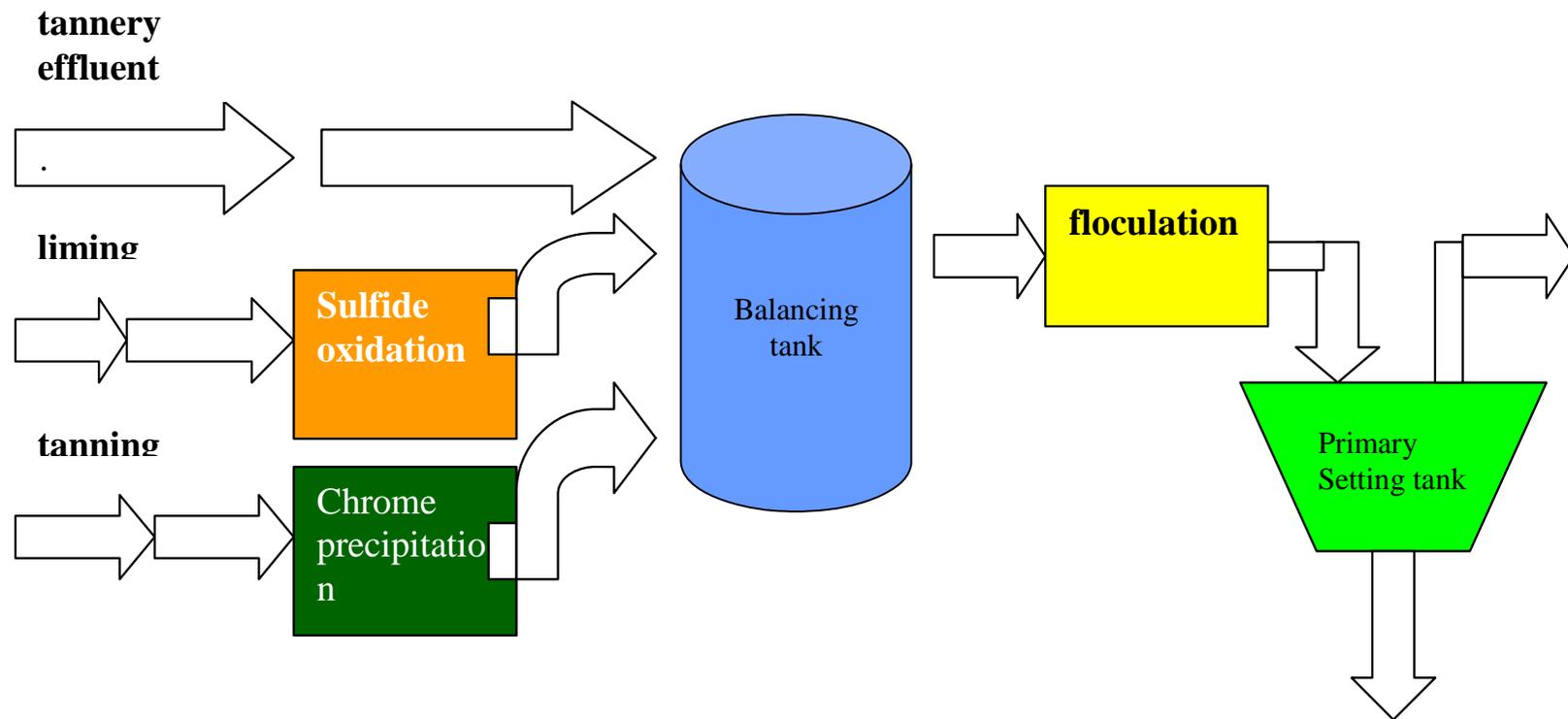
