Case Study: Leather Industry Parks

Planning, implementation, benefits, challenges and experience

Argentina:	Buenos Aires
Bangladesh:	Savar
Egypt:	Al Robeky
Ethiopia:	Modjo
Italy:	Santa Croce Sull'Arno
Mexico:	Leon
Sri Lanka:	Batha Atha
Tunisia:	El Fejja
Turkey:	Bursa and Tuzla

Based on the work of Sauro di Sandro and Ivan Kráľ

UNITED NATIONS

INDUSTRIAL DEVELOPMENT ORGANIZATION

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. Designations such as "industrialized," "developed" or "developing" countries are used for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not imply endorsement by UNIDO.

Acknowledgments:

This Technical report has been prepared under the overall guidance of Aurelia Calabrò and Ivan Kral, Agro-Industries Technology Division, Agri-Business Development Department by Mr. Sauro di Sandro
The authors appreciate the cooperative spirit and the willingness of the managements of the leather industry parks to provide information and data presented in this technical report.

Summary

1. EXECUTIVE SUMMARY

1.1.Intro: Relocation – Global Experience

Historically, for various reasons, tanneries have been generally found in clusters in many countries. In several countries that still possess a strong tanning industry, the industry has either been able to deal collectively with the environmental challenges by means of common waste treatment facilities in existing clusters (e.g. India, Italy, Pakistan) or is in the process of relocation (e.g. Egypt, Iran, Morocco and Thailand). Below are four recent case studies that shed some light on relocation itself.

The tannery regions of Santa Croce sull'Arno, Arzignano and Solofra in Italy are not strictly speaking industrial estates. However, their successful operations, including running of their CETPs are subject of numerous studies and models for industrial clusters in many developing countries and countries with transitional economies.

1.2. Main reason for tannery relocations

Within almost all projects of tannery relocation there are common reasons and the main problems faced by the industry at the current location are:

With no infrastructure for treatment of solid or liquid waste generated by tanneries, a very unhygienic atmosphere has been created in the entire locality due to discharge/disposal of untreated solid and liquid wastes.

Due to extreme limitations of space, even tanneries wanting to modernize and become more efficient in terms of production and environment management are unable to do so. The present location, in this manner, has become a serious constraint for the growth of the industry.

Downstream industries such as footwear, leather garment and leather goods, depend on the tanning industry for supply of quality leather. The existing limitations have put a limit to the growth of leather products industries.

Pressure from the population surrounding existing tannery buyers, the community and NGOs.

Relocation of the tanneries to a more spacious location with appropriate infrastructure for efficient and cost effective treatment of solid and liquid wastes has thus become a prerequisite for survival and growth of the leather industry in such cases.

1.3. Conclusion: Some lessons learned

All the case studies showed that relocation of tanneries is indeed very complex. Each of the case studies has its own peculiarities and uniqueness and yet some lessons can be learned.

Throughout the entire process it is essential to have and maintain the political will to support the process. It is normally initiated by one stakeholder having this idea. If this idea is shared at an early stage and jointly developed further, it can become a vision backed by commitment of the main stakeholders. Relocation of tanneries has to be backed by modernization of the sector.

As pollution quite often is the main cause for driving the industry out from its existing location, obviously all suitable measures should be taken at the new site. In all cases there are obvious advantages of sharing common facilities (general dedicated infrastructure, effluent treatment, solid waste handling etc.) but also of synergies and downstream processing potential. Finally, relocation and modernization is not cheap.

If the industry were to bear the full cost, they would not survive in the global competitive environment, hence a tailored public-private partnership needs to develop to be able to fulfill the main targets of the relocation.

There are several critical factors for successful relocation:

- The introduction of a land 'zoning' policy. Separate areas should be earmarked for housing, green belt and industrial facilities etc.
- Modernization of the tanning and leather product industries including introduction of both mandatory and optional cleaner production methods (such as desalting, hair-save liming, Cr-recycling etc) to be included.
- Relocation also offers the prospect of an introduction of energy saving solutions. These include proper building orientation and use of building materials corresponding to climatic conditions, for example the application of solar energy (e.g. for preheating process water) to generating biogas from solid wastes.
- Strict segregation of streams of "chrome free" and "chrome contained" liquor for easier treatment and possible re-use of sludge e.g. as fertilizer.
- A modular CETP (central effluent treatment plant) provides the flexibility required because of the gradual starting up of the LIP operations.
- Mineral tanning using chrome salts remains the dominant leather processing method for most tanners required for shoe upper, leather-goods, glove and garment manufacturing. Chrome waste management is an important measure; therefore segregation (in individual tanneries), central collection and recovery of spent chrome liquor will be an important part of the pollution control system in LIP.
- Solid waste management should focus on by-product manufacture that on one hand reduces disposed volumes or mass for landfill and, at the same time creates jobs and increases value added on the overall leather production.
- There should be enough space for additional industries e.g. mechanical workshops, chemical suppliers, testing labs etc.

2. INTRODUCTION

This research project and analysis of the formation of Leather Industrial Parks in different countries around the world aims to identify which have been, and remain, the problems associated with their realization and what, on the other hand, has been responsible for their successful completion.

The countries and the parks chosen for this analysis weren't chosen randomly but were selected with the objective of identifying and understanding the reasons why some are successful while others fail or have had difficulties in their realization.
Before going into the details of each single case study, we need to define exactly what is meant by industrial district because the concept of district can bring us to formulate different hypotheses and ways of approaching the research material.

A definition that comes closest to the leather sector is the following:
"An industrial district presents itself as a grouping together of businesses, generally of small and medium size and located in limited and historically determined territory, specialized in one or more phases of the production process and connected through a complex network of economic interrelations"

The English economist Alfred Marshall, in the analysis of the English textile and metallurgical industrial areas in the 19th century argued that … "the district isn't considered only a way of organizing production, but an environment in which the relations between actors are peculiar and representative of a historically and geographically determined social aggregation. The industrial atmosphere is in essence a set of "intangible assets" belonging to a particular social context that results in greater knowledge and know-how which creates a barrier for competitors who do not operate in equal conditions of information and coordination".

From the variety of districts studied in this research project, substantial differences from this theoretical definition arise. In any case, it is possible to affirm that the competitiveness of the districts derives from the organization of production according to the model of flexible specialization, in which the production cycle is divided into phases, and each company specializes in a particular phase, guaranteeing cost reduction, flexibility and innovation.

Globalization of economic systems and markets is putting quite a strain on the stability of districts as previously defined, especially for European countries because of the entry in the global market of new competitors based in low-wage countries.
Some more dynamic companies have developed partnerships with companies very far from them in the belief that they are more advantageous than collaborating with local companies.

All of the leather districts around the world have a reputation, at least among common people, as being the worst plague, disgusting, stinking and polluted areas for making rich tanners richer; few realize that leather working is the recycling of a waste product nor do they ask themselves why a pair of leather shoes (organic material) can last over 50 years.
This is, however, the reality of the situation and some districts have thought about overcoming this dilemma by facing the mother of all battles: the challenge of "environmental sustainability".
It is with this awareness that the following parks have been chosen for this study.

This study includes cases where the parks have been completed or are currently works in progress:

- **Turkey: Tuzla and Bursa**
- **Egypt: Al-Robeky**
- **Bangladesh: Hazaribagh – Savar**
- **Italy: Santa Croce sull'Arno**
- **Ethiopia: Modjo**
- **Mexico: Leon**

and cases where realization is stagnant or has completely failed:

- **Argentina: Buenos Aires**
- **Tunisia: El Fejja**
- **Sri Lanka: Bata Atha**

For each of these parks the following has been analyzed and supported with photographic evidence: the background and context of their historical location, the level of environmental degradation and level of hygiene reached, the relocation projects to new areas and the current problems that have not yet been resolved.

3. TURKEY

3.1. LEATHER IN TURKISH HISTORY

Being a part of human life since the beginning of history, leather is one of the oldest industries in Turkey. Anatolian leather craftsmanship, which is the base of today´s Turkish leather industry, has developed under the influence of different cultures in a vast geography.

Anatolian civilizations over the centuries have used leather by successfully turning it into various products such as clothing, household tools, and musical instruments. Examples of leather tools were first discovered in Çatalhöyük in Central Anatolia (7500 BC to 5700 BC), the biggest and the best protected Neolithic settlement in the region. One of the magnificent civilizations of Anatolia which has been known as a major leather producer site since ancient times, Hittites, is known to have developed the art of aluminum tanning during their brightest era of 2000-1200 BC.

The Anatolian tradition of working with leather advanced when Turks from Central Asia, known for their expertise in leather, migrated to Anatolia in the 11th Century.

Anatolian Seljuk era between 1077 and 1307 represents a period when an interesting synthesis occurred between the culture brought by the Turks from their motherland and the local Anatolian cultural heritage. During this period, old towns such as Sivas and Kayseri stood at the intersection of the East, West, North, and South trade routes. These cities supplied leather goods for traders of the era.

The craftsmanship of Turks in the leather trade advanced immensely during the Ottoman Empire. Fatih Sultan Mehmet (Mehmet II) who was greatly supportive of the leather trade established 33 slaughterhouses and 36 tanneries after he conquered Istanbul, a place that has abundant sources of good water suitable for leather tanning. Constantinople's craftsmen hence started working in these tanneries and slaughterhouses after the conquest. While Istanbul was the leather production and consumption capital of the Ottoman Empire, other regions producing leather in Anatolia flourished as well.

During the 16th and 17th Centuries, Turkish leather trade was at its prime and it became popular overseas due to the intricacy and the quality of the products. "Şahtiyan," a leather production technique created in Anatolia, became world-famous during that period and entered leather terminology in English as the "Turkish Leather."

Tanneries workers

Fur leather

Tanneries workers

Tannery workers

The leather industry's existence in various cities continued with the establishment of the Turkish Republic.
The early years of the Republic oversaw the industry functioning in the same locations of the Ottoman period- small tanneries across Anatolia and most of the industry settled in Istanbul's Kazlıçeşme, the first leather industrial zone ever established and kept running for about 500 years.

Old tannery area outside the old city wall

Tanneries are situated outside of the walls of the old city creating a real leather district that encompasses not only the activities of leather tanning but also laboratories of different size that produce articles in leather for clothing, shoes, bags and accessories.

One of the most successful initiatives taken in the Turkish leather industry happened in 1972 when 35 leather manufacturing companies operating in Kazlıçeşme formed Kazlı Leather Industry Joint Stock Company in İzmit-Köseköy. The largest and the most technologically advanced leather factory at the time, the leather garment sub-section of the company started exports during this period. Kazlı Leather Company was the first Turkish leather company to attend "Semaine de Cuir" in Paris.

Due to the nature and characteristics of the leather tanning process, a large quantity of water is needed. After the tanning process, this water is discharged with all of the contaminating waste that is produced in the process including suspended solids and a

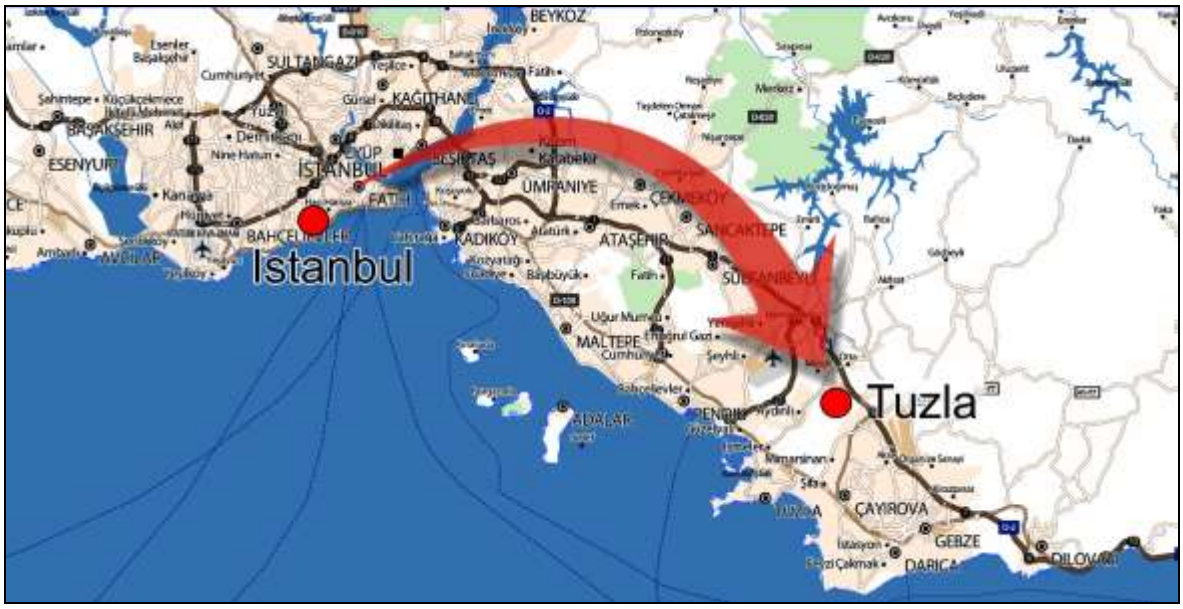
variety of harmful chemical byproducts. Another defining element that characterizes all of the tannery districts is the air pollution created by the use of sulfurs; in the surrounding areas and inside the tanneries that at certain times is unbearable and can be harmful.

Therefore, considering the high level of contamination of the water, solid waste and air produced in the tannery areas, accompanied by the absence of treatment plants until the 1980s, all of the areas and districts in all of the cities around the world have become degraded wastelands. Added to all of this are the grueling working conditions in humid, polluted environments.

From the second half of the twentieth century on we have seen a growing awareness of environmental problems associated with the tanning industry, and this has led to the creation of a long list of social conflicts that have not been completely resolved. Often the responsability has been laid upon the tannery owners and local government to realize treatment plants and facilities.

The wide residential expansion of the city of Istanbul after 1950 rapidly incorporated all of the area of the tanneries outside the old city walls and the neighborhood called Kazlicesme where, together with residences, until 1990 there were about 360 small and large tanneries. It is easy to imagine the working conditions both inside the factories and in the entire area, which is also significantly documented with photographic proof.

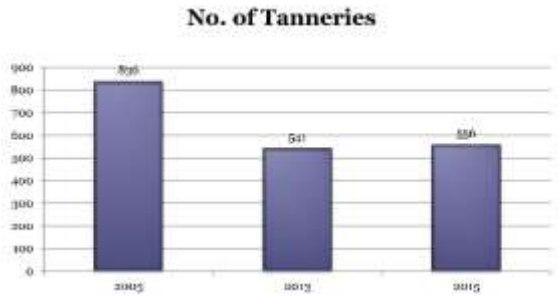
During this period, concerns about pollution inside the city limits urged tanneries of Kazlıçeşme to move elsewhere. In 1986, the first steps towards moving the industry to Tuzla Organized Leather Industry Zone were taken, and the Zone was fully operational by 1992. Over the course of the next years, companies of Kazlıçeşme established themselves in Tuzla. İzmir leather industry also moved from Yeşildere district to Menemen Organized Leather Industry Zone in 1997.

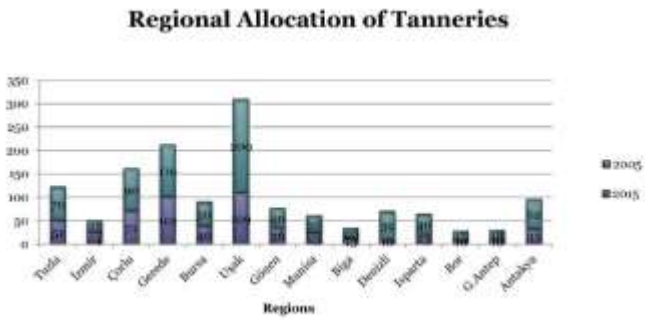


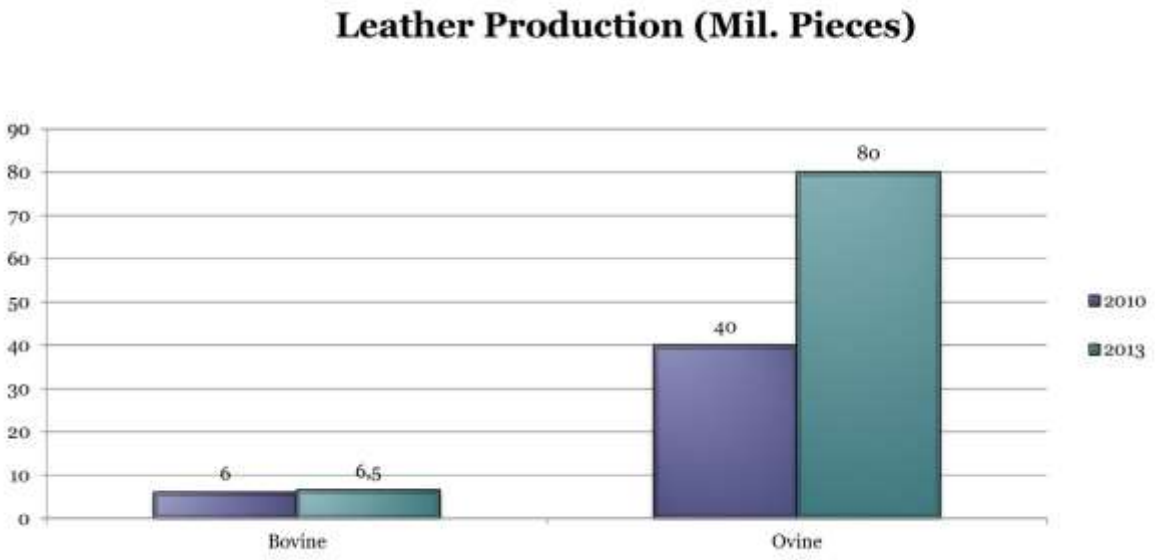
Today, its organized leather industrial zones are equipped with water treatment plants in Tuzla, Menemen, Çorlu, Bursa, Uşak, Gerede, Isparta, Manisa and Gaziantep, and various leather workshops and factories across the country.

Due to a widescale and corageous initiative by the Turkish government, in collaboration with the Ministry of Industry and Commerce, and in accordance with the Association of Tanneries, the process of relocation of all of the tanneries located inside the city to new Industrial Parks has begun.

The most important in terms of production capacity and size is Tuzla which is located, in terms of urban planning, outside of the city of Istanbul (on the eastern side) and flanked next to a major road which links the area to important transports hubs; 5 kilometers from the new airport Sabiha Gokcen and 10 kilometers from the port.








BULGARIA
Black Sea
GEORGIA
Edirne
East Thrace
Bosphorus
Corlu
Tekirdag
Istanbul
Tuzla
Sea of Marmara
Izmit
Sakarya
Zonguldak
Gerede
Pontic Mountains
Samsun
Ordu
Trabzon
Kura
Kackar Dagi 3931
Çorum
Turhal
Tokat
Yeşilırmak
Aras
Dardanelles
Biga
Bursa
Uludag Tepe 2543
Gonen
Ankara
TURKEY
Eskisehir
Sivas
Erzincan
Erzurum
Mount Ararat 5137
Kütahya
Anatolia
Armenian Highlands
Kizilırmak
Euphrates
Aegean Sea
Manisa
Usak
Afyonkarahisar
Lake Tuz
Kayseri
Lake Van
Van
Turgutlu
Izmir
Aksaray
Erciyes Dagi 3917
Malatya
Lake Eğirdir
Nazilli
Denizli
Isparta
Konya
Bor
Demirkazik 3756
Tigris
Batman
Siirt
Siverek
Lake Beyşehir
Seyhan
Ceyhan
Kahramanmaras
Lake Bafa
Karaman
Taurus Mountains
Urfa
Viransehir
Antalya
Adana
Osmaniye
Gaziantep
Tarsus
Mersin
Kizlar Sivrisi 3070
Alanya
Iskenderun
Gulf of Antalya
IRAQ
Antakya
Sea of Crete
Mediterranean Sea
SYRIA

3.2. TUZLA LEATHER INDUSTRIAL PARK

3.2.1. Requirements and development of the park

The project of the new industrial leather district was approved by the Ministry of Industry in cooperation with the Association of Tanners of Istanbul with a special protocol in 1982. A special company, entirely owned by the owners of the tanneries, was created for the management and monitoring of the leather park (IDOSB Istanbul Deri Organize Sanayi Bulges) The Istanbul Organized Leather Industrial Zone.
In 1992 the park was successfully completed and from 1993 on all of the tanneries present in the old district of Kazlicesme in Istanbul were moved to the new park.

The very strategic position of the park immediately attracted a wide range of industries and artisans, also from sectors other than leather, in particular logistics, paper and chemical products. The surface area of the park is 640,000 square meters of which 430,000 square meters were designed for industrial production and the rest for services and equipment. Another large area situated next to the park has been classified as a “free zone” meant to attract Turkish and foreign investors to the area.

3.2.2. Public financial incentives for tannery relocation

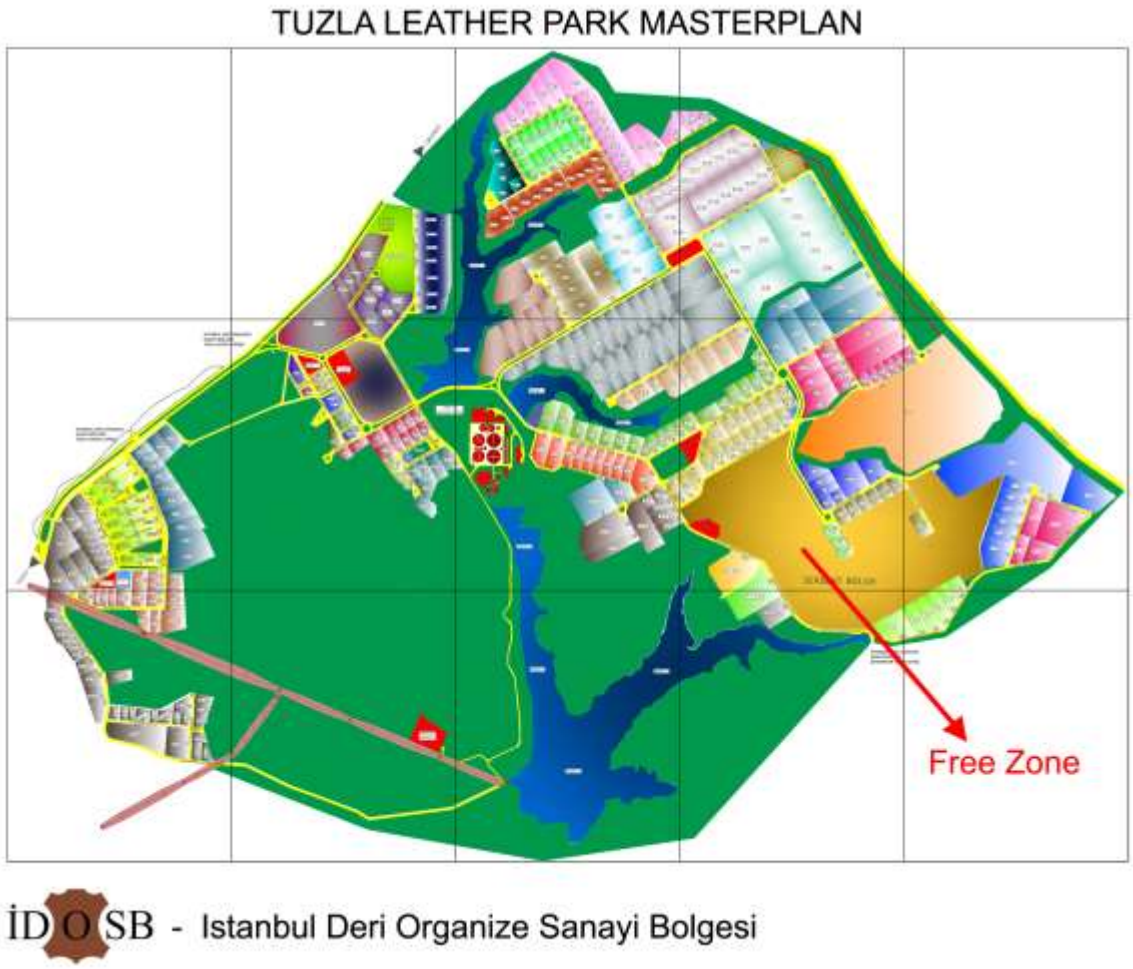
The financial contribution from the Ministry of Industry and Commerce was that of having an active role in the urban planning of the area, buying the terrain from private owners and

building the necessary infrastructure including roads, parking lots, green areas and services such as sewers, aqueducts, electrical and telephone lines.