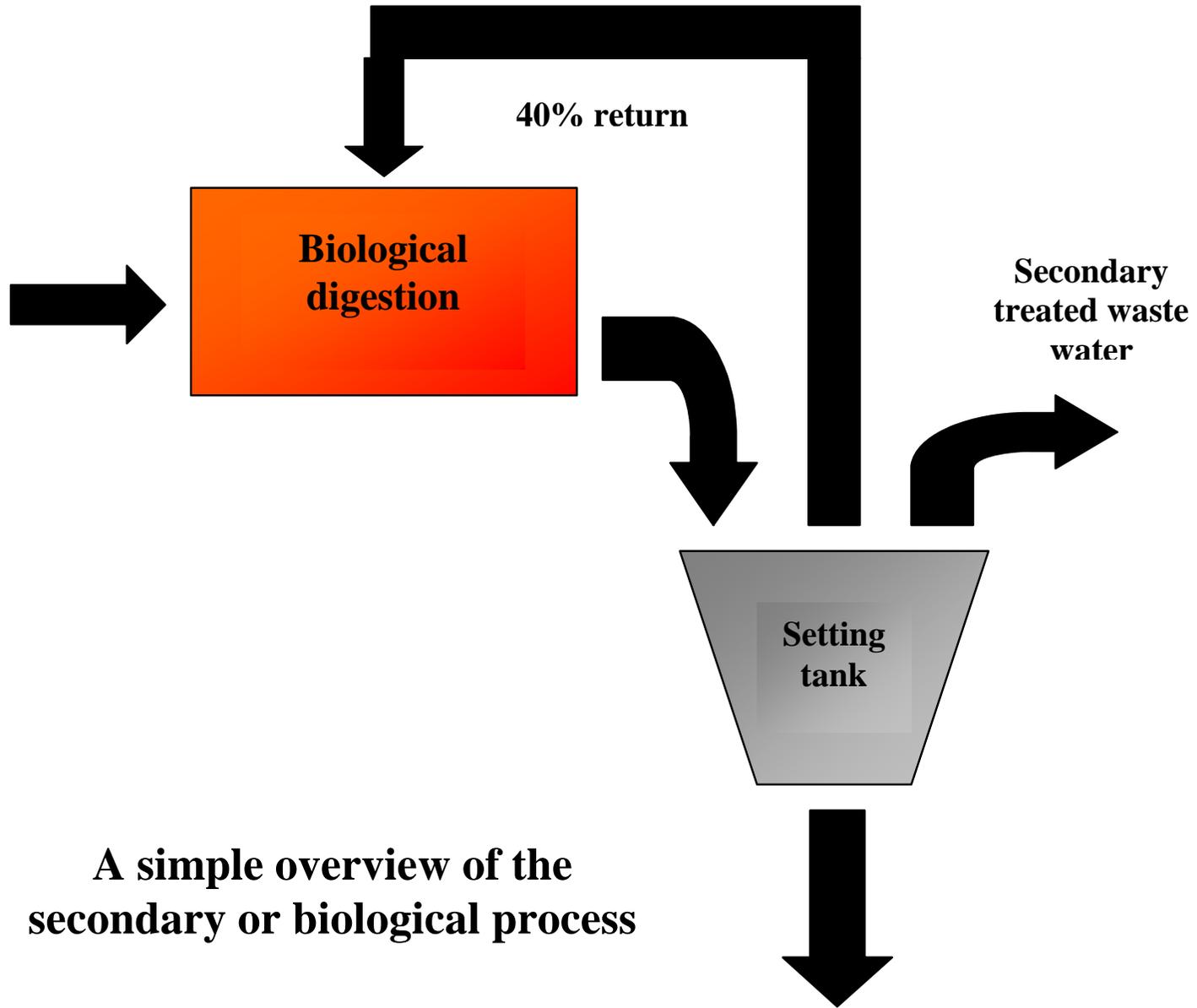