Tannery owners were then sold the terrain for tannery construction from the government at a very affordable price in order to incentivate relocation. For the old buildings in the Kazlicesme district tannery owners receive economic incentives related to land surface.

The construction of the Common Effluent Teatment Plant inside the leather park was fully funded by the industrialists in the zone. The sludge drying and biogas system, and the water treatment facility were also built without any state incentives. Future projects on the treatment facilities will continue to be funded by the members of the zone.

3.2.3. Masterplan design and sector of activities



The masterplan of the new park and its size was designed not only to accomodate the relocation of tanneries from the Kazlicesme district but also related services and businesses.

As a matter of fact there are many different businesses present in the new park which are related to the tannery industry: mechanical workshops, mechanic garages, maintenance shops, chemical products stores, logistic services as well as all kinds of business services including administrative offices, banks, a post office, restaurants and a mosque. The road system inside the park was designed well and in fact appropriately serves all of the sectors and businesses in the park. The green areas are mostly located on the outskirts of the industrial area along a small river that runs down the area.
There are 386 industrial lots and 366 lots for complementary services and businesses.

In terms of urban planning the district was designed following the contours of the hilly terrain; The treatment plant is correctly placed in a natural depression in the ground which facilitates the sliding of liquids discharged from the tanneries and therefore the flow of the sewers with a natural downward slope.

A large green area and square as well as plentiful parking lots were built in the heart of the district along with two modern buildings which house the offices and administration of the company that manages the district and the headquarters of the National Turkish Association of Tanners. Currently all of the lots in the district are occupied and therefore neither adding new companies nor expanding current ones is possible at the moment.

3.2.4. Management of leather park

The management of the park in its entirety is handled by a company (IDOSB) which is legally recognized by specific legislation; the members of the board of administration are nominated by the Association of Tanners of Tuzla.
The company manages and monitors all of the activities within the park including the treatment plant and the green areas.
The funds for the management are drawn from revenue from water treatment as well as construction and subsequent renting of lots by numerous service businesses present inside the district.
The management firm also manages a company which manufactures ingredients for gelatin and cosmetic products; the proceeds earned from this business are used for the maintenance costs of the area.

3.2.5. Environmental and social benefits

All of the countries around the world (and their governments) where tanneries are present are aware of the need to plan new, specialized leather parks. Unfortunately, it has taken many years for countries to realize the toll that the pollution from these activities takes on the environment and then take the necessary steps to prevent further polluting.
Turkey’s tanning industry accounts for 25% of the European tanning industry and is therefore second only to Italy. Planning of new leather parks started in the 1980s for all cities with tanneries.

Today all of the parks have been completed and most importantly treatment plants were built which allowed for the relocation of the tanneries to the new parks. It was a political and social decision which shows admirable foresight and administrative ability in actuating the relocation program; something which many other countries have not yet been able to realize.

The images found in this report adequately demonstrate the living and working conditions that distinguish the degraded and unhealthy environments in the old leather districts; in fact they are the best proof of the environmental and social benefits of reorganizing the leather districts.

Summing up the advantages for Turkey with regard to the relocation of tanneries to the districts analyzed in this study, the main advantages are the following:

1. Better living conditions for residents in the neighborhood of Kazlicsme and the elimination of odor.
2. Recovery of the abandoned tanneries which have allowed for urban redevelopment and the planning of new green areas and facilities for the whole area. The renovation plan of the Kazlicesme neighborhood (apart from a few buildings that will become residential) includes a large park. The old city walls have been rebuilt and are visible again where they were previously overtaken by the old leather district.
3. Reduction and most importantly monitoring and control of polluting waste from the tanneries, facilitated by the centralization of the plant.
4. Rationalization and modernization of the production process with the use of modern equipment and machinery resulting in finished products of higher quality.
5. Better working conditions in the tanneries due to modernization of drums and the use of automated drums.
6. Lower energy, water and chemical consumption.

3.2.6. Leather park capacity

Currently (December 2015) at the Tuzla leather park there are about 43 tanneries: 30 small tanneries that produce up to 10 tons a day, 10 medium tanneries that produce up to 30 tons a day and 3 large ones that produce more than 30 tons a day for a total production of about 300 tons a day.

In terms of production capacity Tuzla is the biggest leather district in Turkey despite the reduction in tanneries present in the district which has fallen from 145 to 43; as shown in the graph there has been a decrease in the number of tanneries in all of the leather districts in Turkey.

Currently, all types of leather are manufactured in the area as it is possible to process both bovine and ovine rawhides. While the number of bovine and ovine processing tanneries were almost equal ten years ago, some of the ovine tanneries have moved away, and the

zone today mostly consists of bovine tanners producing leather for footwear, accessories, and upholstery. The remaining ovine tanners continue to produce zig leather and shearling from sheep and lamb rawhides.

The majority of the production is sent to the Russian (60%) European (40%) and Chinese (10%) markets.
There are currently about 2000 workers employed in the tanneries.
The production system and the tanning process subcontract very little (something which is much more typical in the Italian system); the majority of the tanneries at Tuzla have a full-cycle production system from raw to finished or raw to crust.

Mosque inside the leather park

Tuzla leather park general view

Polyfunctional building

Menagement headquarter of industrial leather park

By-products and logistic factory

Modern tannery

3.2.7. Effluent treatment

The tannery wastewater plant is a biological one and it is the biggest in Turkey in the industrial sector with a treatment capacity of 36,000 cubic meters a day. A biogas production system and wastewater and sludge drying system have been integrated into the plant.

Only part of the sludge gots through the drying process, the other part is sent to the landfill. There are 35 people employed in operating the plant.

Water for tannery use comes from 2 compounds situated inside the park; they are equipped with a reverse osmosis system to be able to supply the factories with two types of water.
Currently 12,000 cubic meters of water in treated daily. This is due to the reduced quantity of production.
The management company of the district (and therefore the tanners who comprise the company) is responsible for handling all of the costs for the construction of the plants and for their proper function, for their maintenance and for future projects.

Parameters set by national legislation for wastewater in the tanning industry are as follows:
Data from analyses of wastewater is sent to the Ministry daily. The cost for the treatment of wastewater is €0.35 per cubic meter, while the cost of the supply of water to the tanneries is €0.21 per cubic meter. Therefore the entire cost to tannery owners for the supply and treatment of water is about €0.56 per cubic meter.
Currently there isn't a centralized plant for chrome recovery.

CETP satellite view

CETP aerial view

3.2.8. Recovery by-products

Presently, only a part of solid waste from the tanning process are salvaged for other uses: fleshing, shaving and buffing.
The management firm also manages a company which manufactures ingredients for gelatin and cosmetic products; the proceeds earned from this business are used for the maintenance costs of the area.

3.2.9. Considerations and evaluations of Tuzla Park

The intuition of the Turkish government to enact the plan to build 10 leather parks around the country in order to incentivate modernized production in a more than thousand year old tradition for Turkey is admirable. All of the tanneries used to be present in the main cities

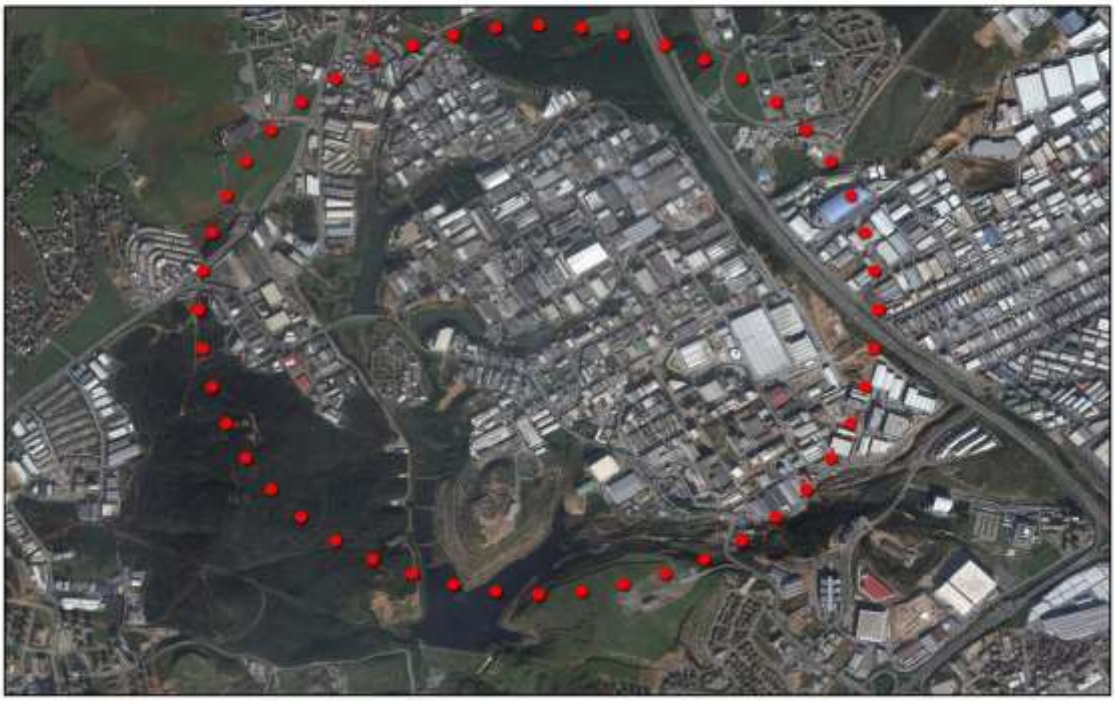
which was incompatible with urban development but also a great limitation on future development and renovation.

The location of Tuzla park was correct at the time when it was being planned and it was placed in a strategic position; in fact Istanbul was not expected to grow so much in recent years and consequently it has been surrounded by residential districts due to urban expansion just as Kazlicesme was.

It is also probable that there was an error in calculating the surface area; as shown by maps, the new park is completely surrounded by other industries which means that it will not be able to expand in the future. In fact, requests for new tannery construction has been re-routed to the Bursa district which isn’t completed yet.

Another thing that wasn't properly taken into consideration was the allowance of companies and factories from other industries/sectors (not tied to the tannery industry) to move into vacant lots following the crisis and the removal of 100 businesses from 2005-2015.

Tuzla Deri OSB, June 2002



Tuzla Deri OSB, December 2015

Under a strictly urban planning and functional profile the surface area of parking seems to be insufficient and above all a high parameter of covered surface area allowed on every lot of terrain. The consequence is the overuse of the areas at a disadvantage for uncovered free space which would have been useful for tannery activities.

In terms of environmental sustainability and waste/pollution reduction, the area is missing a centralized chrome recovery plant and this means that the final destination of the majority of sludge with a high level of humidity is the landfill.

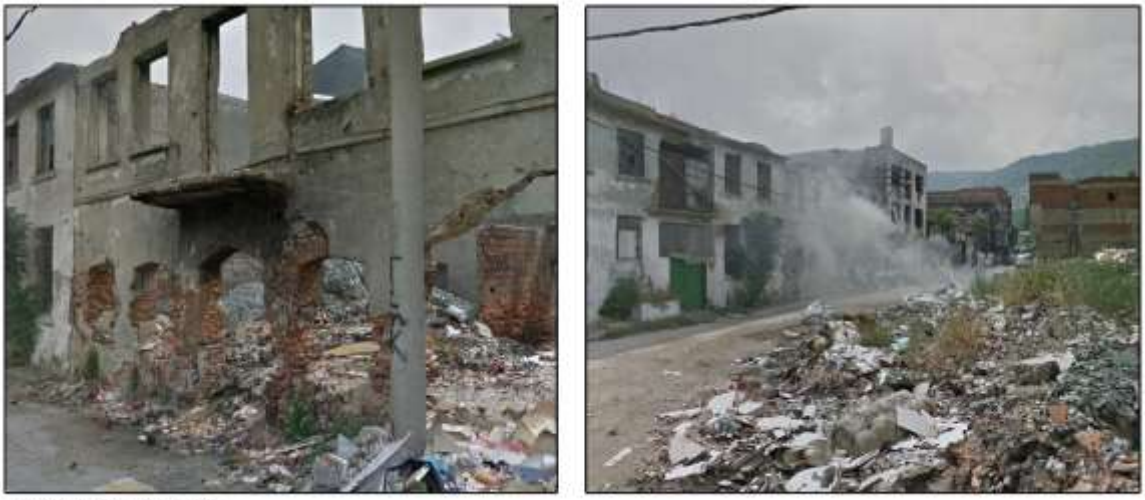
It must be said however that Turkey has established the foundations for well-planned leather parks and that this park could represent the first step for future improvements, even environmentally.

3.3. BURSA LEATHER INDUSTRIAL PARK

3.3.1. Cycle of planning

The project for the relocation of the existing tanneries inside the city of Bursa is part of a bigger program of leather district planning by the Turkish government since the 1980s.
Also in the case of Bursa, the tanneries were located inside the residential area of the city creating inconvenience for the residents including bad odor but above all the lack of a treatment plant and the inability of the development of one.

It is noteworthy that before 1934 the tanneries were actually inside the historic city center. At that time they were moved to an outlying area by of a special ordinance from the city government. The map and the photographs show the status of the areas occupied by old, decommissioned tanneries and some recent specific urban renewal projects for that area.
This is yet another case that shows how the relocation of tanneries not only solves environmental problems but also creates the opportunity for urban renewal with the forecasting of green areas and new projects for better living.



Bursa old tannery area

The masterplan of the new leather park was designed by the Ministry of Industry and Trade in 1994 and finally approved in 1998. The location of the district, at a remarkable distance from the city of about 40 km, near the village of Badirga proved to be quite unique. The position proves to be quite strategic as it is only 5km from the Istanbul-Smyrna highway.

A special company, entirely owned by the owners of the tanneries, was created for the management and monitoring of the leather park (BIDOSB Bursa Ihtisas Deri Organize Sanayi Bolgesi)

The completion of the park finally took place in 2008, 10 years after the project was approved by the Ministry of Industry and Trade. In 2010 about 15 tanneries had already moved to Bursa Leather Park.

The entire surface area of the project is about 18 million square meters of which 640,000 are divided into 143 lots for industrial activity.

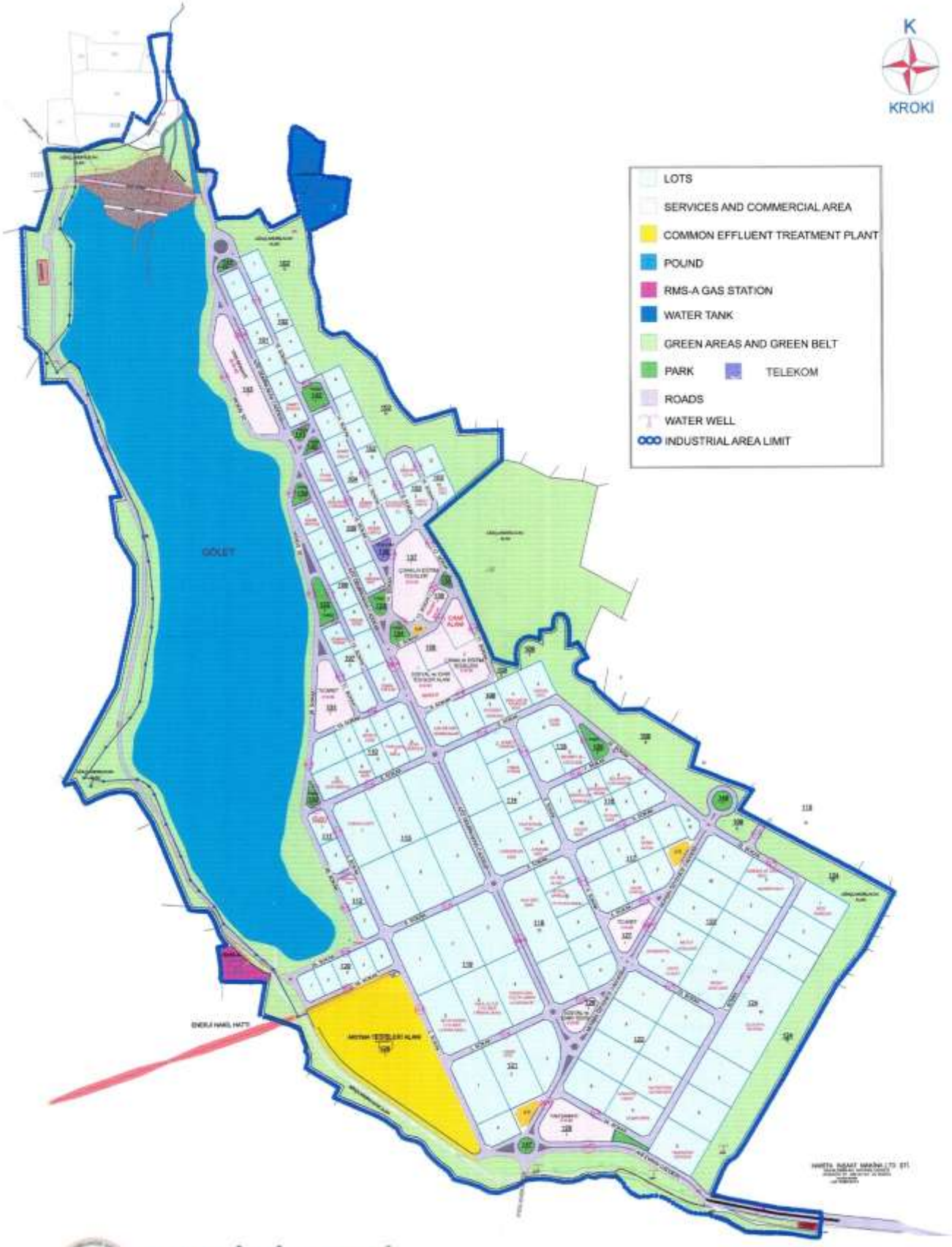
3.3.2. Public financial incentives for tannery relocation

The entire operation for the realization of the project and of the infrastructure was financed in the initial phase by the Bursa Chamber of Commerce and later by the Ministry of Industry and Trade; even the central tretment plant and the latest new building for the Management Company of the park were financed by the Ministry.

Also in this case the tannery owners received the terrain for the construction of the new tanneries at a very affordable price by the government.

For the old, decommissioned tanneries in the city of Bursa, tannery owners received facilitations to re-use the area for more attracting urban destinations.

BURSA LEATHER PARK MASTERPLAN



BURSA İHTİSAS DERİ
Organize Sanayi Bölgesi

3.3.3. Masterplan design and sectors of activities

The location of the new leather park of Bursa, in regards to landscape, is optimal; It has a low impact on the scenery of the area as it is located in a valley which is well hidden from sight and it is sufficiently far-removed from any residential area as to not plague them with bad odors.

The plan provides lots for buildings for complementary activities and tannery support companies e.g. mechanical garages and repair shops, chemical product warehouses, administrative and social structures; at present these structures aren't numerous but they are likely to increase in the future.
Another great feature of the park is that in this area there is the possibility of future, consistent expansion.

An important distinguishing feature of the area is the artificial lake which is used to supply the tanneries with water; it has a surface area of about 40 hectares and is not only vital to the industrial area, but also adds to the attractiveness of the terrain.

On the whole I can affirm that the urban planning of the leather district of Bursa is one of the best that I have visited the world over.
At present the only thing missing is the extension of the 5km section of road that links the district to the Istanbul-Izmir highway and greater attention paid to road and green area maintenance.

There are a total of 143 lots for industrial activities. The network of roads (some tree-lined) inside the park is well designed and appropriately serves all of the areas and lots in the park. The green areas are located on the outskirts of the industrial area and along the artificial lake.
The treatment plant is correctly situated in a natural depression in the ground which facilitates the sliding of liquids discharged from tanneries and therefore also the flow of the sewers with a natural downward slope.
The only negative element is the limited number of parking spaces inside the area.

3.3.4. Management of leather park

The management of the park in its entirety is handled by a company (BIDOSB Bursa Ihtisas Deri Organize Sanayi Bolgesi) which is legally recognized by specific legislation; the members of the board of administration are nominated by the Association of Tanners of Tuzla.

The company manages and monitors all of the activities within the park including the treatment plant and the green areas.
The funds for the management are drawn from revenue from water treatment by the tanneries.

3.3.5. Environmental and social benefits

All of the tannery relocation projects from residential areas to specially designed leather districts are meant to improve the natural environment and also the social environment.
The transfer is not just a relocation of industry but also includes the construction of new, modern buildings; the use of new and updated technologies and equipment; the reduction of chemicals used; better safety conditions and health and working conditions and especially the centralization of waste treatment.

Only with centralization is it possible to monitor the compliance to the parameters of waste discharge. In many cases, relocation also represents an important step in modernization in terms of production and organization within the companies, often from a family business to an industrial enterprise. Further positive features of relocation are the qualification of the workforce which typically generates social growth.

3.3.6. Leather park capacity

Currently at the Bursa leather park there are about 20 small tanneries that produce up to 10 tons a day, 6 medium tanneries that produce up to 30 tons a day and 3 large ones that produce more than 30 tons a day.
At present there are mostly bovine tanners producing leather for footwear, accessories and upholstery.

The majority of the production goes to Russia (60%), Ukraine (20%) and the local market (20%).

There are currently about 1200 people employed in the tanneries.
The production system and the tanning process subcontract very little (something which is much more typical in the Italian system); the majority of the tanneries have a full-cycle production system from raw to finished or raw to crust.

Bursa, August 2011

Bursa, July 2015

3.3.7. Waste Treatment

The treatment plant for tannery waste and discharge has a treatment capacity of 8,000 cubic meters a day; The volume that is currently treated is around 2,500/3,000 cubic meters a day considering that production at the park is not at full capacity.
Parameters set by national legislation for wastewater in the tanning industry are highlighted in the analysis of Tuzla park.

The sludge undergoes only minimal dehydration as it is pressed with a round baler and subsequently sent to landfills. A huge canopy was built to store the sludge under in order to keep it away from rainwater. There are 4 people employed in the operation of the plant.
The water used by the tanneries comes from an artificial lake located within the area. The park management company and therefore the tannery owners are responsible for all costs incurred for plant construction, operation and maintenance.
The cost for the supply of 1 cubic meter water, and of the treatment of 1 cubic meter of wastewater, is €0.60. At present there is the chrome recovery plant within the CETP.

CETP satellite view

CETP

3.3.8. Recovery by-products

Currently only a small part of solid waste from the tanning process (fleshing, shaving and buffing) are re-used in the production of gelatin.

3.3.9. Considerations and evaluations of Bursa leather park

The location of the park is advantageous from a logistical point of view and is also befittingly isolated from residential areas and not visible from nearby villages. The park is completely urbanized with all of the necessary networks and has the capacity to hold at least 20 more medium sized tanneries.

The covered areas of the lots is more adequate in this case and therefore the space for maneuvering and parking outside the tanneries is greater.
As mentioned in the Tuzla master plan the public parking area seems undersized, and the plan lacks the design for a large square which could be appropriately situated along the artificial lake.

In terms of environmental sustainability there are still many steps to be taken for the treatment of sludge, the reuse of solid waste and last but not least a reduction in the total waste produced by the factories**.**
These are problems still present in all of the leather districts in Turkey.

At a distance of about 1 km from the park another industrial zone is being constructed for the textile industry which could allow for the synergy of the service businesses available and the general infrastructure.

Considering that Tuzla park is completely filled up, and the fact that unconnected industrial activities filled up the tannery vacancies there, the only alternative for future development close to Istanbul is Bursa.

3.3.10. Analysis and final evaluation of Turkish leather park

Turkey is going through a challenging phase not only for the international crisis and globalization of markets which favors low-wage countries, but mainly for difficulties in relations with Russia, their biggest export market for leather and shoes.
The characteristics of the present-day global market can't be blamed completely for the current crisis as there are reasons from some years back as well, including:

- Turkey is a big producer of ovocaprine leather and for many years these hides were double-faced or sherling tanned, which was in fashion for many years around the world but especially in northern European countries and in particular Russia. This hide made Turkey a fortune and solidly engaged its tanneries until the 1990s. The crisis of this particular product was the first difficulty encountered and from that moment it became necessary, at least in part, a reconversion of the tanneries in order to process cowhides. The processing of lambskin is currently used to produce Nappa leather but it's a cheap, low quality product which doesn't produce much added value.
- Another contributing factor to the crisis was the fall in demand by the military for leather accessories and shoes, having greatly curtailed their numbers. The main suppliers of these products, including vegetable tanned leather for shoe soles, were the tanneries located in Denizli. These tanneries now operate for the belt and sandal sectors.
- The market of footwear and leather goods for export is likewise involved in the general crisis. This is because historically Turkish tannery owners are also the owners of leather clothing and shoe factories that use their own materials for the finished product.

Despite this particularly challenging phase, the Turkish tanning industry is investing heavily in marketing and in promoting their production quality so as to get a foot in the door in terms of producing for the high fashion market; in fact there is an ever growing participation in international trade fairs supported by the Turkish Leather Council.
Simultaneously idea and design contests have been organized with a special exhibition entitled "The Leather Age" as well as consulting services for model patents and brands.

Turkey, advantageously boasts the presence of a special University Department called "Leather Engineering" and numerous research centers e.g. Tubitak.
The Turkish Leather Industry has a demand of 6.5 million cowhides and 60 million sheepskins; in order to reduce the need to buy raw skins from abroad, the president of the Leather Promotion Group (DTG) has recently called for the skins of animals slaughtered during the sacrificial festival (about 2 million sheep and 600,000) to be preserved in the best way possible as he declares that they comprise a part of national heritage.

Considering the scenario presented here it is quite difficult to expect, in the short term, significant investment, in addition to what has already been done, in reducing environmental pollution.

Finally, Can the leather parks in Turkey that have been included in this study been considered a success? What are the problems that have not yet been solved and what are the prospects for the future?
The answer to the first question is "yes"; the answer to the second question is that there is still a lot of work to be done in terms of environmental sustainability and the reduction of pollutants.

What are the elements that constitute success?

- efficient time management: about 10 years from the planning phase through to the realization.
- The economic and financial support of the Turkish state, especially for the most vulnerable districts e.g. Bursa, for the realization of urbanization works and the treatment plant.
- Authoritativeness in having relocation time parameters respected.
- Recognition of the governance of the parks entrusted to companies controlled directly by tanners;
- Quality of projects for the regeneration of brownfield sites and disused areas left behind by tannery relocation, above all in the neighborhood of Kazlicesme.

The most important and urgent interventions for environmental protection are the following:

- Technological and systems innovations in centralized treatment plants to reduce the volume of sludge
- Treatment of sludge by dehydration, drying and subsequent reuse in other industries without recourse to discharge in landfills.

Bursa deri OSB head office

Bursa artificial pond

Tannery under construction

Kardersan tannery

Bursa landfill with CETP sludge store

Bursa environmental context

Bursa old tannery area - satellite view

Bursa old tannery are - aerial view

Old tannery area re-use proposal

Old tannery area re-use proposal

4. ITALY


GERMANY
Munic
Linz
Vienna
Bratislava
SLOVAKIA
Freiburg
Salzburg
AUSTRIA
Basel
Zürich
LIECHTENSTEIN
Innsbruck
HUNGARY
Graz
SWITZERLAND
Klagenfurt
Bolzano
SLOVENIA
Ljubljana
Zagreb
Trento
Udine
Magenta
Arzignano
Aosta
Brescia
Verona
Milan
Venice
Turin
Padua
Piacenza
Parma
Ferrara
Alessandria
Modena
BOSNIA AND
HERZEGOVINA
Genoa
Reggio
Emilia
Bologna
Ravenna
CROATIA
Savona
Rimini
FRANCE
La Spezia
Carrara
SAN MARINO
Forli
Sarajevo
Sanremo
Florence
San
Marino
Pesaro
Nice
Pisa
Urbino
Ancona
MONACO
Livorno
Cannes
Arezzo
Split
Mostar
Siena
Perugia
Ascoli
Piceno
Bastia
Grosseto
Adriatic Sea
Terni
Pescara
Vitetto
L'Aquila
Corsica
Civitavecchia
Ajaccio
Corsika is
Tivoli
Vatican
City
Rome
(Roma)
Campobasso
Foggia
Andria
Bari
Porto Torres
Olbia
Caserta
Napoli
Solofra
Sassari
Matera
Brindisi
Siniscola
Potenza
Taranto
Tyrrhenian
Sea
Sardinia is
Oristano
Otranto
Mediteranean Sea
Cagliari
Cosenza
Crotone
Catanzaro
Ionian
Sea
Messina
Sicily
Palermo
Trapani
Taormina
Reggio di
Calabria
Mount Etna
Enna
Catania
Agrigento
Syracuse
Gela
ITALY
National capital
Administrative region capital
City, town
Major airport
National boundary
Main road
Railroad
Santa Croce sull'Arno
ALGERIA
TUNISIA
MALTA
N
0 50 100 150 200 km
0 50 100 mi

4.1. ITALIAN LEATHER INDUSTRIAL PARK

The Italian leather industry has always been considered the world leader in terms of product quality, technological development, environmental involvement and style innovation. The leather industry is organized in three regional districts that have unique characteristics and peculiarities in terms of products produced, processing and organizational models.

- Arzignano (Veneto region - northern Italy) represents the largest in terms of quantity of production and workers (53% of the national total), and it is composed of small-medium businesses and large industrial groups that are specialized in large cowhide for upholstery, car interiors, shoes and leather goods.
- S. Croce sull'Arno (Tuscany region - central Italy) is the most famous because of the importance given to production quality (28% of the national total); Santa Croce is considered a poly-centric district because it has appendices in the surrounding cities of San Miniato, Fucecchio and Castelfranco di Sotto. It's renowned for it's high level of craftsmanship and flexibility and it's close relationship with the world of high fashion.
- The tanneries in Santa Croce work mainly with calfskin and cowhide of medium size. In the adjacent area of Ponte a Egola the real local specialty is the production of sole leather.
- Solofra (Campania region - southern Italy) is specialized in processing Sheepskin for use in clothing, footwear and leather goods (8% of the national total);
- Magenta (Lombardy region - northern Italy): Few tanneries mainly specialized in the production of sheep and goat skins for haute couture, whose total value is just over 5% of the national total.

Altogether, in December 2015, the total number of Italian tanneries including small and medium enterprises was 1254, which in total employ 18,000 employees.
The Italian share of European leather production is 65% while the share of global leather production is 18%.

4.1.1. Types of product

The main types processed by the Italian tanneries are cowhide (79% of total), sheep and goat (20%), whose supply dynamics depend on slaughtering and meat consumption. Less than 1% is attributed to other species (pig, reptiles, deer, kangaroo, etc..)

Footwear is historically the main use for these leathers (43% of tanning production), followed by leather goods (25%) which has grown in recent years that to the success of some
international fashion houses. The following are listed in terms of importance: furniture upholstery (15%), car interiors (10%) and clothing (5%).

4.2. SANTA CROCE SULL'ARNO LEATHER INDUSTRIAL PARK

4.2.1. Background

The first tanneries settled in Santa Croce at the beginning of the 1800s and grew steadily throughout the nineteenth century. In 1865 there were already 10 tanneries in the area, and 10 years after that the number rose to 15, employing in total 150 workers. By the end of the century that number had grown to 32, with a total number 1,280 tanning vats.

During this time in Santa Croce there were 439 workers employed in the industry, 70 of which were under the age of 15, and sources indicate that 2 structures were already technologically ahead of their times on a national level in that they had already installed mechanical motors for the power supply of the drums.

In the 1900s the tanning industry grew exponentially, especially in the second half of the century, specifically between 1950 and 1980.

Together with the long history of tanning in the area we can find protests; dating back to 1855 there were complaints about the fumes of soaking skins to the point that the governor of San Miniato urged the governor of Santa Croce sull'Arno to relocate the tanneries outside of the city to resolve the problem of the stink associated with waste and discharge. One of the main sewage drains was in fact called "The Leather Rio" and in 1898 laws were enacted to protect workers from dangers at work. Subsequently more laws were enacted to protect workers from accidents and diseases associated with working in the tanneries, including Anthrax which workers contracted from bacillus found in the skins and hides.

After the end of World War II, the industry expanded and became part of the urban fabric of the municipal areas in the District. This area has always been traditionally linked with the processing of leather. Its roots lie in the craftsmen who once ran small tanneries in their own homes. With the passing of time, production expanded, making use of the gradual introduction of new technologies and acquiring increasing importance on the reference markets.

Santa Croce sull'Arno (Italy)
Leather District
ITALIE EN TOSCANA
LEATHER DISTRICT

4.2.2. The tanners association

The Tanners Association of S. Croce sull'Arno and the Tanners Consortium of Ponte a Egola are the political and logistics wing for the tanneries spread across the territory, and fulfill an important support role in industrial development of the district, by assisting companies in projects to transfer their plants from residential areas to the industrial areas and by adaptation for the industry of new water, land and environment related regulations. The Associations also offer assistance to associated companies on the subjects of accident prevention, workplace hygiene, financial concessions, research, professional training, contracting and other services.

They have gradually implemented foreign sales development, promoting and coordinating participation in international exhibitions and trade fairs. The growing interest in exporting abroad by tanneries in the District is proven by their percentage (representing 65-70%) of participating Italian tanneries in international industrial trade fairs, and associated companies now have business relations with all countries of the European Union, the United States, Canada, Asian countries, China, Japan, Hong Kong, Korea, sub-Saharan Africa, Central and Southern America and Eastern Europe.

The Tanning District of Santa Croce sull'Arno represents one of the main strongholds in the leather sector at both Italian and international levels. As already mentioned, investments made over the years in environmental protection, by companies forming the Tuscan Leather District, have been considerable. A priority objective for District companies, acting as a consortium, is to reduce to a minimum the environmental impact on the territory and at the same time satisfy the production needs of individual businessmen. Working together as one on common projects, it has been possible to sustain the investments, which from 1970 to date amount to 1.500.000,000 Euro, placing the Industrial District at the forefront in the environmental field.

4.2.3. The secret of success

The extensive production capacity of the companies is the basis for the commercial success of the Industrial Tanning District of S. Croce sull'Arno. The expertise of the entrepreneurs in seizing market opportunities and the know-how in adapting to change imposed by society have led to the achievement of exceptional results in an area comprised of companies with an average of twelve employees each. The Tuscan tanneries have succeeded in transforming themselves from simple home-based firms into complex creative industries, employing specialist personnel, stylists, chemical experts and sales staff with longstanding experience on the subject, deriving from years spent travelling in leading countries of the world.

Out of the Industrial Tanning District of S. Croce sull'Arno come the trends which characterize leather for fashion and which influence the choice of leading companies in the fashion world. The Tuscan tanneries have gradually become consultants to designers such as Armani, Versace, Luis Vuitton, Gucci, Prada, Cavalli and many others. Born from the

synergy between these famous names and the Tuscan tanneries are the creative ideas and leathers we find every season in the windows of the most prestigious boutiques in the world. Research and innovation are the foundations of this phenomenon. The entrepreneurs work with trend research teams and creative, famous designers, who represent one of the most important elements of production activity. Trend research and continuous technical testing of materials render this area a true melting pot of ideas, leading to regular discoveries and frequent inventions in the design field. It is sufficient to mention "pony skin" and "ostrich skin", materials developed within the Industrial Tanning District of S. Croce sull'Arno and which have conquered the world's leather goods, clothing and footwear markets. The attention and quality constantly sought by individual companies in their production requires careful control of every skin produced. The task is facilitated by the widespread use of modern technologies in the production process, but the secret of the success of the Tuscan tanning industry lies in its obsessive attention to every single detail.

4.2.4. The great challenge

If on the one hand, the force of the Industrial Tanning District of S. Croce sull'Arno can be attributed to the noteworthy production capacity of the companies, on the other the value acquired on the international market by Tuscan tanneries may be sought in the philosophy with which the principal business topics of skin tanning have been confronted. The reference topic is the environment, without which it would not have been possible to maintain this rate of production. Rendering development sustainable became necessary when the Italian Government decided to establish solid and fundamental regulations for environmental protection, imposing prohibitive parameters upon the pollution produced by the companies.

Rather than equip each company with a treatment system, the district philosophy thought to create special solutions for each kind of problem posed by the leather industries. As a result, there are three treatment plants in the district, each day receiving the wastewater from all the tanneries, treating it as a single discharge. And it is for this reason that there are companies specializing in the recovery and disposal of so-called "by-products" of the tanning industry established around the Industrial Tanning District of S. Croce sull'Arno. The development of this network of companies specialized in pollution control was possible due to the concerted efforts with which the public authorities and tanners, via the industrial associations, confronted the situation.

4.2.5. The future

Company expansions, penetration of "new markets", greater implementation of new technologies, increased training and further development of environmental topics. These are the salient points to be confronted in the future by the Industrial Tanning District of S. Croce sull'Arno.

The dimensional characteristics of Tuscan tanneries have allowed the safeguarding of market shares on the international scene, since they can count upon far-reaching flexibility

and upon a working environment based on maximum harmony between owner and workforce. The objective for the coming years will be that of increasing the production capacity of the companies, yet maintaining the quality and strongpoints that until now have guaranteed the excellent results achieved by Tuscan companies. To participate in the globalization process and be measured against the rest of the world right now means increasing the production capacity of the individual businesses.

The exploration and monitoring of commercial outlets will act as constant for the next few years, with a close eye kept on those countries satisfying the requirements of excellence. A clear reference is to China, an economic power which under the guidance of the current government is making colossal attempts to come into line, from all points of view, with the leading world industries. Growth in China may represent an opportunity for the economy of the Industrial Tanning District of S. Croce sull'Arno, albeit a profound knowledge of the characteristics of the Chinese market is still relative. The desire to compare with this country, demonstrated by companies of the Industrial Tanning District of S. Croce sull'Arno in recent years, leads to an assumption of production moves between the two countries. Numerous scenarios are imaginable. A fundamental step forward in the future of the Tuscan tanning industry will be that of the maximum possible implementation of new technologies in the production process and business management, safeguarding the human factor, a fundamental element in the creation of articles which the entire world envies and attempts to imitate.

And this topic is strongly linked to improvement in the quality of staff employed in tanning, from apprentice to company manager. A delicate step, yet fundamental for company growth. As important as the continuation of the environmental policies adopted by the Industrial Tanning District of S. Croce sull'Arno.

The centrality of these two aspects, training and environment, has led to the founding of the Po.Te.Co. tanning technology centre, a structure in which both companies and public authorities participate.

PO.TE.CO Centre

On its premises, Po.Te.Co. has a modern experimental tannery equipped with the basic machinery for wet processing and finishing of skins. It also has a laboratory equipped for physical tests on skins, with the basic machinery used for characterization of the finished leather. This equipment allows technicians to develop research activity on materials and production solutions which will allow the Tuscan tanning system to optimize its operational procedures and improve environmental standards, studying methods to eliminate the pollutant substances used in tanning.

Po.Te.Co. is also the reference contact for all that concerns training in the tanning sector. In fact, it arranges many courses for both the unemployed and workers. Two three-year degree courses in Chemistry and Chemical Engineering for the Tanning Industry are already operative, created in collaboration with the University of Pisa, the Tanners Association of S. Croce sull'Arno and the Tanners Consortium of Ponte a Egola. With regard to high school education, Po.Te.Co. offers work experience periods for fourth and fifth year students of the technical high school ITIS Cattaneo of San Miniato (tanning chemical technician diploma).

Given all of this, the Industrial Tanning District of S. Croce sull'Arno plays a leading role in the international context. The art of tanning is in its DNA, and its know-how of environmental problems is the added value that may become fundamental in the future.

The important challenge of the international tanning world is to become compatible with the environment, and the District commenced investments in this aspect already 30 years ago. It is now a leader in the field and can become the ideal partner for businesses aiming to grow, in full respect of the environmental system.

Everyone will need to face the demands of our planet, sooner or later, but what is important is to be ready to solve the problems.

4.2.6. Environmental protection

In collaboration with various associations, local tanning companies have worked together to deal with the following issues:

- the construction of centralized water treatment plants
- the setting up of industrial zones
- the recovery of processing by-products
- the re-use of water treatment sludge

to create an efficient organization of "cooperating companies" composed of the following consortiums: Water treatment consortiums, Consorzio Aquarno, Consorzio Cuoiodepur, Consorzio Recupero Cromo, Ecoespanso, Consorzio S.G.S., and Consortiums for urbanisation, advertising and exports;

Together with these companies, tanning enterprises have been organizing a widespread range of collective initiatives necessary for environmental protection.

Aquarno CETP - Aerial view

Aquarno CETP

Aquarno CETP

Aquarno CETP

Aquarno CETP

Ecoespanso

Cuoiodepur

4.2.7. "Collateral Management Companies"

The efforts made by the various companies to protect the local environment have been considerable from both organizational as well as economical viewpoints: costs for water treatment as of 31/12/2014 totaled 1,813 MILLION EURO, while other investments for hundreds of millions of euro have already been programmed for technological upgrading of plants and equipment.

Excellent collaboration and teamwork by both public administration and private companies has meant that de-pollution work has been financed by public as well as private investment.

It is a well-known fact that environmental problems are not limited to water treatment, but also involve the wide-scale production of sludge and processing by-products which can be recovered for re-use in other sectors. The very large-scale and extremely complex initiatives necessary for these operations were undertaken each time by the following bodies:

- Consorzio Depuratore di Santa Croce sull'Arno Spa

474 private companies worked together as a consortium with the Municipality of S.Croce s/Arno, to finance the construction of the centralized S.Croce sull'Arno water treatment plant which has a treatment capacity of up to 30,000 cubic meters of waste per day. The plant employs a staff of 8 operators.

- Consorzio Aquarno Spa – Effluent treatment

This is a mixed consortium composed of a majority of private companies and the body which manages the S.Croce water treatment plant. The plant deals with all the industrial waste (approx. 3,600,000 cubic meters a year) and urban waste (about 1,000,000 cubic meters/year) from the municipalities of S.Croce, Castelfranco and Fucecchio. With the Consorzio Depuratore (Water treatment consortium) these three municipalities form the Aquarno social structure that employs a staff of 50.

The centralized WWTP in Santa Croce sull'Arno receives wastewater produced by the whole industrial area on the right bank of the river Arno within the Tuscan Leather District. This implies that 95% of incoming flow is tannery wastewater while the remaining 5% arises from minor manufacturing processes or extra-fluxes which arrive by tankers. That condition makes the industrial stream flow very similar to a tannery wastewater which is known to be very difficult to cleanse.

The intrinsic characteristics of industrial wastewater, present several unfavorable issues for conventional activated sludge (CAS) process. However, CAS was the selected process for many years in the past in combination with a heavy physico-chemical treatment which produced huge quantities of excess sludge.

Since 2002, thanks to the "Tutto Biologico" process and the structural interventions for the construction of a second biological oxidation stage, it has been possible to limit an untenable situation such as the tannery sludge issue. At present time the industrial section of the plant has got a total volume of about 135.000m3 spread through 34 tanks with different inner volumes that could vary from 100 to 15.000m3. This arrangement allows an internal wastewater residence time of about one week (seven days) ensuring the compliance with the legal limitations for the final discharge.

The critical issues related to well known treatment recalcitrance of tannery wastewater, required special solutions which have been continuously studied and optimized over the years. Here below it is reported how these arrangements have been implemented in the present plant.

- Ecoespanso srl

This is a mixed private and public company, with a majority of private shareholders, which was set up especially to organize the project design, construction and management of the plant which processes the sludge produced by the local treatment plants on the right bank of the Arno. The treatment capacity totals about 100-120,000 tons per year, and the treatment sludge is transformed into inert materials.

This processed sludge is completely recycled for other productive operations, and no waste is sent to public dumps. In short, Ecoespanso is able to close the whole treatment cycle without producing any waste. This plant employs 35 in staff.