Fig. A simple overview of the primary Treatment of wastewater

Example of liming using small quantities of sulphide, bath recycling and hair recovery on salted green bovine hides

Phase	+	%	Product	°C	Time minuts	pH other controls
		70	Recovery bath	23	Rot. 5	pH = 12,5
Incubation	+	1,3	Mercaptan 20%			
		0,15	Anionic surface-active		Rot.30- stop 30	
Hair top immunization Hair root activation	+	1,2	Ca(OH) ₂		Rot. 60	
Hair releasing	+	0,8	Sulphydrate 72%			
		0,8%	Ca(OH) ₂		Rot. 60	
						Hair detachment control Filtration x 3 h
	+	20	Recovery bath	23	Rot. 5	
Epidermis structure opening	+	0,3	Mercaptan 20%			
		0,9	Lime			
		1,1	Sodium sulphide 60-62%		Rot. 90	
	+	20	White water	23	Rot. 5	
		0,2	NaOH 50%		Rot. 90	Automatic drum Rot 5 min. x h. Total 24 h
Draining off						
Degreasing		100	Water	24		
		0,2	Anionic surface-active		Rot. 20	
Draining off						
		100	Water	22		
		0,15	Polyphosphate		Rot. 15	
Running-off, fleshing						



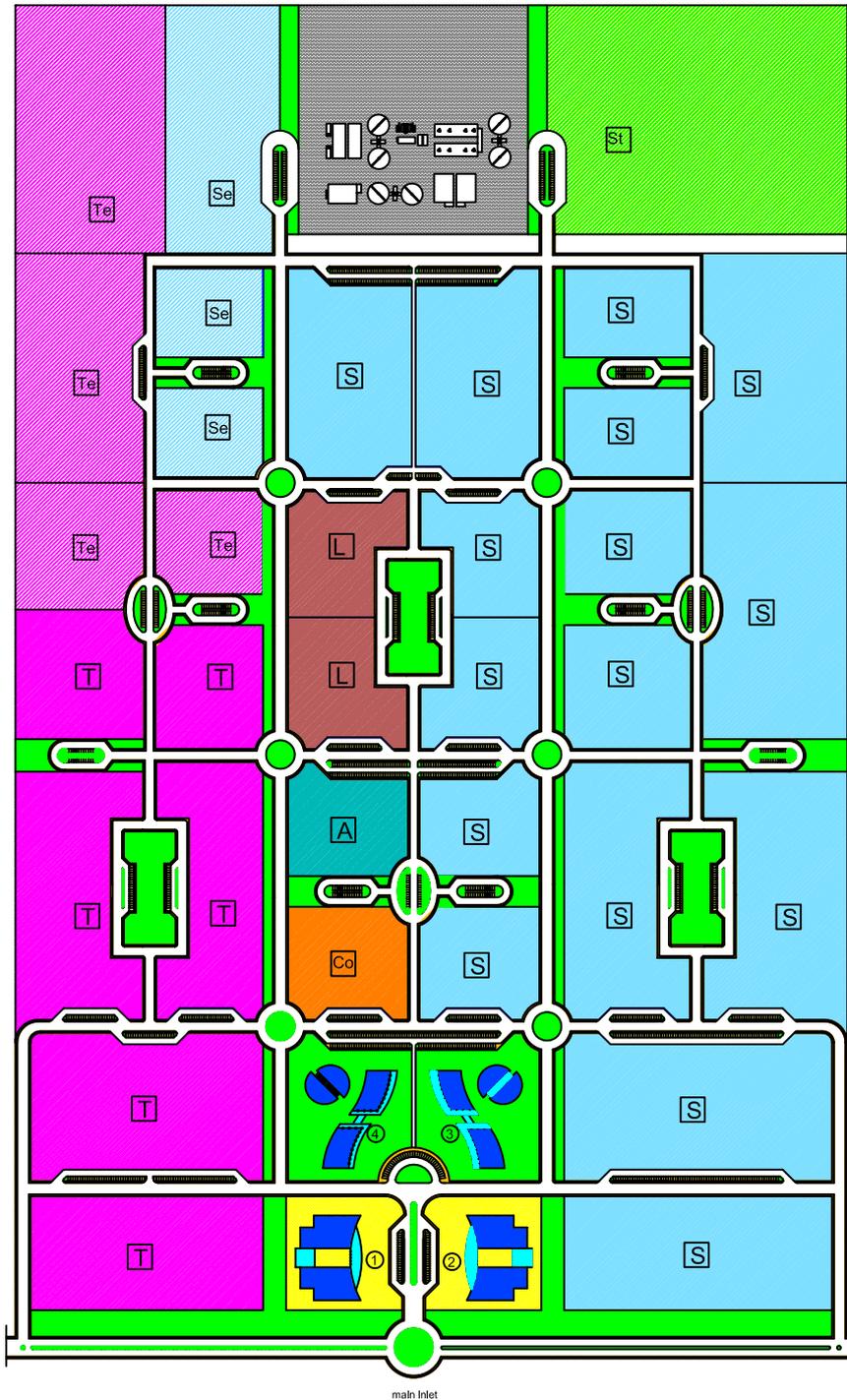
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VIETNAM