The upgrading of treatment plants and related technologies, have significantly reduced the amount of excess sludge to dispose of. Throughout the past 20 years the excess sludge production has dropped from 180.000 tons/year in 1995 to 15.000 tons/year in 2015. Despite this, the massive flows still remain huge and the landfill disposal has shown some problems connected, firstly, to the volumes needed by this kind of solution. As a consequence of this, an alternative method has been studied, which would reduce the overall volume of excess sludge and allow its reuse as recovered second raw material MPS at the same time, closing, this way, a virtuous recycle started from the waste.

The Ecoespanso s.r.l. plant was built in 2001 to solve the environmental issues related to the excess sludge disposed of in landfills, in order to improve the environmental sustainability of the whole tanning process.

Since July 2014 Consorzio Aquarno has been managing the Ecoespanso plant and it has carried out some little rearrangements, also due to new synergies between the two plants and their needs.

Ecoespanso premise is almost fully dedicated to the treatment of Consorzio Aquarno's excess sludge, whose production, since June 2013, has increased significantly. The final product of Ecoespanso's process is the sintered granules (KEU) which is usually mixed with Calcium Carbonate to make the filler mixes HSC and HBC. The first one is used as a

component for the production of cement, while HBC could be used for the production of asphalts.

Ecoespanso is authorized to manage a plant able to store, centrifuge and treat waste sludge produced by the WWTPs on the right bank of the river Arno. Excess sludge is regularly conveyed to the facility by means of a "sludge-pipe", a special pipeline which links together the two wastewater plants (Fucecchio and Santa Croce sull'Arno), to the final sludge treatment plant in Castelfranco di Sotto.

Ecoespanso has a maximum treatment capacity of about 20.000 ton/y of dry substance which corresponds to a sludge flow of more than 500.000m3/y; that is more than currently produced by Consorzio Aquarno.

- Consorzio Cuoiodepur Spa

This is a mixed private and public company, with a majority of private shareholders which forms the company that set up the construction and management of the treatment plant for the tanneries in Ponte a Egola and San Romano. It is composed of 155 member companies, which work together with the Municipality of San Miniato, to form a social structure. The consortium plant has a processing capacity for 10,000 cubic meters of waste per year and treats an average of 1,300,000 cubic meters of industrial waste a year, plus about 1,200,000 cubic meters of annual urban waste. 40 operators are employed in the plant. The treatment plant also includes a thermal waste sludge drying system to stabilize the sludge for use in other sectors. The treated sludge is used for building materials and as fertilizer for farming. The drying plant has a potential operating capacity of 7,000 Kg of water per hour, transforming approximately 85,000 tons of damp waste sludge per year into about 36,000 tons of dried stabilized products.

- Consorzio Recupero Cromo Spa

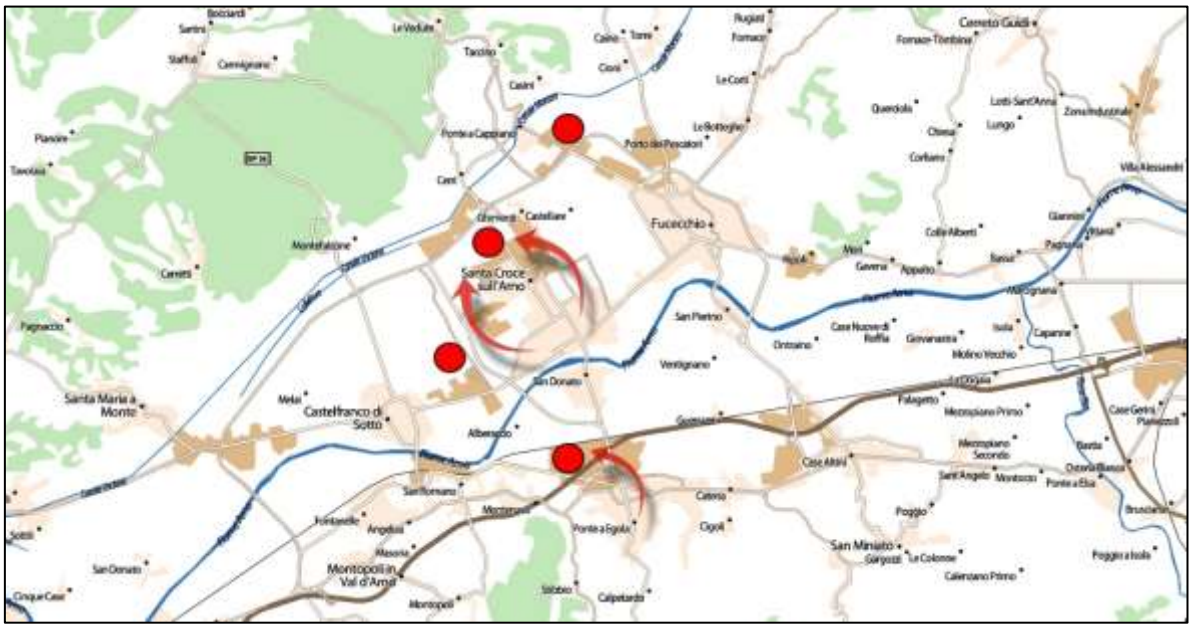
This private company is composed of 240 member tanning companies from all over the district. These companies send the exhaust chrome liquor to the consortium for chrome extraction. The recovered chrome is returned to the original companies which use it directly in tanning processes. This plant can produce over 21.000 kilos of basic chrome sulphate per day.

This consortium plays a dual role: economical, because of the recovery of an important product such as chrome, strategic for the tanning industry, and ecological, because the metal is eliminated from the waste sludge. The plant employs 15 employees.

- Consorzio S.G.S. Spa

This private company is composed of 230 member tanneries which produce fleshings. This plant is focused on recovering the fleshings, extracting the fat and protein that is then sold. The plant employs a staff of 50 and processes 70,000 tons of fleshings per year.

4.2.8. The Relocation Process



Despite the planning by the City Council of Santa Croce sull'Arno for the relocation of tanneries to outside of the city since the 1960s, in the 1990s there were still 40 tanneries present inside the residential area of the city.

Finally in the 2000s, an appropriate recovery plan was implemented for the permanent transfer of all tanning activities and the conversion of abandoned buildings associated with those activities.

The area identified as acceptable for the relocation was on the margins of the industrial tanning area built in the 1970s, with a more rational and extensive layout including ample parking lots and green areas.

The ratio of covered lots is expected to be 40% of the total lot area. The relocation plan was completed in 2006 and in the following years the conversion of abandoned buildings and brownfield sites was implemented and is currently nearing completion.

For the abandoned buildings considered most representative of local history, special attention has been paid to preserving the architectural features of the old tanneries and their facades, even when destined to be converted into residential buildings.

COMUNE DI SANTA CROCE S/ARNO

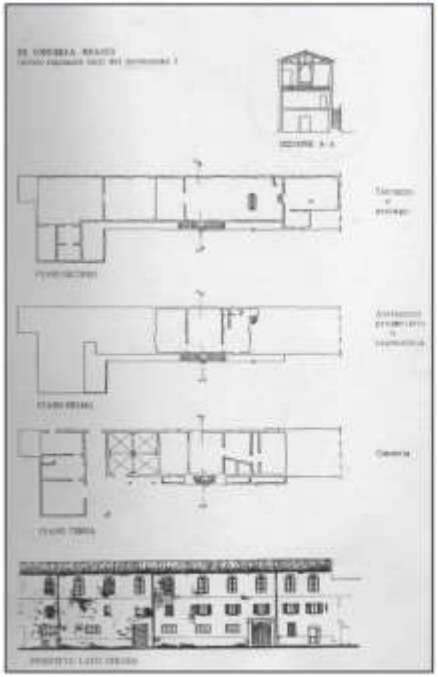
PROVINCIA DI PISA

Variante Organica al P.R.G.

Progettista: Arch. Sauro Di Sandro
Collaboratore: Uff. tecnico comunale
(Arch. Antonino Bova)

Legend

- First and second phase relocation tanneries
- Second phase relocation tanneries
- Old town
- Residential area
- mixed area (mostly residential + commercial and offices)
- mixed area (mostly manufacturing area + residential and commercial)
- handicraft and industrial area




Santa Croce S/A old tanneries to restore



Santa Croce S/A old tanneries restored



Santa Croce S/A old tanneries restored



Santa Croce S/A new tanneries



Santa Croce S/A new tanneries



Santa Croce S/A by-products factory



Santa Croce S/A tanneries first relocation area

Santa Croce S/A green belt between old and new tanneries

4.2.9. The Production Model

The production model is characterized by a highly fragmented structure of small and medium enterprises, integrated with "third party" activities specialized in certain steps in the production process. There are about 600 companies in the district, 300 of which are tanneries and 300 are subcontractors, which employ in total about 8,000 employees, making an average company size of about 12 employees.

There have been many complementary sectors joining the area over the years, including companies that produce chemicals, tanning machinery, services, clothing manufacturing, footwear and leather goods creating important employment opportunities in the area.

Some of these industries represent important percentages of their sectors on a national level, even within niche markets (the tannery machinery sector in this district represents 30% of the total national production and exports specialized machinery and technology worldwide).

In terms of commercial flow, 75% of raw materials, raw skins or semi-worked material come from slaughterhouses in Europe and eastern Europe, 15% from domestic and 10% from other markets, namely North America and Latin America. Exports account for 70% of total sales and they are sent mainly to the European, Asian and North American markets.

4.2.10. Main Conclusions and Lessons

The high organizational level and efficient of the district is renowned worldwide, but what are the main reasons for this success? Is the Santa Croce model exportable?

The success of Santa Croce sull'Arno has gone down in history for a number of reasons, including the sturdy social relationship between the people and associations involved in this industry, the artistic creativity and the awareness of the need to respect the environment and the laws associated with this task.

- The art of leather working in organized companies has a history here of over 150 years; tanners have created a sort of "genetic information" that they pass down from generation to generation made up of inventiveness, craftsmanship, elegance and design. These factors, accompanied by progress in the application of chemistry and machinery have allowed for true development and success.
- The phase of greater industrialization of the tanning process coincided with the fragmentation of activities into distinct and specialized phases creating "subcontractors", which has given rise to a decentralization of production; a true

characteristic of the tanning industrial production of Santa Croce sull'Arno which represents one of its main strengths.

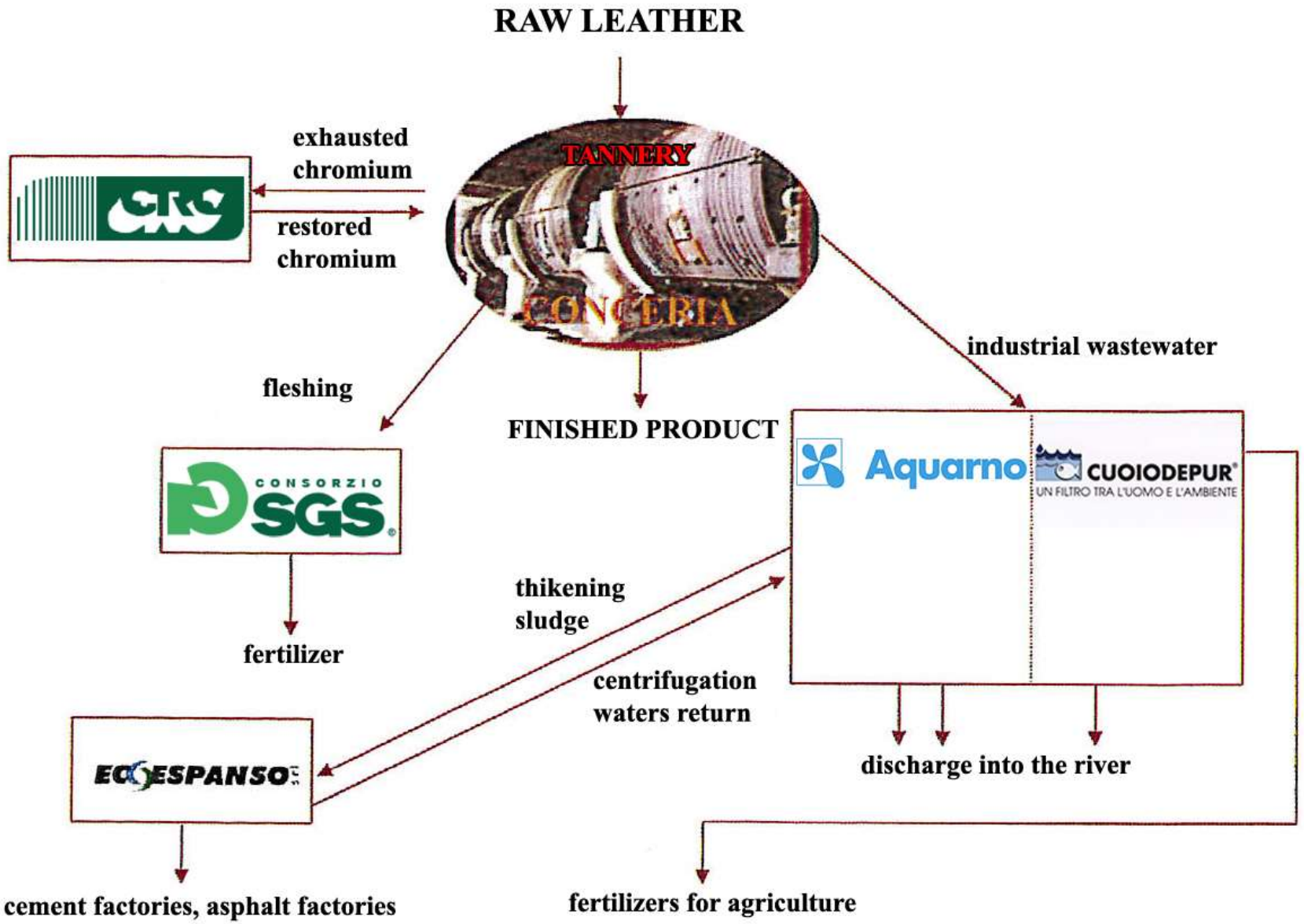
- With the introduction of the first important law regarding water contamination in 1976, companies are forced (at first the authorities forcibly closed all of the companies for some days) to face the environmental problems at hand. The great foresight of the Tanners Association (that in 1972 had already started the construction of a treatment plant unique in all of Europe) was that of considering environmental sustainability a strongpoint instead only a production cost.
- The Tanners Association manages environmental issues firsthand by creating subsidiary companies that always have public entities present in all of the boards of administration.
- The network of relationships between public and private entities and the decision-making bodies that are made up of a mix of both are the real governance of the district.
- The financial contribution for all of the investments in environmental and treatment related needs have been made directly by the tanners (65%) and by regional, state and European contributions (35%).

The results are evident and the summary diagram of the by-product recovery cycle is a shining example of what has been achieved with regards to environmental sustainability. The new challenge of certification will allow the district to move forward once again as it has in the past.

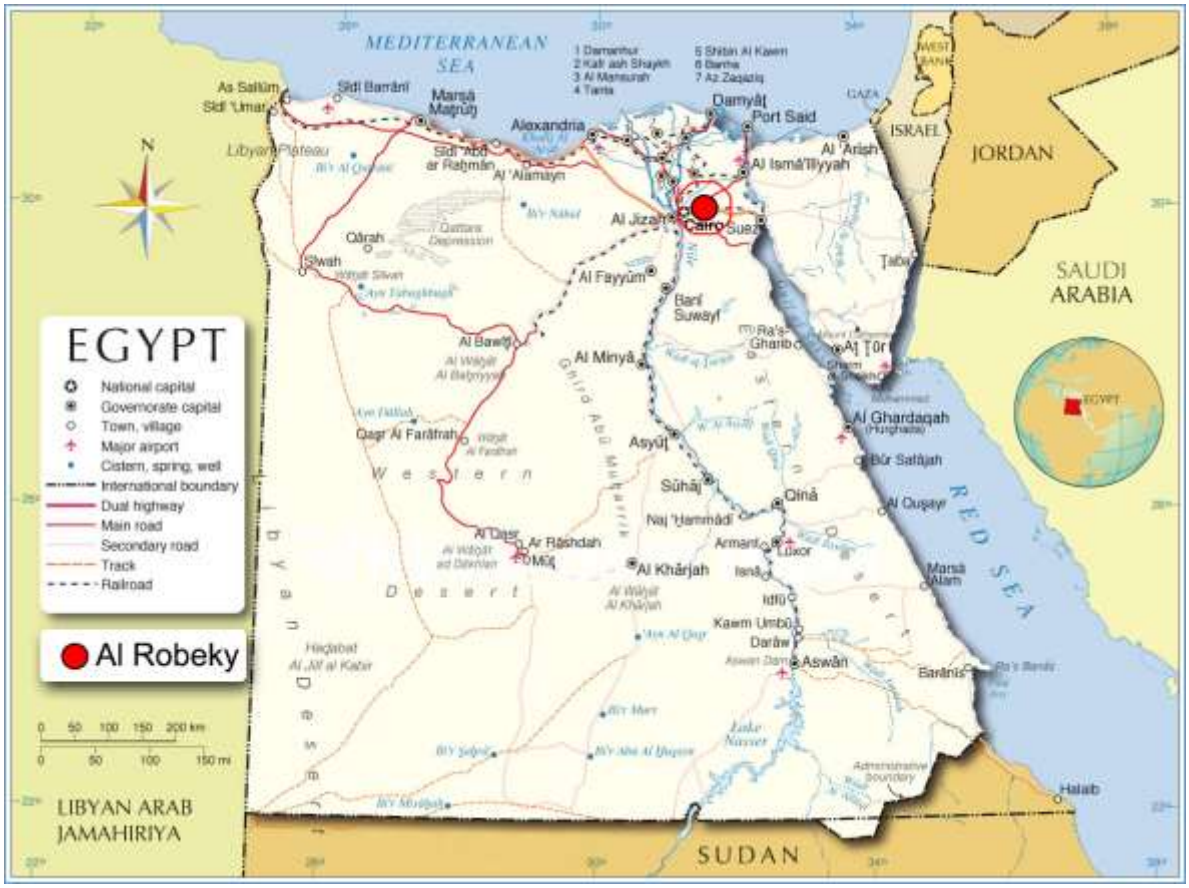
What is exportable in all of this?
The knowledge and the analysis of achievements made; the process of making the available to other counties with diverse statuses depends highly on their specific political, economic, social and cultural situations.

Awareness of the need to protect the environment and of sustainability is at the base (and guides) the decision making process in this area as it is fundamental to advancement in this sector. It is the latest challenge that the tanning sector is facing: we know the way there but the road can be quite tumultuous.

Santa Croce sull'Arno - By-product summary scheme



5. EGYPT



5.1. AL-ROBEKY LEATHER INDUSTRIAL PARK

5.1.1. Introduction

The tanneries located in old Cairo city have produced, over time, one of the gravest and most worrisome environmental conditions found in the world today; the living conditions of the local population and of workers are not any better.
The relocation project has a long history dating back to 1997, when the Ministry of Industry and Mineral Wealth along with the Industrial and Mining Project (I.M.C.) started studying a Masterplan for the relocation project.

In response to industrial and environmental needs, the Egyptian government has made the decision to transfer the tanning industry, presently situated in Old Cairo, in the heart of the capital, to the industrial area near of Badr City (Al-Robeky area), which is situated approximately 45 kilometres from the capital.

This decision by the government is of particular historical importance: on the one hand it is a choice imposed by the limits of environmental acceptability of urban industrial

development, and on the other it expresses a desire to take the opportunity to support and strengthen the Egyptian tanning industry by helping it to become part of an industrial economy. The examination of the various future scenarios associated with the relocation of the tanneries to Al-Robeky area has thus become the subject of a detailed and articulated study which has looked at all aspects, both theoretical and practical, of the setting-up of a new industrial area.

The task of carrying out this study, and of developing a project to guide the setting-up of needed infrastructure (in line with the ecological standards and production competitiveness required by the international market), has been given to Assomac Servizi srl on behalf of the Egyptian Ministry of Industry, and for the IMC, has organised and coordinated a study group which includes internationally-recognized experts, the Egyptian plant company Egitalec, and representatives of the various Egyptian industrial Associations which are involved in the project.

5.1.2. The Actual Tanning Activities

At present the Egyptian tanners are not, generally speaking, in a very bright situation. Few companies are industrially organized and able to offer a product suitable for the international market. This is particularly true for the 320 tanneries in Old Cairo, which are predominantly artisan workshops, with insufficient and often obsolete machinery. Their production appears to lack a rational organization, and the spaces they occupy are in buildings which are completely inadequate for running a modern production cycle.
These companies employ a total of around 7,500 workers, and produce around 95 million square feet of leather. These figures give an average daily production per worker of around 48 square feet, which is less than half of the European standard. Profit margins are also very low. However, on the positive side Egypt has a strong leather-working tradition, a good pool of entrepreneurs, as well as good raw-hide which can be further improved, and a work-force willing to work in tanneries at low cost. These factors are sufficient to face the challenge of change.






Old Cairo tanneris and environmental pollution

5.1.3. Theoretical Standpoints Extract from Masterplan Final Report

The models of industrial development used to support the analyses and the conclusions reached are generally those defined as 'industrial districts'. The reasons for referring to these areas, which have been the subject of considerable attention by economists from a number of countries, is thus explained:

- An industrial district is, by definition, a socio-economic entity characterized by a community of people and a population of industrial concerns located in a single area.

- The small and medium-size of the companies which make up the industrial area is one of the reasons for its competitiveness, but at the same time this indicates how the success of a single company is influenced by the general conditions of the area.

- It is the type of industrial organization which has determined the international success of the leather and footwear systems in certain countries. A good example is the competitive nature of Italian companies involved in the leather industry. The layout of the industrial area should therefore follow a model which encourages the development of an industrial settlement made up of small and medium-sized companies, and which aims to strengthen their capacity to work together. In more specific terms the area offers certain structural advantages to these companies, with respect to other industrial alternatives:

- the reduction of transaction costs between companies thanks to their proximity

- some external advantages such as:
    - the chance to sub-contract some parts of the work cycle
    - the sharing of services
    - the availability of qualified personnel
    - greater access to information regarding the market and technological innovation
    - the likelihood of the development of communal and synergetic learning processes

5.1.4. Relocation opportunities

All the opportunities for development of the Egyptian tanning industry are linked to the transfer of the tanneries outside Old Cairo. The success of the move to Al-Robeky however depends on reaching of a number of objectives:

- Innovative organization of the tanneries in the new industrial area: the move from Old Cairo to Al-Robeky must include, as an integral part, the transformation of the present production and management systems. The tanner must plan his resettlement, following criterion of specialization, to meet the changing requirements of the market and to prepare for possible future developments. In planning the development of the new area a number of logical organizational factors have been favored. These include those which

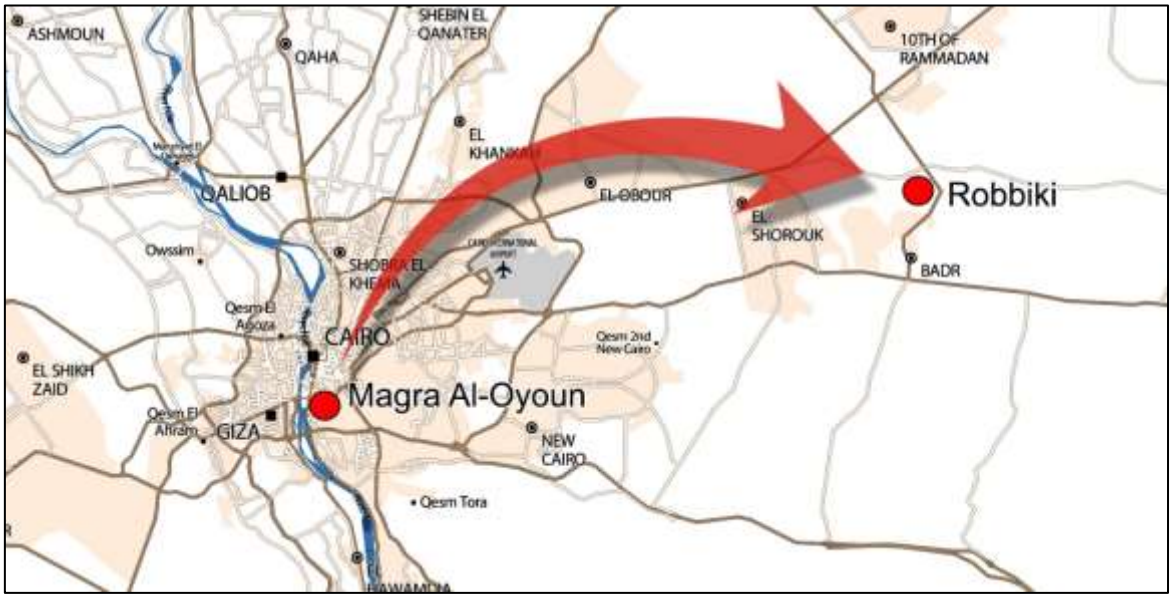
help to obtain an efficient and effective distribution of resources and services, the rationalization and savings of costs of transport, the collection and use of all by-products, and the collection and treatment of industrial waste. Finally it should be pointed out that

- the Al-Robeky area can house all the types of production units presently operating in Old Cairo, from those carrying out just one part of the production cycle, to those carrying out several parts, to those taking leather from the raw to the finished state, and will be capable, according to planned development, of producing 200 million square feet of leather per year by 2017.

- The building of new production units: The developments planned in the project permit factories to carry out the whole production cycle which will exist side by side with cottage industries, giving work to single families, offering high standards of health and safety at work, as well as making services available which will make the working process less tiring and more productive, while at the same time reducing infrastructure costs. On the other hand, the move to the new industrial area will uproot the present socio-economic context of the farming industry, and the new area and its systems will have higher water, energy and waste treatment costs, which will result in a natural selection of those companies able to survive and grow in this new climate. It is thus important to create an environment where the human resources and experience of Old Cairo are not lost, giving small companies the chance to group together so that they can restructure themselves to cope with the change.

- The use of advanced technologies: The use of innovative technologies is a must if the objective of reaching international quality and quantity levels is to be reached. Increased production is achieved through the intensive use of technologically advanced plants and machinery, increased yield of raw hides and finished leather, and the rationalization of the use of chemicals, with a consequent reduction in the level of pollution.

- Improved professional skills at all levels of human resources: all the changes mentioned require an equally radical change in human resources. The updating of structures and technologies revolves around the re-qualification of the human resources employed in the tanning industry, from the entrepreneur, the focal point of a company and the drive behind the change, to the management, presently little found in the industry, to the workforce, which will need to be trained in skills, as they pass from mainly manual tasks to largely mechanized work.



5.1.5. Environmental Considerations

The tanneries present in the old city (inside the Magra Al Oyoun neighborhood where 40,000 residents and workers currently live) use products, materials and chemicals which are often outdated and harmful, especially for the children who are affected by diseases caused not only by their daily work in garbage collection but also for the complete lack of a system of wastewater collection.

They all live in an environment continually contaminated by wastewater which runs freely down the streets. Security conditions inside the factories are terrible; some of the workers suffer from coughing and various forms of asthma, but what's even worse is that they are at risk of contracting infectious diseases, getting cancer, and suffering from liver inflammation.

5.1.6. Land-Use Planning

The study of the urban development of the leather district has been to create a modern, functional industrial area which takes the greatest possible advantage of the geographical characteristics of the area and of the road and rail links mentioned above for the transport of raw materials and finished goods.

The transfer of the activities presently based in Old Cairo is foreseen in a series of phases, so that investment in infrastructure is divided over a period of time. The sizes of the production units will be highly varied taking into account the morphology of the land. These initially single units will be laid out in lots of variable sizes, giving them the opportunity to group together at a later date.

The study of the urban layout of the leather district of Al-Robeky will allow the authorities in charge of construction to proceed quickly to the execution of the project. The study examines in detail the available data and information regarding the morphology of the area, its geology and all the other physical characteristics of the territory, illustrating the details in individual tables which enable the general plans of the district to be in line with the physical and geological characteristics of the area.

The general plans have been laid out taking into account the following structural factors:

- the road network, with direct links to the national network
- the separation of the various production functions
- the identification of green and recreational spaces
- a centralized service area
- a green belt around the zone and between the various production units

The production units have been grouped according to function. Those which are more polluting, i.e. glue production and waste treatment, have been located to the north, and separated from the rest of the area by a green belt.

The production units, which include tanneries, shoe factories, and other units either working leather or producing shoe components have been grouped together according to activity, while the mechanical workshops and the warehousing facilities have been located in two separate areas, one to the north and one to the south of the production units.

At the centre of each group of units is a space left for parkland for recreational use by the people working in the area and which will contain basic services for the area.

The general service area, which may be considered the central business district, the heart of the whole system, runs from north to south from the railway station. Among other services this area will house the Training and Service Centre.

Consulting:

ASSOMAC SERVIZI

s.r.l. [illegible]

Client:

MINISTRY OF INDUSTRY AND MINERAL WEALTH

THE EXECUTIVE ORGANISATION FOR THE INDUSTRIAL AND MINING PROJECTS (I.M.C.)

Project:

ROBBIKI LEATHER PARK

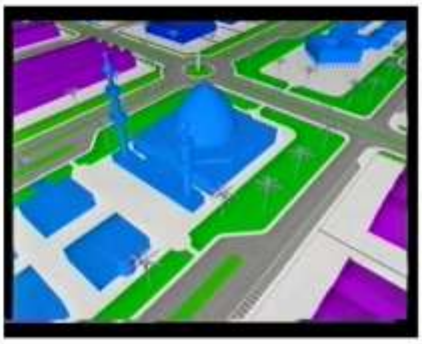
001 GENERAL LAYOUT

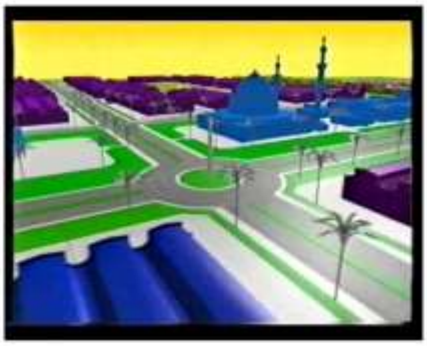
Arch. Sauro Di Sandro

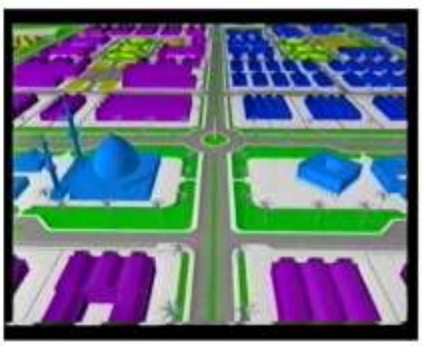
ROBBIKI LEATHER PARK MASTERPLAN

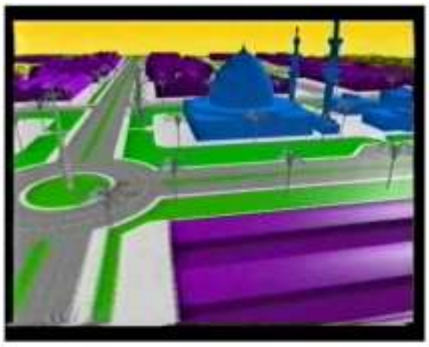
LEGEND

	Total area Sq/m	Covering Ratio max	Covered area sq/m
TANNERIES & LEATHER WORKSHOPS	556.303	45%	245.563
SHOES AND LEATHERGOODS FACTORIES	289.646	45%	130.325
GLUE UNITS	72.989	45%	32.841
LEATHER BOARD	10.067	45%	4.530
MAINTENANCE WORKSHOPS & STORES (raw materials)	54.445	45%	28.998
STORES (raw leather)	44.106	45%	19.847
STORES (chemical products)	18.510	45%	8.329
DISPATCH AREA	12.825	45%	5.771
MOTEL AND SERVICE AREA	18.465	25%	8.309
FIRE STATION	7.420	30%	2.226
Railway station and goods-yard			
Bus terminal			
Parking	69.052		
Main services center	96.314	20%	19.262
– Mosque – Egiptian Leather Industry Development Institute – Post office – Telecommunication center – Essential housing – Small shopping complex – Administration centre – Leather museum – leather design school – Experimental laboratories – Recreational green area			
[illegible]	[illegible]		
Central treatment plant	[illegible]		
Main trasformer substation	[illegible]		
Inside green belt	[illegible]		
Outside green belt	[illegible]		









Model of Robbiki Leather Park

Robbiki, March 2005 - Starting infrastructures

Robbiki, January 2010

Robbiki, July 2013

Robbiki, January 2014

Robbiki, March 2016 - Present

5.1.7. Common Effluent Treatment Plan

The technical solutions felt to be most fitting for the two principal sources of negative environmental impact - liquid effluent and solid waste - foresee:

- in the case of the treatment of effluent, three distinct lines.
- residual chrome recovery from the tanning bath, justified from both an economic and environmental point of view.
- the evaporation of high salt-concentration effluent, as dispersion or irrigation are the only possible types of disposal, considering present local norms.
- The chemical-physical treatment of other waste, with the possible future addition of biological treatment.
- The building of the waste treatment plant is foreseen in two phases, in line with a process of progressive transfer and a gradual increase in production by the tanneries. For each phase of the plant required, the workforce, service and chemical consumption, building and running costs of all parts of the waste treatment system are detailed in full.
- In the case of solid waste treatment: the creation of a controlled sludge collection site, which will look into the possibilities of using the sludge as a fertilizer after suitable treatment.

CETP satellite view

CETP detail

CETP detail

CETP detail

CETP detail

5.1.8. Actual situation of relocation process

After the official approval of the project in 2002 and subcontracting of construction work for building the infrastructure, the urbanization work was started in 2005. The Italian government has had an important role in this project through the donation of €38 million for infrastructure and plants including the wastewater treatment plant. The relocation was planned by the government in two phases; one calls for the transfer of a first group of companies with the production capacity fitting for the activation of the plant, and another more long term transfer which will see the relocation of all companies. There have been many problems encountered along the way but some of the most important are:

- Lack of an authoritative governance able to make decisions and see that they are respected;

- Defined compensation program for the tannery owners in the old area and contracts to be drawn (in regards to this, see the complex method of compensation attached).

Actual situation in Robbiki leather industrial park

5.1.9. Conclusions

The Egyptian situation in the new district planning is characterized by, and representative of, complex and intertwined mechanisms that underlie the relocation process:

- Substantial absence of tannery owners and their representative entities in the definition of the master plan and the relocation process.
- A set of problems relative to finding funding for the realization of the works,
- Lack of authoritative governance
- Delays in the definition of relocation compensation

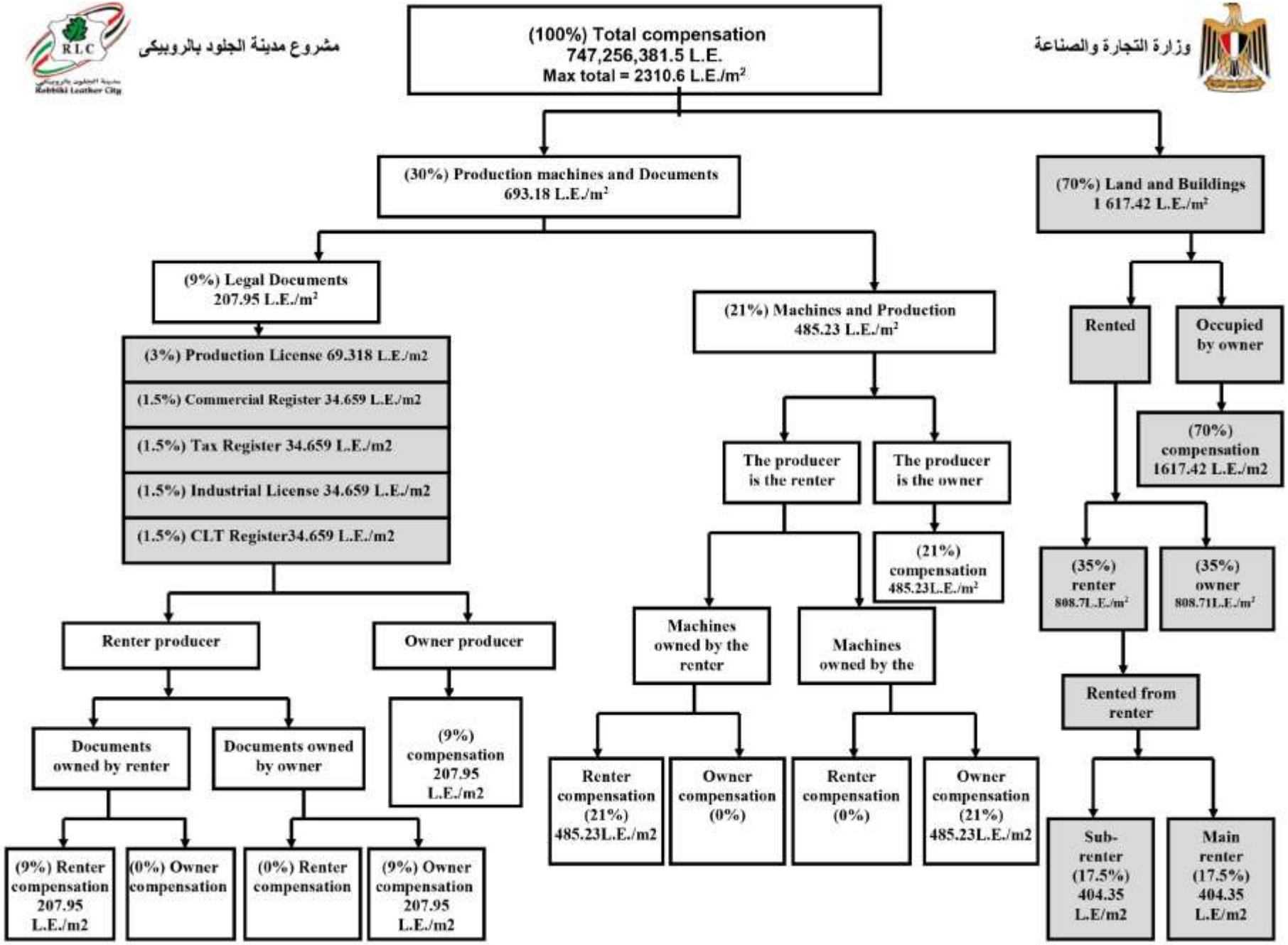
Finally, in July 2016, the park will be officially inaugurated with the first tanneries connecting the the treatment plant, while the allocation of the other lots is currently in progress.

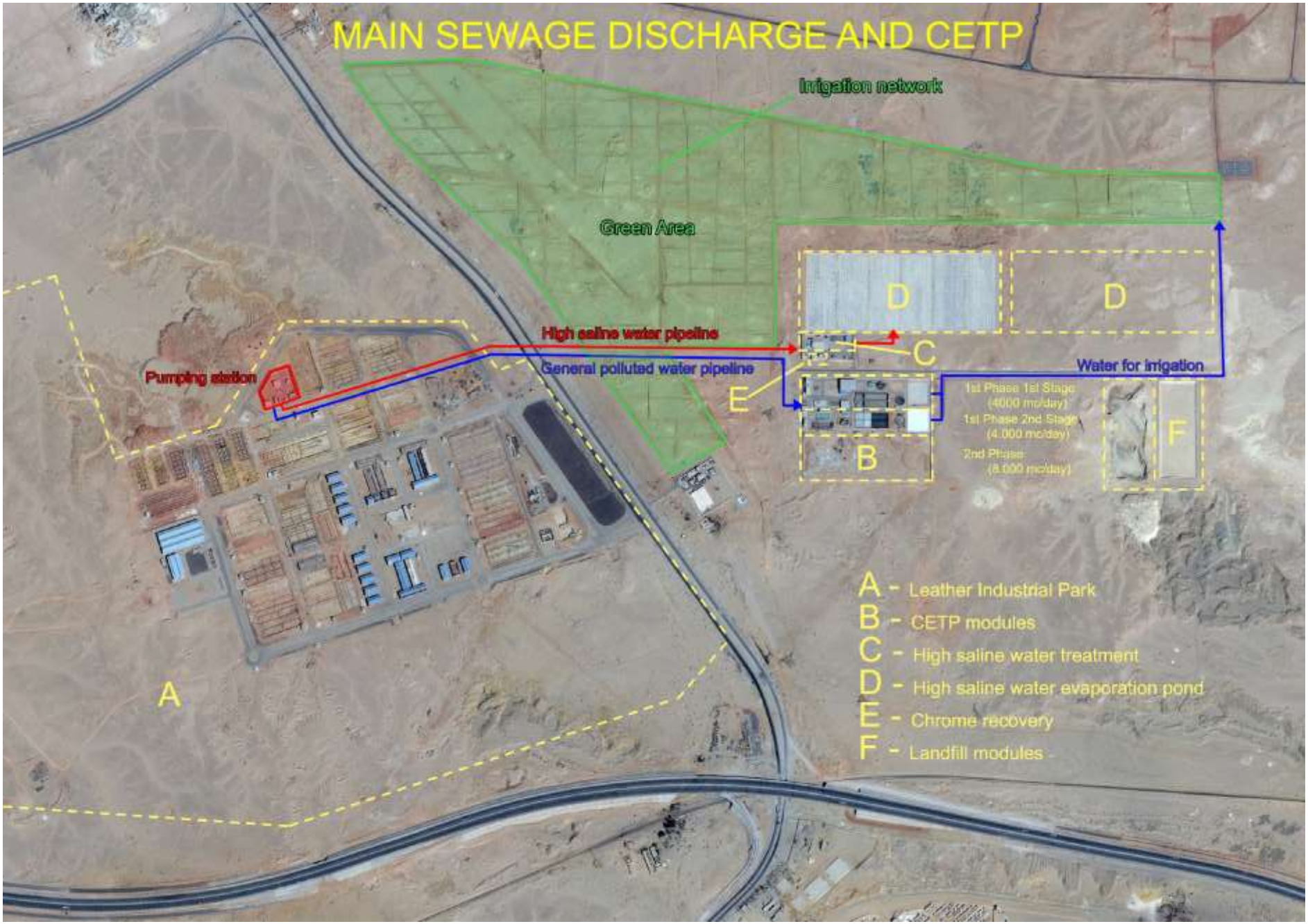
With the arrival of the new military government, the situation has radically changed and the new firm IDA (Industrial Development Authority) has been appointed to manage the relocation process in collaboration with IMC and the supervision of the Ministry of Industry. A special new company has been created for the management of the park.

The treatment plan is completed, for the first phrase, with a capacity of 8,000 cubic meters a day and has innovative features for the recovery of water for irrigation for a park adjacent to the treatment plant.

مشروع مدينة الجلود بالروبيكى

وزارة التجارة والصناعة




MAIN SEWAGE DISCHARGE AND CETP
Irrigation network
Green Area
D
D
C
High saline water pipeline
General polluted water pipeline
Pumping station
E
Water for irrigation
1st Phase 1st Stage
(4000 mc/day)
1st Phase 2nd Stage
(4.000 mc/day)
2nd Phase
(8.000 mc/day)
B
F
A
A - Leather Industrial Park
B - CETP modules
C - High saline water treatment
D - High saline water evaporation pond
E - Chrome recovery
F - Landfill modules

6. BANGLADESH

6.1. LEATHER INDUSTRY IN THE NATION'S ECONOMY

The leather industry developed in Bangladesh on a large scale basis from the 1970s. The leather industry is now reasonably well established in Bangladesh, with about 200 Government-recognized leather plants processing raw hides and skins into wet-blue, crust or finished leather, and over 2,000 leather footwear and leather-goods factories (over 90% micro; employing less than 9 workers) producing various kinds of leather footwear and other leather products such as garments, ladies bags, suitcases, wallets and some fancy items. It is, however, the processing of raw hides and skins into some form of crust, finished or semi-processed (wet-blue) leather which has dominated the industry in Bangladesh, as high as 85 per cent of the total output being exported from this sub-sector.

The manufacture of crust/finished leather and that of wet-blue, both for exports, is the dominant activity of the industry. The value of exports from leather goods is negligible, although this sub-sector is dominant in the domestic market especially in leather footwear, as almost the entire demand in this regard is satisfied through local production. Another important item of output of the leather sector is vegetable tanned leather, made of buffalo hides. The entire output is locally used for shoe-soles and industrial uses.

Bangladesh is a developing country with a population of about 150 million and Dhaka, the capital city of Bangladesh since it achieved independence in 1971, has had rapid population growth, increasing day by day with an estimated population of around 12 million.
Bangladesh's economy is now in transition. It is shifting from agriculture to non-agriculture.

In 2004-2005, the contribution of the agricultural sector was 21.91% and the industrial sector was 28.44%. In 1979-80 it was 33.21% for agriculture and 17.08% for industry. This data demonstrates the steady growth of the industry sector. It is an encouraging feature of the economy.
The main area where employment can be created is in the industry sector. At present the total volume of employment in the industry sector stands at 5.98 million which is 13.5% of the total employment of the country.

Leather tanning is one of the more prosperous industries in Bangladesh in terms of its financial return. The tannery industry in Bangladesh is concentrated in the Hazaribagh area in the south-western periphery of Dhaka.

Most of the tanneries were built on land either purchased or acquired by inheritance, mortgage, and temporary lease or rented on a monthly basis. The land covered by these industrial enterprises ranges in size from small (around 29 decimal), to medium (around 48 decimal) to large (around 98 decimal). Apart from the tanneries there are two painting

factories, plus 70 manually operated glue factories and one mechanized glue factory in the industrial area.