LEATHER DISTRICT LAYOUT

Marzo/2005

LAYOUT GÉNÉRAL DISTRIBUTION DES ACTIVITÉS



main Inlet

LEGEND

	Tanneries
	Tanneries expansion
	Shoes factories
	Shoes factories expansion
	Leathergoods factories
	Maintenance workshops
	Components laboratories
	Stores for: - Spareparts - Chemical products - Raw material By product units
	Effluen treatment plant
	① Shipping-yard Bus terminal
	② Fire station custom area
	③ Tecnological service centre
	④ Main service centre: - Bank offices - Post offices - First aids - Shopping mall etc.
	Parking and streets
	Green area
	Sidewalk

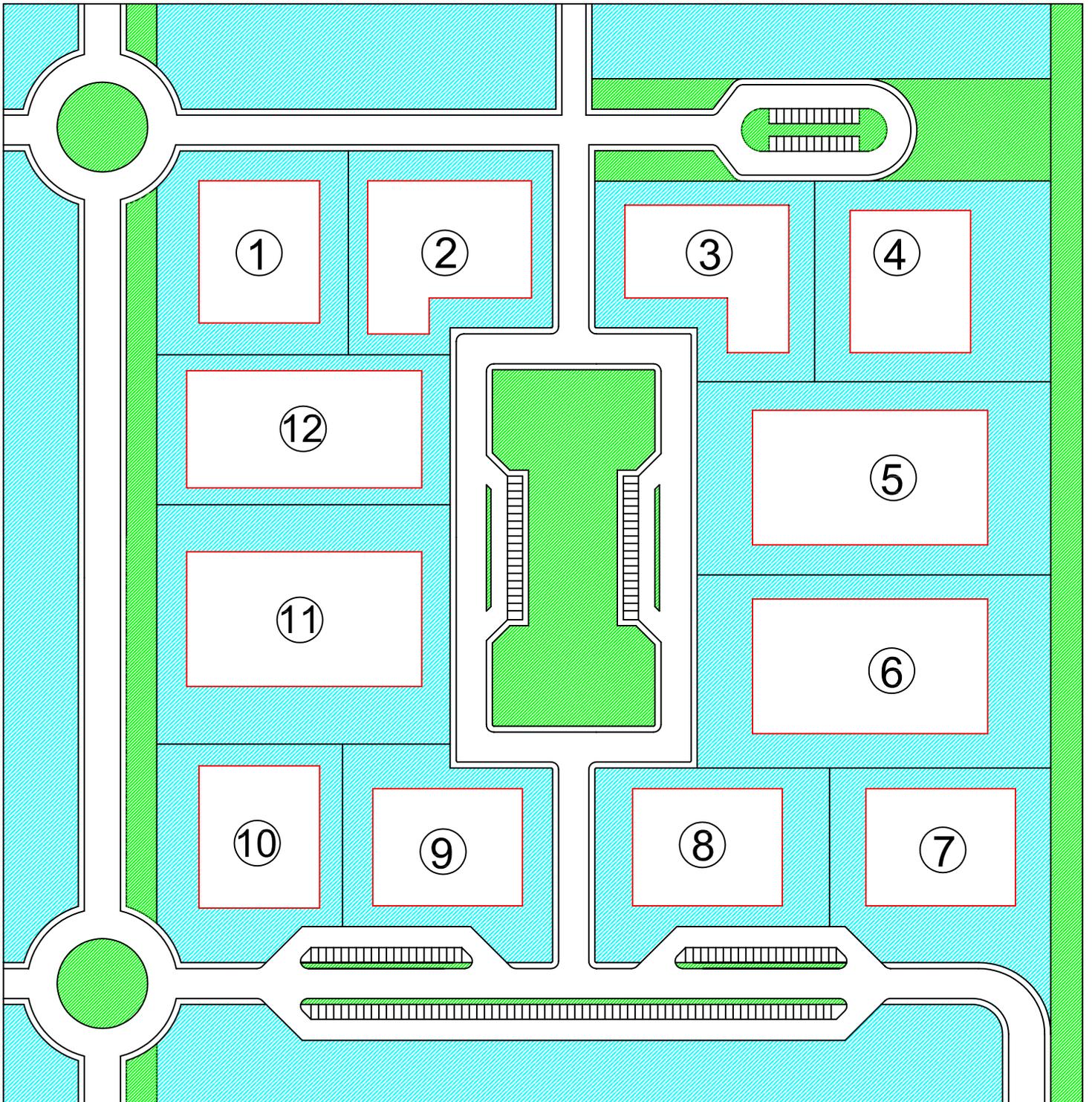
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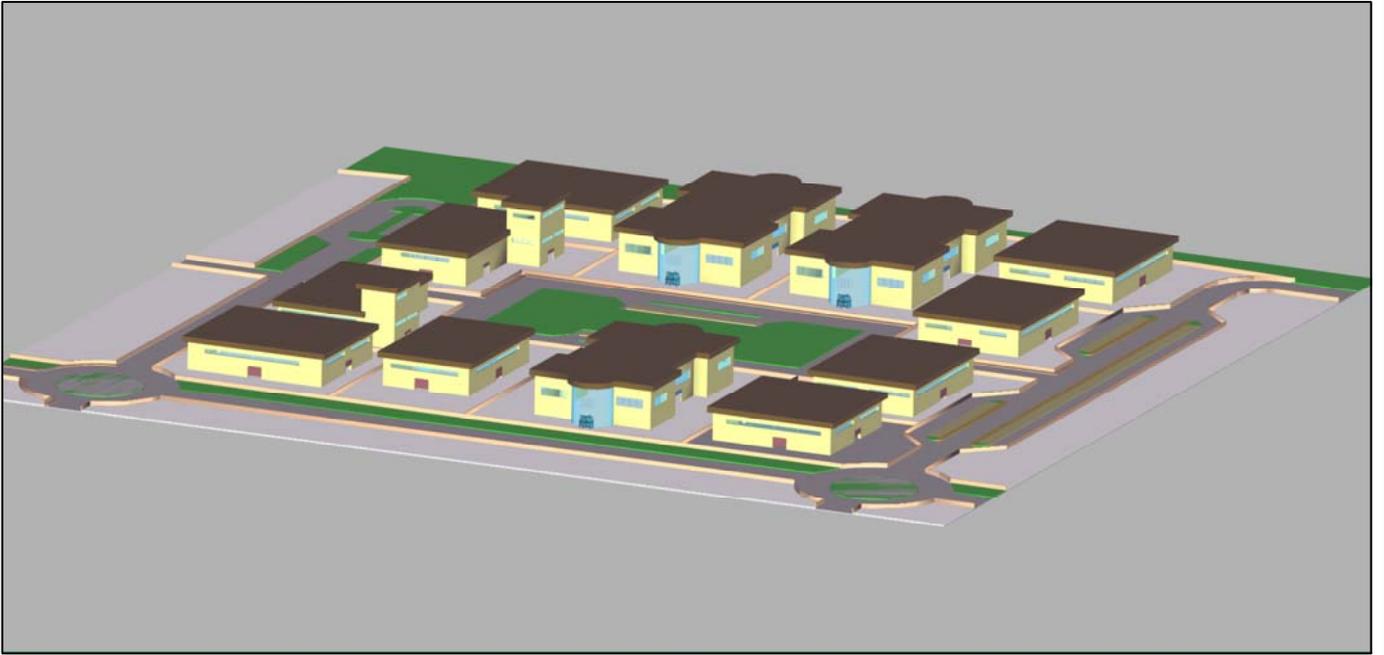
VIETNAM

LEATHER DISTRICT LAYOUT

Marzo/2005

Hypothesis of a shoes factories sector





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VIETNAM

LEATHER DISTRICT LAYOUT

Marzo/2005

Hypothesis of a tanneries sector