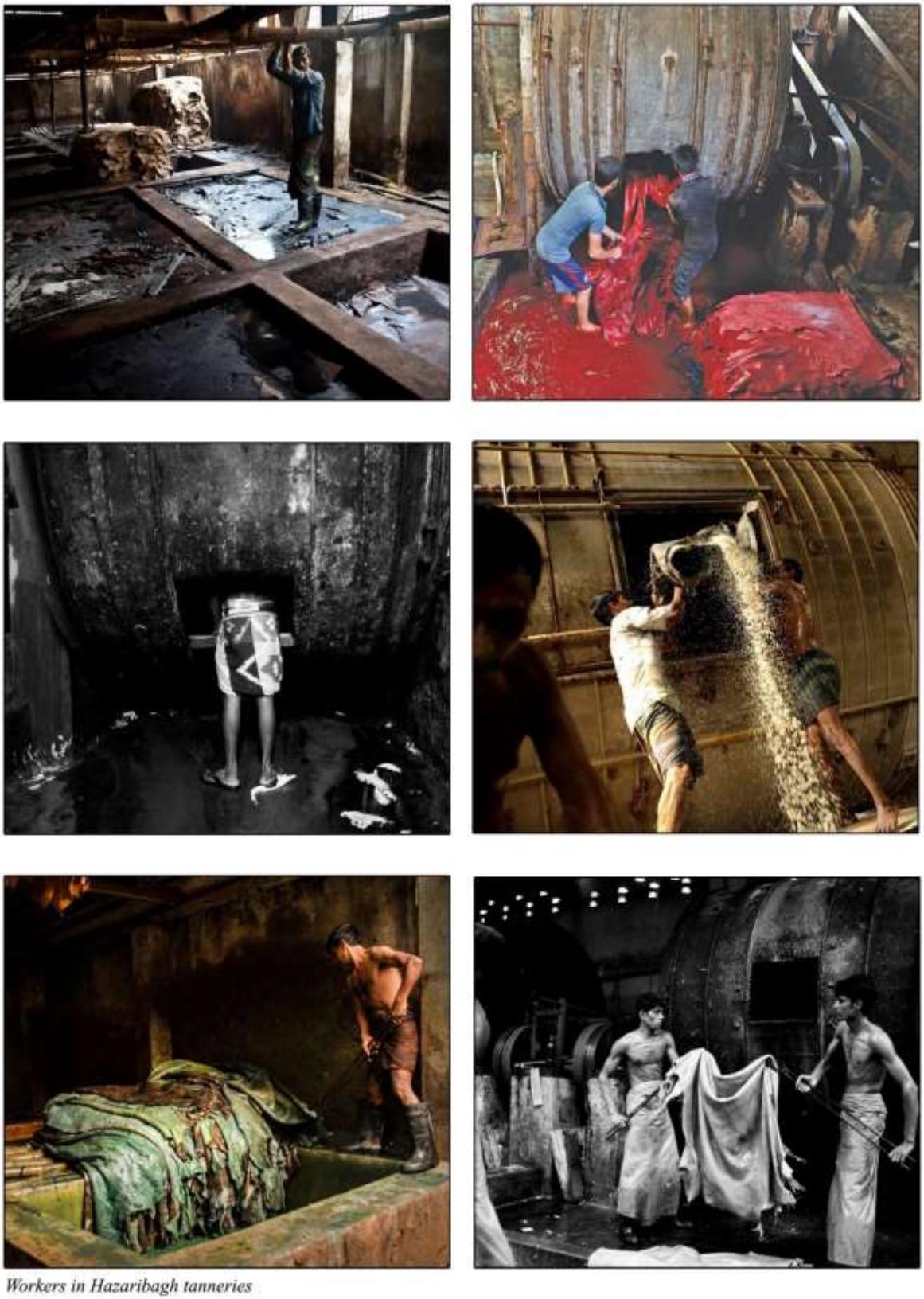
The leather sector is a prudent manufacturing sector in Bangladesh with a good blend of artisan and industrial heritage of more than five decades. This is an indigenous raw based industry having tremendous potential for export development through strengthening and modernizing the sector. The market of leather and leather goods throughout the world is vastly expanding. Technology also developed significantly over the past few years. So, the potentiality of the sector in the economy of Bangladesh is yet to be explored.

There are around 220 producers in tanning industry in Bangladesh. About 90% of these are located in the Hazaribagh area of Dhaka city. These tanneries have created havoc, environmentally speaking, in Dhaka and have caused severe damage to the Buriganga river. Above all, the overall environment of Hajaribagh has deteriorated. All of these factors have led to the decision for the relocation of tanneries from Hajaribagh. The productivity of these tanning units are about 240 tons per day. Around 40 thousand workers are employed in tanneries.

Almost all the activities of the leather sector were managed and owned by non-Bengalis before the Liberation of Bangladesh, so the entire leather sector was in chaos immediately after the liberation. The government had to intervene and nationalize the abandoned tanneries and establishments, and form the Tannery Corporation.

Bangladesh's tannery sector at that time was simple; only wet-blues were exported. The newly formed tanneries corporation tried its best to improve the management of technology and other infrastructural development of the tannery sector. Initially, the shortage of skilled workers was the main impediment.

6.2. HAZARIBAGH TANNERY AREA



Workers in Hazaribagh tanneries

Hazaribagh, situated in the western side of Dhaka, is famous because it is the location of most of the tanneries in Bangladesh. As per latest available information, out of 206 leather enterprises in the country 192 (or 93.2%) of leather enterprises are located in Hazaribagh. It may be noted that the leather industries of Hazaribagh grew in the last century. It is known that, in the past the leather industries were developed in Narayanpur of the Narayangonj District. Later on, they were shifted to Khaslands of Hazaribagh and also on individual lands and gradually Hazaribagh emerged as a tannery industrial zone of the country.

6.2.1. Environmental status

The major pollution aspects of Hazaribagh are tannery wastewater, solid wastes, sludge, bad odor, narrow-zigzag roads, unplanned drainage system, drain overflow, garbage pile-up from tanneries, transportation of raw & semi processed hides, unplanned construction of residential buildings, slum dwelling and densely populated areas.

Throughout the country, raw hides and skins are collected from the slaughters and rural areas by forias (small businessmen). To protect them from bacterial decomposition, the raw skins are preserved by wet-salted curing, dry-salted curing and drying processes. After that they are entered into commercial channels i.e, transported to tanneries for the production of wet-blue, crust and finished leather. There are many chemical processes and unit operations which are involved in leather processing, these steps consume a huge amount of water and various types of chemicals like Sodium sulphite, common salt, Calciuni hydroxide, Hydrochloric acid, Sulphuric acid, Ammonium sulphate, Sodium sulphite, Sodium bisulphite, Calcium formate, Sodium carbonate, Chrome salt, Vegetable tanin, Dyes, Dyeing auxiliaries etc…

In Hazaribagh, tannery effluents are flowing through the drains by the side of the roads. It is seen that the drains are being blocked by tannery sludge and the roads are over flowed by the polluted water. Sometimes municipal cleaners de-block the drains and sweep the sludge to side of the roads. Such an abhorrent situation is seen almost everywhere in Hazaribagh, causing irritation to commuters as well as dwellers. The municipal wastes are also mixing into drains, The wastewater drains to the lands out ide the Dhaka flood protection dam and ultimately flow into the river Buriganga.

In conclusion, The tannery industry has contaminated the Hazaribagh area of Old Dhaka making it one of the most serious environmental problem areas in the Metropolitan Area. The problem has gotten worse over the last decade with the construction of the embankment which has trapped the wastewater in a series of stagnant ponds on the city side of the dike. The sewage lift stations either do not function properly or are out of operation which considerably exacerbates the drainage problem.

Tannery wastewater is discharged into an open drainage system. Industrial and residential sludge accumulates and the level of the sledge drains down slowly, if at all. Since the

tanneries discharge considerable volumes of floating and suspended solid there is a general tendency for the drains to silt-up and become clogged.

Moreover the wastewater flowing through the surface drains contains sewage, which needs the special attention of the sanitation authority concerned. There is no central collecting point for domestic and industrial sewage treatment in this area. Nearly all the drains are in poor condition, silted and of insufficient capacity. The drains were not designed to discharge solid waste.

Within the catchments area of the tannery industry there is a sewage lift station which was not operating at the time of this study due to various technical problems of the upstream sewerage network. As a result the sewage upstream of the sewage lift station must be discharged to the adjacent low-lying areas from various points along the network. As there is no piped sewerage network within the industrial area, only a severely impaired low cost sanitation system is in operation there.

The town of Hazaribagh has access to the city sewer system. Some of the residential holdings of this area have septic tanks, but the supernatant liquid from the septic tanks is discharged to the nearby surface drains. The rest of households do not have septic tanks and they directly discharge sewage including wastewater into the nearby surface drains. Most of the tanneries have toilet facilities for the workers and discharge their sewage directly to the surface drain or to septic tanks. The latter do not function well because of the high water table. Some industries have sewage tanks but ultimately they also discharge liquid waste to the surface drains creating severe environmental pollution.

Actual environmental conditions in Hazaribagh

6.2.2. Masterplan process 2006/2016

What's contained in the preceding paragraphs is only a micro-synthesis of an extensive, detailed project set up by UNIDO, consisting of documents, research studies and assessments that are very efficient for understanding the reasons for the delays in the implementation of the relocation program of one of the most polluted sites in the world to a new district.

Notwithstanding the concerns and difficulties related to the determined location of the park in the area of Savar eloquently described heretofore, let's take a look at the issues and events of the last ten years and what is the current situation.

In terms of urban planning the final layout of the internal organization of the new park shows considerable differences from the initial estimates, in particular:

- Overuse of the area and lack of green areas inside the park;
- Absence of parking not only for automobiles but also for large transport vehicles;
- disproportionate number of covered lots and therefore lack of uncovered areas which prove to be very useful in leather processing or for construction

Construction of infrastructure started in 2005 with the realization of a major project consisting in elevating the entire area due to the site's vulnerability to flooding.
This costly maneuver presented some difficulties for laying the foundations of buildings and presents grave future risks if the realization of the embankment is not isn't completed respecting high standards of safety criteria.

The extended, general urban planning in a wider context includes residential areas, schools and services in the internal area behind the district. This choice could have very negative consequences if not properly distanced from the industrial park; the risk is that of creating a modern Hazaribag.

There have been numerous calls to construct buildings to be able to start relocation to the area, but as of February 2014 there was still no construction of buildings for tanneries and construction of the treatment plant had just begun.
In April 2016 they were ready to start operating two treatment plant modules, sufficient for about fifty tanneries and for treating 12,500 cubic meters of wastewater a day.
Almost all of the lots were already assigned by April 2015, but the electricity connection requests have only been 85.

Indubitably we are talking about an irreversible process, and that the relocation will surely happen, but the resistance by tanners and the continuous shirking of responsibility in terms of delays continue to hog the limelight.

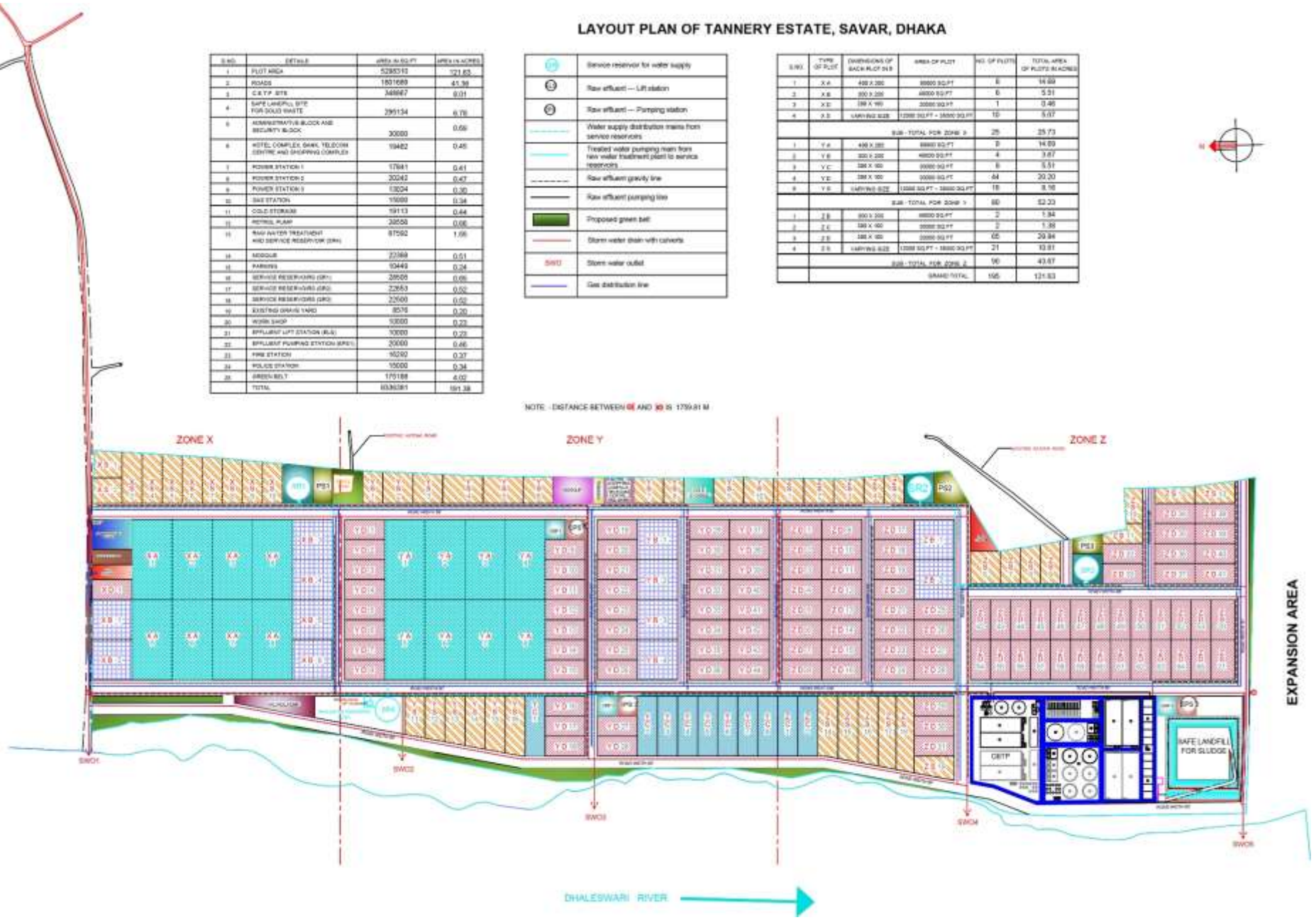
LAYOUT PLAN OF TANNERY ESTATE, SAVAR, DHAKA

S.NO.	DETAILS	AREA IN SQ.FT	AREA IN ACRES
1	PLOT AREA	5285510	121.63
2	ROADS	1801689	41.36
3	C.E.T.P. SITE	348667	8.01
4	SAFE LAND(PCL) SITE FOR SOLID WASTE	295134	6.78
5	ADMINISTRATIVE BLOCK AND SECURITY BLOCK	30000	0.69
6	HOTEL COMPLEX, BANK, TELECOM CENTRE AND SHOPPING COMPLEX	19462	0.45
7	POWER STATION I	17661	0.41
8	POWER STATION II	20242	0.47
9	POWER STATION III	13024	0.30
10	GAS STATION	15000	0.34
11	COLD STORAGE	19113	0.44
12	PETROL PUMP	28558	0.66
13	RAW WATER TREATMENT AND SERVICE RESERVOIR (SWA)	67562	1.55
14	MOSQUE	22369	0.51
15	PARKING	10449	0.24
16	SERVICE RESERVOIRS (SR1)	28508	0.65
17	SERVICE RESERVOIRS (SR2)	22653	0.52
18	SERVICE RESERVOIRS (SR3)	22500	0.52
19	EXISTING GRAVE YARD	8576	0.20
20	WORK SHOP	10000	0.23
21	EFFLUENT LIFT STATION (ELS)	10000	0.23
22	EFFLUENT PUMPING STATION (EPS1)	20000	0.46
23	FIRE STATION	10292	0.27
24	POLICE STATION	15000	0.34
25	GREEN BELT	175188	4.02
	TOTAL	8036381	191.38

SR	Service reservoir for water supply
ELS	Raw effluent — Lift station
EPS	Raw effluent — Pumping station
	Water supply distribution mains from service reservoirs
	Treated water pumping main from new water treatment plant to service reservoirs
	Raw effluent gravity line
	Raw effluent pumping line
	Proposed green belt
	Storm water drain with culverts
SWO	Storm water outlet
	Gas distribution line

S.NO.	TYPE OF PLOT	DIMENSIONS OF EACH PLOT (in ft)	AREA OF PLOT	NO. OF PLOTS	TOTAL AREA OF PLOTS IN ACRES
1	X-A	400 X 200	80000 SQ.FT	6	14.69
2	X-B	200 X 200	40000 SQ.FT	6	5.51
3	X-C	200 X 100	20000 SQ.FT	1	0.46
4	X-D	VARYING SIZE	12000 SQ.FT - 35000 SQ.FT	10	5.07
			SUB - TOTAL FOR ZONE X	25	25.73
1	Y-A	400 X 200	80000 SQ.FT	9	14.69
2	Y-B	200 X 200	40000 SQ.FT	4	3.67
3	Y-C	200 X 100	20000 SQ.FT	6	5.51
4	Y-E	200 X 100	20000 SQ.FT	44	20.20
5	Y-D	VARYING SIZE	12000 SQ.FT - 35000 SQ.FT	19	8.16
			SUB - TOTAL FOR ZONE Y	80	52.23
1	Z-B	200 X 200	40000 SQ.FT	2	1.84
2	Z-C	200 X 100	20000 SQ.FT	3	1.38
3	Z-E	200 X 100	20000 SQ.FT	65	29.84
4	Z-D	VARYING SIZE	12000 SQ.FT - 35000 SQ.FT	21	10.81
			SUB - TOTAL FOR ZONE Z	90	43.87
			GRAND TOTAL	195	121.83

NOTE : DISTANCE BETWEEN SR AND SR IS 1759.81 M



Savar, December 2006

Savar, February 2014

Savar, January 2016

6.2.3. Environmental and social benefits

The Social Impact Assessment, prepared for UNIDO by Zahirul Alam, provides us with a better understanding of the key elements in terms of environmental and social improvement from tannery relocation:

- The people of Hazaribagh are very enthusiastic about the relocation of tanneries from Hazaribagh to Savar. Therefore, their problems need to be addressed by MOI, BSCIC and other related agencies and they need to be supported.

- A micro-credit program may be initiated in both the Savar and Hazaribagh areas to address the suffering of people in the lowest income bracket.

CETP project

Work in progress at 01/13/2016 (Satellite view)

- A program may be implemented to provide skill development for the people of the area in general and that of displaced persons in particular.
- Some of the people and stakeholders are apprehensive to the relocation. This needs to be addressed assistance needs to given. In connection to this a separate budget needs to be established.

- The stakeholder's opinions indicate that the shifting of the tanneries will not be very cost effective for them. Therefore, the relocation process should recognize their concern by providing necessary support.

- The shifting of tannery industries to Savar will have a positive impact on the growth of Savar in terms of employment, business and other economic activities. This may result in an increase of population in the adjacent area. The health, education and sanitation of the increased population should be addressed by the local municipality.
NGOs may also be asked to provide micro-credit, medical support, education, skill development, housing and other such needs.

- Assistance to the relocated workers, small traders and support service personnel needs to be addressed properly and provision may be made for subsistence allowance for the affected and dislodged persons.

- The assistance, shifting and other related issues should not only be addressed by MOI and BSCIC alone; the whole gamut of work should be coordinated with RAJUK, Dhaka City Corporation and the Savar Municipality.

- Adequate civic facilities should be established near the proposed tannery estate for the new entrants in tannery estates and the adjacent area.

- Proper compensation should be given to the landowners where land was acquired for tannery estate. The damage of other properties due to the project should also be considered. Those landowners are yet to get compensation. Due to the non-establishment of title right, they should get assistance from BCSIC in establishing their claim.

- The Navigability of Dhaleswari River should be increased for easy access to the proposed tannery estate which in turn will reduce the pressure on the busy road from Dhaka to Savar and its downstream water needs to be protected from pollution.

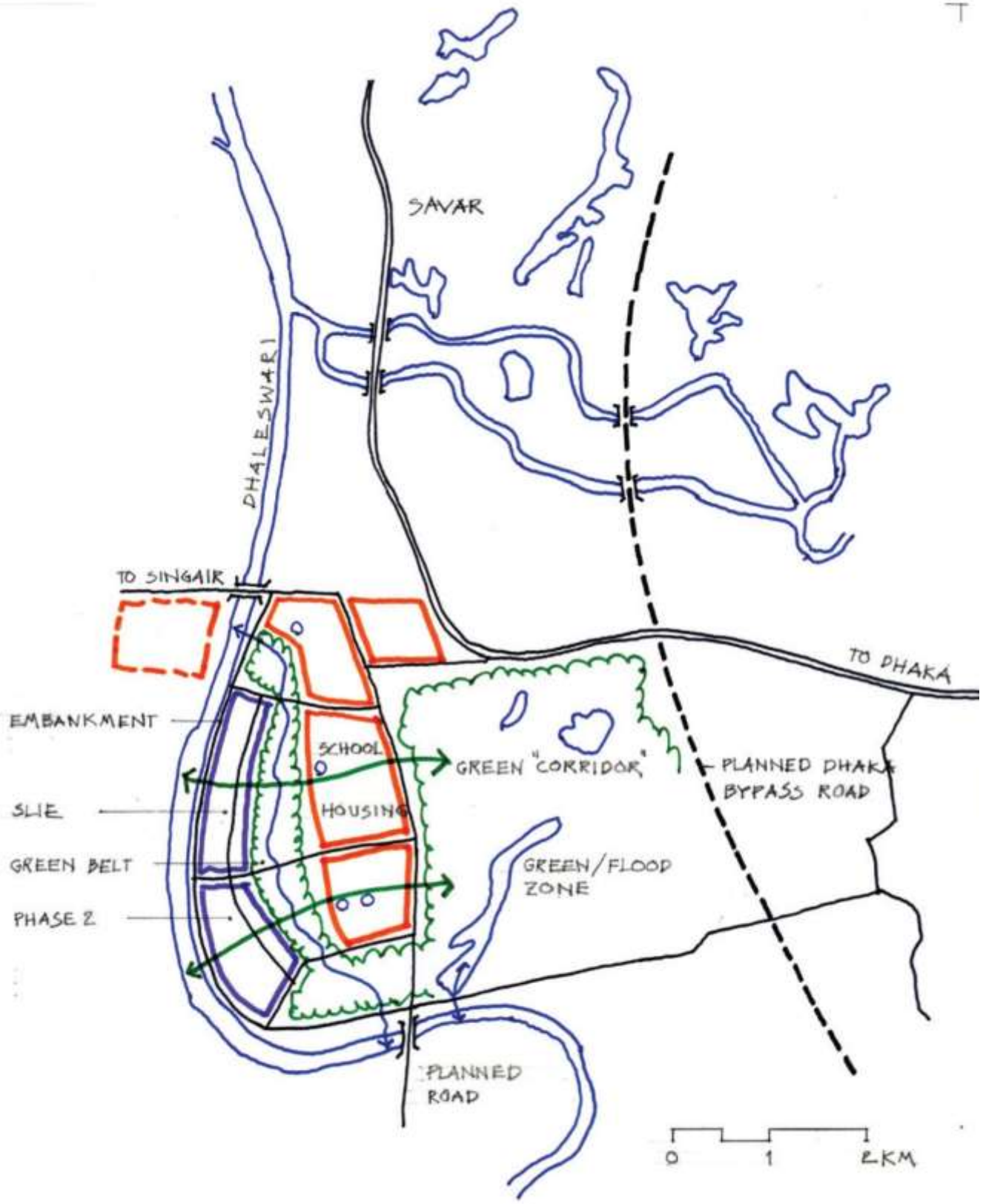
- A green space can be created in the adjacent area to create an environmental friendly atmosphere in the proposed estate.

- Constant Monitoring of EIA and SIA should be done by BCSIC for ensuring the sustainability of the proposed tannery estate.

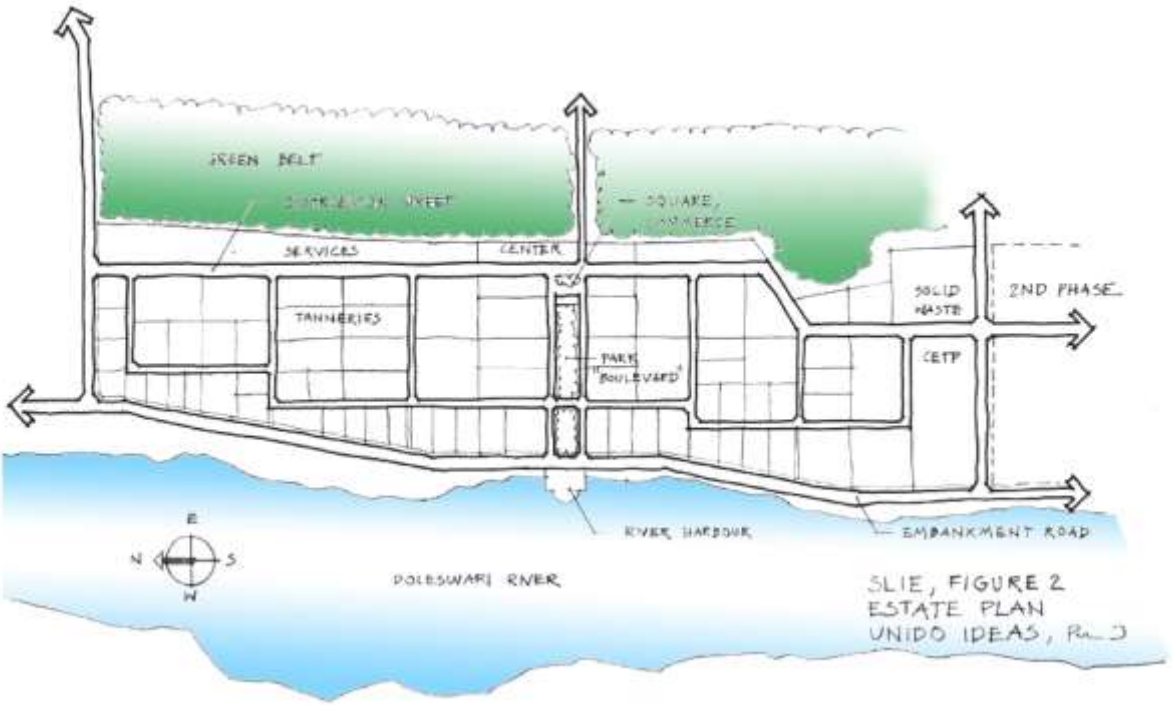
- There should be provisions to address children who are dropouts from school and street children through non-formal education in both Savar and Hazaribagh.

- Provision for separate toilets and facilities should be made for the women in each of the tanneries.

Embankment works in Savar layout



SLIE, FIGURE 5
URBAN DEVELOPMENT
UNIDO IDEAS, Part 3.



6.2.4. Hazaribagh relocation conclusions and lessons learnt

Without a doubt, the problems connected with tannery relocation from Hazaribag to the new area of Savar aren't comparable with any other leather district in the world. The environmental, social and economic situations are so convoluted that they desperately require an efficacious political program and a large economic investment to support the program.

Assistance by UNIDO has been helpful, and actually crucial, in successfully addressing the strategies that have brought about the results we are seeing today.
At this point the process is in an advanced phase and there is no turning back; at least that is certain.
The latest photos of Savar show the zone as a huge construction site where the tanneries are being built and we can finally the outlines of the CEPT structures that, once completed, will silence any justifications as to delaying tannery relocation to the site.

Analyzing the numerous documents and research available regarding the site, the "Why did this take so long?" question is the first to come to mind. The environmental, political and social condition of the country are in their entirety to blame for the difficulties encountered along the way and there probably wouldn't have been a faster way.

Let's nevertheless take a look at what issues have been critical in the relocation process and try to draw lessons for the future for other districts which, luckily, don't present such dramatic environmental conditions.

6.2.5. Critical issues

- The lack of total awareness and consciousness of the “ecological bomb” that is Hazaribag by all of the actors involved in the process from the beginning including tanners and the government;
- Scarce respect for the law, in particular those which are tied to the natural environment;
- Sluggishness in identifying proper sites for the relocation, in general planning and in a relative evaluation of the environmental impact;
- The necessary flood protection measures for the chosen site which brought further delays and augmented costs.
- Economic compensation (and other benefits) for tanners that relocate from Hazaribag wasn’t immediately clear which led to resistance;
- Little indication or guidance on the future of the area of Hazaribag in terms of urban planning and soil decontamination but above all on the fate of the thousands of workers employed in the small leather factories which will not relocate;
- Land-use planning provides an insufficient area for all of the related activities which are necessary and indispensable to the park: byproduct processing, chemical warehouses, maintenance shops, raw skin warehouses, logistics center…

6.2.6. Lessons

- Identify from the beginning a governance that actively involves every actor for all decisions tied to the relocation process: the government, the ministry, the planning team, big and small tanners, environmental associations, social-economic experts;
- Drafting of a financial-economic plan that ties necessary investments to program progress;
- Obligations to timely decision making and ongoing monitoring of program implementation;
- Contextual approval of urban-planning for the abandoned brownfield sites and the new areas;
- Comprehensive outline of benefits for companies which transfer and re-employment and/or transfer programs for workers;
- Outlining of heavy penalties for non-compliance with construction deadlines

Actual situation in Savar

Drums installation - work in progress

Drums installation - work in progress

Tanneries under construction in Savar

Pipeline installation

7. MEXICO

7.1. LEON LEATHER INDUSTRIAL PARK

7.1.1. Introduction

Mexico boasts a long tradition in leather working and in footwear production; the leather sector is an important industry for the country with about 850 tanneries and over 50,000 people employed in this sector.

Most of the tanneries (77%) are located in the city of Leon (Province of Guanajuato) equal to about 650 units, of which 30 are large tanneries (>30 tons/day), 65 medium tanneries (10-30 tons/day) and 555 are small (> 30 tons/day); all together they employ about 40,000 people.

Half of the leather production is produced for the footwear sector while the other half is produced for the automotive sector that is forecasted to grow due to the arrival of Japanese and American automobile companies.

Originally, the tanneries were located exclusively inside the historic part of the city; in the last 40 years a new area has been created, called The Industrial Zone but it has also been enveloped and surrounded by residential areas and other craft businesses, thus compromising future development and recreating the conditions of environmental contamination found in the old city.

Tannery area inside town (Barrio)

"Barrio" tanneries and by-product activities

7.1.2. Relocation Progress

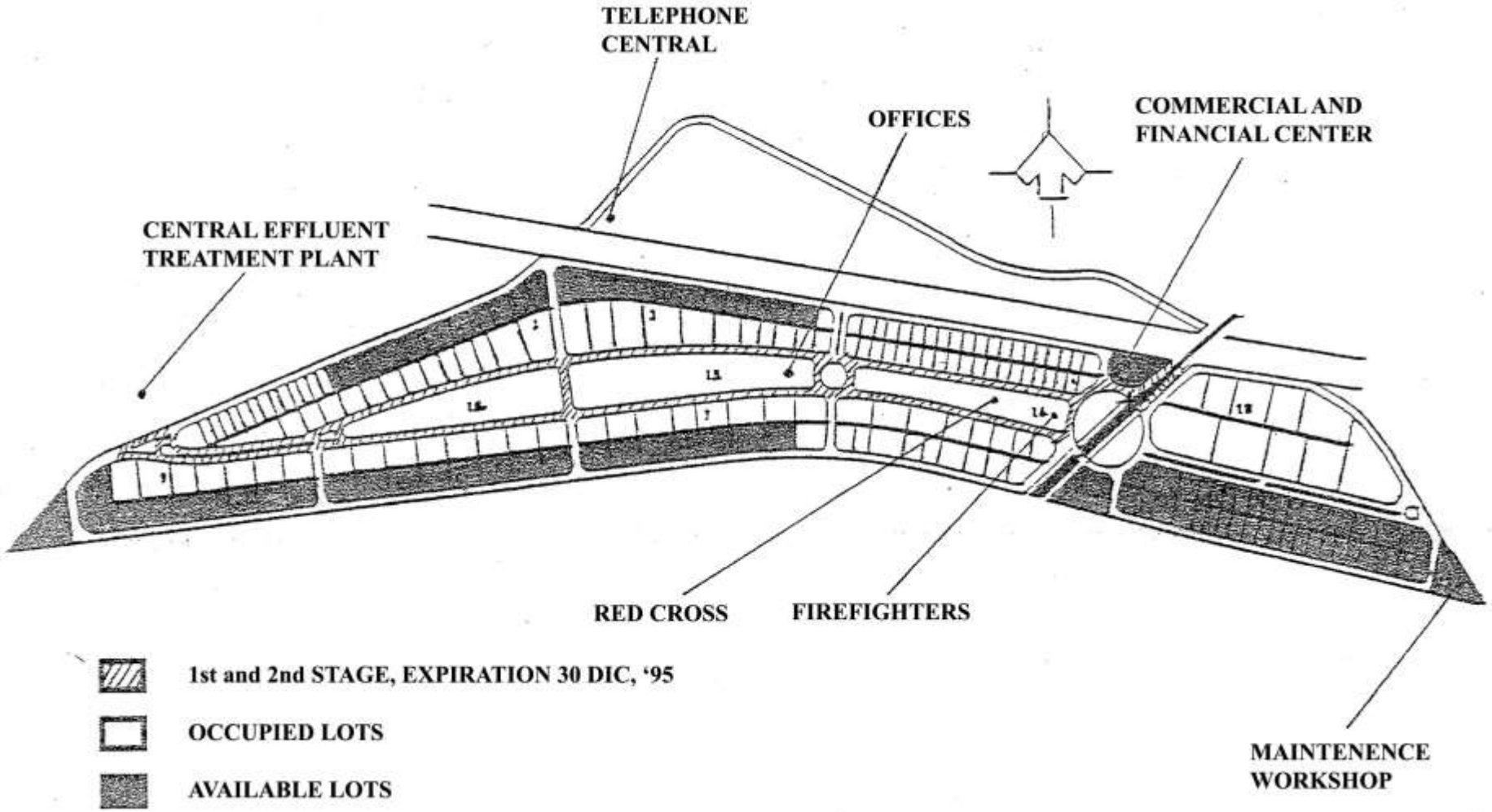
Mexico was one of the first Latina American countries to envisage a leather park that would be located in the city of Leon, approved in 1993 and called “Parque Piel”.

The existing tanneries in the old city, after years of disputes with the local government and protests from the residents due to the high level of contamination produced, have recently been forced to relocated at least the “wet” part of the production process of the tanneries, allowing for only the part of production which doesn’t create polluting discharge to remain.The new park remained a reality only on paper for about 15 years even though a large part of the urbanization work had been completed. The main reason behind the non-relocation of the tanneries is the lack of the construction of a sewer connection with the new park and the treatment plant. All of the tanneries in the industrial zone use the civil sewage treatment plant which is absolutely unsuitable and insufficient in treating the effluents of tanneries. Currently, there is a plan in progress to expand the civil plant with a new module designed specifically for the tannery business, located downstream from the existing civil plant. The current plant is managed by a private company (SAPAL)

7.1.3. Capacity of the Park

The land-use design of the masterplan forecasts a settlement capacity for 230 new businesses and it covers a surface area of 90 hectares, within it there is space allotted for ancillary services: a shopping center and offices, maintenance shops and garages, lots for companies that process byproducts and all of the other services connected with the industry. From a cursory analysis, the surface area allotted for ancillary services seems to be underestimated, as is the area allotted for tanneries.
The urbanization of the district was totally financed by the state;
The particular urban location of the park does not easily lend itself to future expansion.

PARK LEON MASTER PLAN



Leon, February 2004

Leon, February 2013

Leon, July 2015

7.1.4. Current Environmental Issues

The failed relocation of tanneries to the new park and the absence of a proper treatment plant are the most important unresolved issues to date, together with these other factors:

- Absence of a centralized or private chrome recovery plant
- Complete lack of respect for the parameters of liquid waste disposal; a good part of the discharges are pumped to a large pond located in the vicinity of the tanneries (Presa Blanca)
- Difficulty in monitoring and accounting for water used in the tanning process and continual recourse to the use of water from unauthorized or illegal wells which is brought to the tanneries with water tankers.
- The sludge produced by the mixed civil and industrial treatment plant is discharged in the vicinity of the tanneries in an open-air zone leaving the underlying aquifers susceptible to contamination.
- There is no substantial recycling of solid waste, only a recently implemented plant for the treatment of fleshing.

Satellite view of the central effluent treatment plant

Central effluent treatment plant access

Central effluent treatment plant details

7.1.5. Conclusions

Despite being the first leather park in Latin America, and despite the fact that there is a great debate in the tanning industry over environmental sustainability, the reality of the matter is that Mexico has taken few steps in protecting the environment.

There is such a high level of circumvention of water usage monitoring used as a method to reduce the already low costs of water treatment and to evade the possibility of quantifying the production of wastewater and the relative costs associated with treatment.
At present the treatment plant, which has just recently been enlarged, doesn't have a sewage connection to the park on the second lot.

The recent substantial development of the automotive industry has considerably increased the production of leather for auto interiors, but at the same time it has also presented a significant series of problems connected to the certification of leather products.

It is very probable that, before long, we will see an inversion in the tendencies of tannery owners in regards to environmental norms and regulations and there will most likely be progress in terms of respecting environmental law.

Actual tannery area inside residential district

Actual tanneries

Leather industrial park entrance

View from di highway - esternal view

Important leather industry just located inside the leather park

Modern tannery inside the leather park

8. ETHIOPIA

8.1. MODJO LEATHER INDUSTRIAL PARK

8.1.1. Introduction

Ethiopia does not boast a great tanning tradition of the industrial type nor a specific historical area dedicated to leather production.

Currently 26 tanneries are operating in Ethiopia among which 10 are specialized in both hides and skins, and 16 in skins only. Five new tanneries are under construction implying that in the future there will be a total of 31 tanneries in the country, of which 20 tanneries will be located in MLC. In MLC, 7 tanneries are already operating. Seven tanneries are under construction and 6 tanneries will be relocated from Addis Ababa and its surrounding area.

The industrial waste refers to all waste generated due to industrial operations or derived from industrial processes. The tanning industry is characterized by disposing of solid, liquid, gaseous and sludge into the environment. Hence, the waste management of the tanneries is a major environmental concern. MLC (Modjo Leather City) appears to be an opportunity to setup an environmental friendly leather tanning cluster driven by a network of tanneries and other businesses located in Modjo town, plus wet ends of other tanneries that will be relocated from and around Addis Ababa. Priority for the cluster is given to the provision of a CETP (Common Effluent treatment Plant), to reduce the environmental impact of the leather processing.

8.1.2. Master plan Process

In synthesis, MLC envisages: service units for wastes of the tanneries; services that process by-products of the tanning activities; services that are related to the existence of tanneries, such as trade facilities, workshops and stores; all services that are related to human resources, such as training and technology transfer agencies, transports, medical services, shops, etc..; other non-tanning industrial activities.

The MLC project is overseen by a Steering Committee composed of ELIA, LIDI, AAUAAiT, Federal Environmental Protection Authority (Federal EPA), Oromia EPA, Addis Ababa EPA, UNIDO and Modjo City Administration. This steering committee is chaired by H.E. Tadesse Haile - State Minister, Ministry of Industry.

In addition a Technical Committee which undertakes the technical aspects of the project and comprises a member from each of the above organizations was formed and is working towards the implementation of the project.

MLC will be the first established industrial cluster in Ethiopia in line with the country's Climate Resilient Green Economy (CRGE) Strategy and will include new and existing tanneries in Modjo, relocation of tanneries (their beamhouses only) from Addis Ababa and its adjacent areas, and will link some other industries to the MLC waste treatment infrastructure. With MLC becoming an industrial cluster with new investments, the old sectoral steering committee will no longer be in the lead role for the management of the MLC. Instead the responsibility will pass to a new management structure based on a Private – Public Partnership (PPP).

8.1.3. Site location and characteristics

The primary focus of the Ethiopian Leather Industry Development Institute (LIDI) from the MLC project is to have a centralized waste treatment facility (Common Effluent Treatment Plant, ETP) for the tanning industries located in (and to be relocated to) Modjo town. The project site is located in Oromia regional state, Eastern Shewa Zone, Lume District, Shara Dibandiba Farmers Association near Modjo town, about 70km south East of Addis Ababa. Modjo town lies along the major Addis Ababa and Djibouti highway. The only rail network of the country that connects
the capital to the major port of Djibouti also passes through Modjo town. Although the MLC will include a number of different industries, it should be noted that this study has remained focused on tanneries.

SWOT: (s) The leather industries in the town create a wider economic linkage; (w) the tanneries have swarmed the town and make the town inconvenient for living and pestiferous; (o) removal of the current pollutants problems and introduction of proper eco-friendly technologies and production at full scale, up to finished leather and products;
(t) a critical issue is for the inhabitants circumscribing the center of the town to become victims of investment activities carried out in their locality.

8.1.4. The Roles of Modjo Municipality

The MLC project is a sub-set of much larger projects relating to the redevelopment of the leather sector with a green approach. On its own, the tannery clustering and relocation project lacks scale and impact to make the project work, but it can play a useful role to kick-off wider activities and act as a pilot for establishing private-public partnerships to redevelop Modjo urban economic development. Modjo Council will take part in the PPP with regard to land, CETP shareholding, some urban aspects of the cluster upgrading in connection with LIDI, waste co-management and provision of public services.

Lead Role for MLC Construction Project: Public implementation of the overall project comprises of all MLC elements (core businesses of the MLC - like CETP, new tanning facilities and modernization of the tanneries, together with other non-tanning businesses, sub categories of businesses, services and the redevelopment of the Modjo industrial area involved in the MLC) in synergy to extract funding packages, both public

and private for the MLC long term development. A PPP will be established for the tannery development project, the CETP and the networking of the cluster. The Steering Committee will lead the MLC project to enter into PPP contracts where the overall development objectives will be delivered by the Project Implementation Council (PIC) and the construction activities will be delivered by the MLC Development Company (MLCDC). The selection of the public and/or private sector party(ies) that will work as the MLCDC should be undertaken on a competitive basis.

Modjo will be the first leather cluster set-up under the auspices of the recently established "green approach". It will provide the first opportunity to put together a PPP funding package that relates to an Industrial Cluster supporting the modernization of a significant industrial sector. The modernization of the cluster, and supporting the tannery business to become more internationally competitive, will be achieved through the application of business development activities that will be delivered as integral parts of the MLC project. The implementation of the MLC will act as a demonstration project for the establishment of other modern clusters in other industrial sectors, or sub-sectors.

8.1.5. Business Development Initiative - ELIA involvement

Ethiopia has been recording two digit economic growths for the last five years. The role of tanners for the implementation of an eco-friendly tanning cluster is through ELIA taking part in the Steering Committee for MLC project implementation. ELIA is working with the government on finding the solutions for the environmental challenges of tanning industries nationwide. A lot of pressure has been put on the eight tanneries in Addis Ababa to make them have an integrated and commercialized waste management system. For this reason ELIA is working on the project to relocate the tanneries to MLC and integrate their waste management systems sustainably.

8.1.6. Roles of LIDI

LIDI's mission is to facilitate the development of the leather and leather products producing industries by helping the technology and knowledge transfer so as to upgrade production, quality and marketing required for international competitiveness. LIDI, under the supervision of MoI has established a Steering Committee, chaired by H.E Minister Tadesse Haile, which oversees the overall implementation of the project and a technical team.

8.1.7. Roles of EPA

The Ethiopian Environmental Protection Authority (EPA) outlines laws, effluent standards, regulations and guidelines with regard to waste management. The Authority is also involved in assisting the tanneries to be clean and carbon neutral.

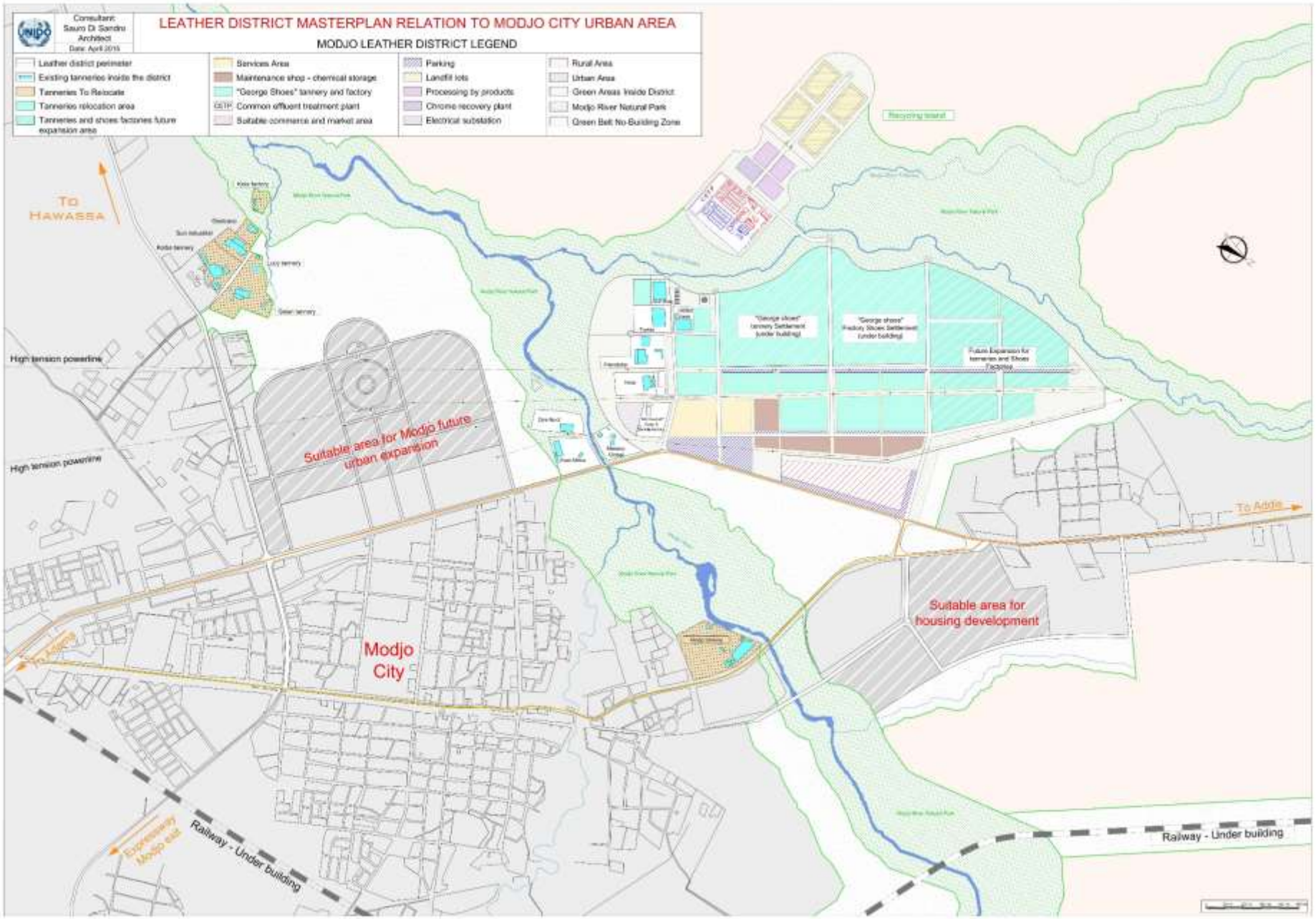
8.1.8. Land-Use Planning

The current urban planning of Modjo, at a glance, is not determined based on planning that controls and programs the location of activities and services in relation to the development of residential areas. But it is more of a "wildfire" expansion in public functions and services that are not properly located. The absence of proper planning leads to the establishing of tanning activities in different parts of the territories located
along the Modjo River, both in the southern and northern areas.

The peculiar location of Modjo, standing at the crossroads of the most important connections between the eastern and western parts of the country, and the upgrading of roads and logistic assets, as a result of operations in progress (new highway, expansion of the container terminal, new industrial development), makes Modjo town the "South Gate" to
Addis Ababa. For this reason it is important to radically revise the development plan of Modjo based on its topography making it compatible with and respectful to the natural environment. The concentration of tanneries in a new and modern industrial district leads to facing problems of environmental pollution and solving them with the construction of a centralized wastewater treatment system and by the provision
of productive activities and services to the cluster.

The resolution of the current environmental issues (water pollution and air pollution from tanneries), as the City Mayor complains on behalf of the local stakeholders, will make reassessment of natural resources in the region possible, for example the entire are around the Modjo River that will get the opportunity to become a natural park in the city. The new leather cluster is integrated into a case of reprogramming of the entire area of west of Modjo to encompass the enhancement of Modjo River and its beautiful river banks rich in flora and fauna of great environmental interest. The design shows the general plan of a wide area west of Modjo city and highlights the integration of the new leather district as part of a wider urban framework mainly characterized by the creation
of a green area reserved for Natural Park along the Modjo River banks.

The creation of a protected area along the river and the provision of additional recreational green areas surrounding the leather district are in our opinion major positive elements for the whole city and contribute significantly to the mitigation of the environmental impact of the new
industrial area.


Consultant:
Saum Di Sandro
Architect
Date: April 2015
LEATHER DISTRICT MASTERPLAN RELATION TO MODJO CITY URBAN AREA
MODJO LEATHER DISTRICT LEGEND
Leather district perimeter
Existing tanneries inside the district
Tanneries To Relocate
Tanneries relocation area
Tanneries and shoes factories future expansion area
Services Area
Maintenance shop - chemical storage
"George Shoes" tannery and factory
CETP Common effluent treatment plant
Suitable commerce and market area
Parking
Landfill lots
Processing by products
Chrome recovery plant
Electrical substation
Rural Area
Urban Area
Green Areas Inside District
Modjo River Natural Park
Green Belt No-Building Zone
To Hawassa
High tension powerline
High tension powerline
Suitable area for Modjo future urban expansion
Modjo City
To Addis
To Addis
Suitable area for housing development
Expressway Modjo exit
Railway - Under building
Railway - Under building


Consultant
Sauro Di Sandro
Architect
Update: July 2015
MODJO LEATHER CITY
LANDUSE LEGEND
Feasibility study
Existing tanneries
Relocated and new tanneries
Tanneries future expansion
Shoes factories future expansion
Area assigned to foreign investment (under building)
Services center (Banks - Post Office - Leather school training center)
Maintenance shops - chemical storage
Main square
Recycling Island
Processing by products
Chrome recovery plant
Landfill lots
1st Phase Limit
Suitable commercial and business area
CETP Common Effluent Treatment Plant
Green areas
Recycling Island
CETP
Modjo River Tributary
Pumping Station
Jiaxin Zhong
United Vaan
Farida
Friendship
Hora
Electrical substation
Modjo River
Dire No-2
East Africa
Mesaco Global
To Modjo
Modjo City
Modjo-Addis Main road
To Addis

Modjo leather industrial park actual situation

8.1.9. CETP Location

A necessary preliminary step for CETP location evaluation is the analysis of the actual situation and of the possible MLC development in the future. Two distinct MLC Project implementation phases have been identified. The first phase (Named Phase 1) refers to the situation at the moment of the CETP start up, when the tanneries of both sites (southeast and northwest clusters of tanneries in Modjo) and those that already have shown the interest of relocating to MLC will discharge their effluent to the common wastewater treatment plant. Moreover, this scenario includes the opening of the industrial landfill and the implementation of simple green in-house treatment technologies. The second phase (Named Phase 2) represents a long-term future development of the district that involves the implementation of all facilities for material recovery, a closer integration with the municipality, the full implementation of green in-house treatment technologies and a possible evolution of the regulatory limits for effluent discharges.

8.1.10. SWOT Analysis of the Options for CETP Possible Locations

The comparison of six options for CETP location was carried out through SWOT analysis. To include a new location close to the North West (NW) site, the number of options was increased to six including the three options identified in previous studies. The optimal location was identified by comparing the following alternatives:

- having only one CETP or more;
- the implementation of a pumping system versus partial or complete relocation;
- South East (SE) with NW sites for CETP implementation; and
- NW sites No.1 and No.2 for CETP implementation.
- West site, beyond the river (update April 2015)

Based mainly on the significant series of opportunities that the solution will offer and on the basis of comparable strengths and weaknesses (with respect to the other options), the west site was identified as the optimal location. This site will offer expansion possibilities for the future.

8.1.11. Conclusions

As of now, the presented Masterplan has been evaluated and compared with other solutions and has received positive feedback.

The creation of the new leather park will without a doubt contribute to helping local tanneries with product qualification and with reaching targets set in terms of protecting the environment.

UNIDO has recently organized various “study-tours” with representatives of the national, regional and local governments with the goal of educating on awareness. The aim is to highlight the potential that an efficient leather park has in terms of offering better working conditions inside the tanneries and safeguarding the environment.

For the site and for the sizes of the tanneries which currently exist in Ethiopia there aren’t alternatives to the creation of a modern CEPT.

Let it be noted that there is an important foreign investment taking place in the leather park and this could have a “flywheel effect” in terms of accelerating other foreign investments in the park.

The current state of the park could be defined as a “work in progress” as the next step is for the Ethiopian government to ask for financing from the European Investment Bank for the construction of necessary infrastructure and for the realization of the park including the CEPT.

Modjo, December 2009

Modjo, June 2014

Modjo, February 2016

9. SRI LANKA


SRI LANKA
National capital
Provincial capital
Town, village
Provincial boundary
Main road
Secondary road
Railroad
Airport
Bata - Atha
INDIA
Palk Strait
Palk Bay
Gulf of Mannar
Laccadive Sea
Bay of Bengal
INDIAN OCEAN
Kankesanturai
Point Pedro
Kayts
Jaffna
Elephant Pass
Devipattinam
Rameswaram
Dhanushkodi
Talaimannar
Mannar
Kilinochchi
Puthukkudiyiruppu
Mullaittivu
Vellankulam
Manjulam
Nedunkeni
Puliyankulam
Pulmoddai
Silavatturai
Madhu Road
Vavuniya
Kebitigollewa
Pankulam
Trincomalee
Horuwupotana
Medawachchiya
Hamillewa
Mutur
Kantalai
Pomparippu
Anuradhapura
Kalpitiya
Maragahewa
Kathiraveli
Puttalam
Kekirawa
Habarane
Galgamuwa
Polonnaruwa
Anamaduwa
Dambula
Valachchenai
Maho
Chenkaladi
Batticaloa
Ganewatta
Naula
Chilaw
Maha Oya
Kuliyapitiya
Kurunegala
Matale
Paddiruppu
Kehelula
Kalmunai
Pannala
Kandy
Mahiyangana
Uhana
Amparai
Negombo
Kegalla
Tirrukkovil
Gampaha
Bibile
Ja-Ela
Nuwara Eliya
Badulla
Colombo
Avissawella
Sri Jayewardenepura Kotte
Potuvil
Mount Lavinia
Moratuwa
Haputale
Monaragala
Horana
Buttala
Panadura
Ratnapura
Balangoda
Okanda
Kalutara
Pelmadulla
Matugama
Telulla
Kumana
Beruwala
Rakwana
Kataragama
Deniyaya
Embilipitiya
Tissamaharama
Kirinda
Ambalangoda
Udugama
Akuressa
Hambantota
Galle
Tangalla
Matara
N
SRI LANKA
0 20 40 60 80 km
0 10 20 30 40 50 mi

9.1. Introduction

Leather industry in Sri Lanka is an industry belonging to the small and medium sector with a good potential for future development. In fact, the industry of manufacturing leather and leather products is very labor intensive and can provide employment to the country. In addition, it is capable of contributing to the growth in Gross Domestic Production.

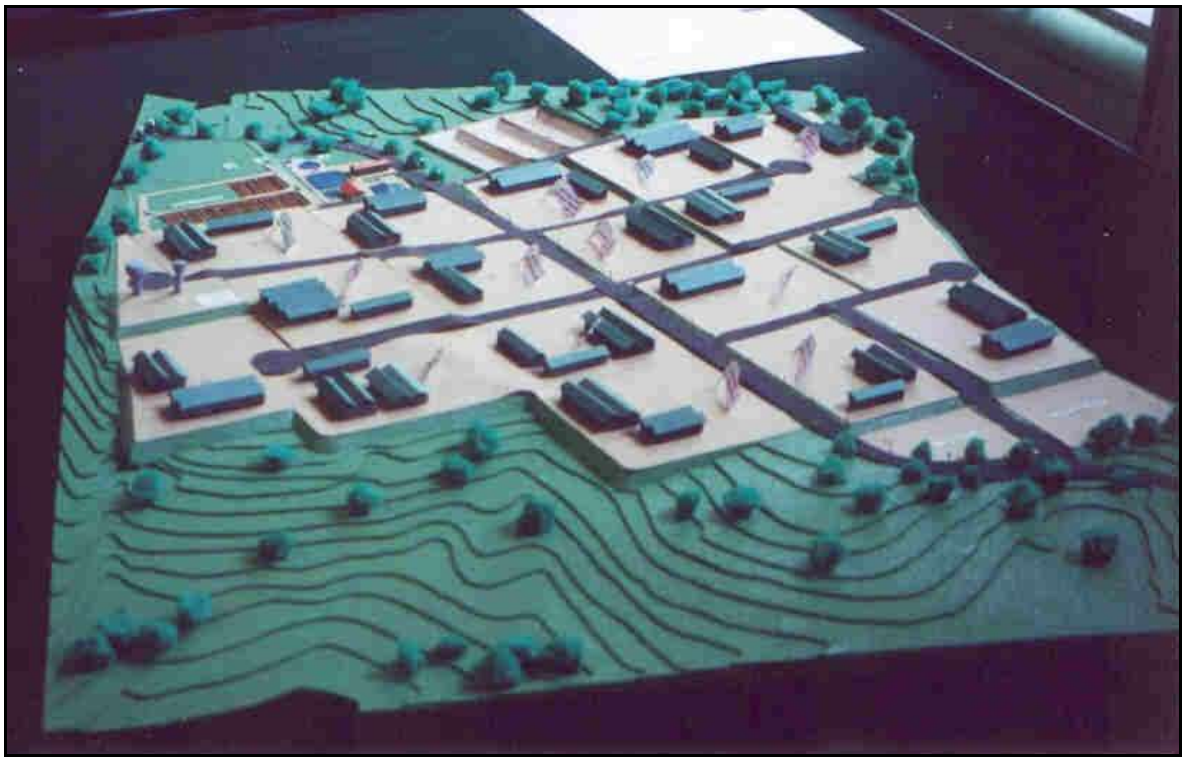
Leather Industry in Sri Lanka first became commercialized at the time of the Second World War, with the objective of supplying the Leather goods for the Armed Services. Initially the government owned the operation and later in the 1960's, the private sector entered into the industry. At present, there are about 10 private tanneries located in the Colombo and Gampaha Districts.

Two of them are doing only the vegetable tanning while the others are doing both vegetable and chrome tanning. Most of the tanneries fall within the small-scale sector processing up to three tons of raw materials whereby one or two tanneries may be considered as medium-scale where about six tons of raw materials are processed per day.

The products of tanneries are both semi finished or finished Leather and they are either exported or sold to the domestic Leather goods manufacturers.

9.2.Tannery relocation

The main constraint for the tanning industry in Sri Lanka is environmental. To tackle this, a joint industry-government decision has been taken to relocate industry out of Colombo to a leather complex at a distance of well over 200 km (Figure 2.2). All tanneries located in the suburbs of Colombo were expected to move into the estate .



The Bata-Atha project was a complex public-private sector partnership with international (UNIDO) inputs in the CETP, disposal site and related processes.

As per designs completed under UNIDO supervision, the Government has implemented infrastructure . Quality of their work is of international standards.

The estate would be functional by now if it were not for local protest (focusing on the sea outfall), which have effectively stopped construction of the sea outfall.

Proper communication with population surrounding planned industrial estates is essential in order to realize such industrial parks.

Bata Atha, 2010

Bata Atha, 2013

Bata Atha, 2015

Bata Atha actual situation

CETP

10. TUNISIA


Banzart (Bizerte)
Manzil Bū Ruqaybah
Gulf of Tunis
Strait of Sicily
Annaba
La Calle
Tabarka
Mattur
Tebourba
Aryanah
TUNIS
Kélibia
Pantelleria (Italy)
Scauri
Ain Draham
Manūbah
Soliman
Mennzel Temine
Menzel Bou Zelfa
Jemmapes
Béja
Grombalia
Guelma
Jendouba
Souk-el Khemis
Zaghouan
Nabeul
Hammamet
Ghardimaou
Oued Zenati
Gaafour
Souk Ahras
Le Kef
Gulf of Hammamet
Enfidaville
Sedrata
Siliana
Oum el Bouaghi
Aïn Beïda
Kalaa Kebira
Susah (Sousse)
Monastir
Linosa (Italy)
Kairouan
Msaken
Morsott
Thala
Moknine
Mahdia
Khenchela
Lampedusa (Italy)
Tébessa
Sbeitla
Cheria
Chebba
Kasserine
Sidi Bouzid
ALGERIA
Sfax
MEDITERRANEAN SEA
Kerkennah Islands
Metlaoui
Gafsa
Skhira
Chott Rharsa
Djebel Mdilla
Gulf of Gabès
Nefta
Tozeur
El Hamma
Gabès
Houmt Souk
Kebili
Djerba Island
Chott Djerid
Matmata
Zarzis
Medenine
Ben-Guerdane
Zuwārah
TRIPOLI
Tataouine
Az Zāwiyah
Remada
Dehibat
LIBYAN ARAB JAMAHIRIYA
El Borma
Ghadamis
El-Fejja
TUNISIA
National capital
Governorate capital
Town, village
Major airport
International boundary
Regional boundary
Main road
Secondary road
Railroad
The Governorates of Tunisia are named after their Capital
TUNISIA
0 20 40 60 80 100 km
0 20 40 60 80 mi

10.1. Introduction

The leather sector is one of the most important economic sectors in Tunisia. The EU is the main export market . However, the industrial processes involved in leather production use high quantities of water and chemicals.

Waste water containing high levels of organic matter and chemical residues have a very negative impact on the environment. Infrastructure for treating waste water is rarely installed and used in Tunisian tanneries.

In order to comply with more strict environmental legislation, to contribute to the sustainable development and the improvement of the competitiveness of the leather sector, the implementation of efficient waste-water-treatment systems are necessary.

10.2. The leather industrial zone of Grand Tunis, Tunisia – El Fejja

Plans to relocate tanneries are dated back to 2002-2004. The zone, still on the drawing board, is an attempt to preserve the local tanning industry (a significant supplier to the expanding local leather products sector) now exposed to strong environmental pressures and facing water scarcity.

The plan calls for relocation of medium and small-scale tanneries scattered in the northern region of Tunisia to a well-organized estate with various common facilities and services.

However, it is recognized that only propulsive, well-equipped, modern tanneries can compete in the market and that some traditional, tiny units may not survive.

El Fejja, actual situation

El Fejja, November 2009

El Fejja, August 2012

El Fejja, April 2016


PÔLE INDUSTRIEL D'EL FEJJA /
LA MANOUBA
STEP
à loti ultérieurement
LEGENDE
Tannery Area


mfcpole : 2-Pôle d'El Fejja –Manouba
Tannery Area

The main features of the zone:

- A mixture of some 20 tanneries processing bovine hides and sheep from raw to wet blue, crust and/or finished stage; the total daily input 33 t/day wet salted raw material, production about 140,000 sq.ft/day.

- In addition to some 10 leather goods workshops, there will also be warehouses/stores for raw hides and skins, chemicals, show/sale rooms, canteen, green/sports areas.

- Joint facilities: centralized chrome recycling plant, plants for utilization of tannery solid wastes, machines repair & maintenance shop.

- Common effluent treatment plant (CETP): 1,500 m3/day, constructed in three steps (500/1,000/1,500 m3/day) for primary (physical-chemical) treatment; the secondary (biological) treatment together with municipal wastewater. Mandatory pre-treatment in individual tanneries, sludge disposal at the municipal landfill.

- Area: approximately 100,000 m2 (10 ha or nearly 25 acres), out of which the net production area is about 60%

- Anticipated power requirements: 5,500 kW, high-tension line of 10 kVA.

- Anticipated work force: some 1,100-1,200 employees.

- Due to salinity (TDS) of tannery effluents and non-existence of freshwater bodies (rivers, lakes) as potential recipients, the zone has to be adjacent to a city with a sewage system and sanitary water treatment facilities.

Due to lack of funds and other issues this tannery zone has not materialized yet.

11. ARGENTINA

11.1. Introduction

Argentina is the second largest producer of raw hides in Latin America after Brazil.

Producing mainly cowhide, there are large tanneries spread out across the whole country, but the most important concentration of tanneries is in the province of Buenos Aires, in the municipalities of Avellaneda and Lanus, and substantially in residential areas.

Due to social pressure because of the difficult residential and industrial coexistence in the area, and the high level of contamination of the city's water canals, the municipality created a consortium for the environmental management of Avellaneda (CGA) that foresaw the realization of an "Urban Environmental Plan" and an "Ecological Industrial Park" for the relocation of the tanneries.

Buenos Aires, Old Tanneries in Lanus

Buenos Aires, Old Tanneries in Avellaneda

The tanneries situated in the area of Lanus were not set to be relocated but instead to have a centralized treatment plant built in the area of Acuba meant to serve the tanneries of the area.

Tannery area in Lanus inside residential district

11.2. Parque Industrial Ecologico

Due to the initiative of 15 of the most important tanneries is the Avellaneda area (Becas, Esposito, D'Amore Fonseca, De Maio etc..) a centralized chrome recovery plant was realized in 1996 (TEA Tratamiento de Effluentes Avellaneda). It was built outside the residential area of Canal Sarandi where the "Ecological Industrial Park" was set to be built thereafter.

Buenos Aires, January 2001

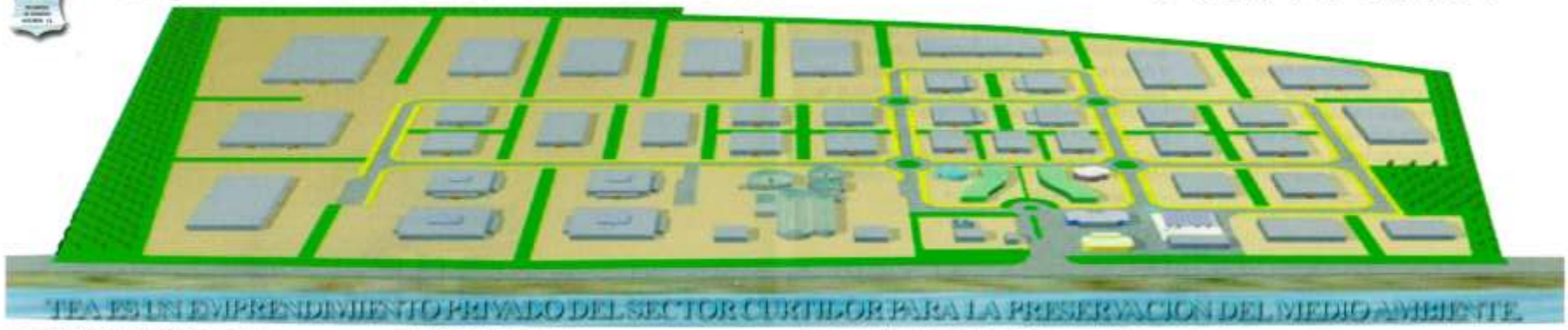
Buenos Aires, August 2008

Buenos Aires, February 2016

Also by initiative of the consortium of the largest tanneries (TELIPA), the project for the relocation of the tanneries to the industrial park of Avellaneda was presented in 1997.

PARQUE INDUSTRIAL AVELLANEDA

Buenos Aires



TEA ES UN EMPRENDIMIENTO PRIVADO DEL SECTOR CURTIDOR PARA LA PRESERVACION DEL MEDIO AMBIENTE

LA INDUSTRIA CURTIDORA DE AVELLANEDA

- Avellaneda es considerada la Capital del Cuero de la República Argentina.
- Se procesan unos 15000 cueros vacunos diarios y más de 4000 cueros entre caprinos y ovinos, cifras que equivalen al 40% de la producción nacional.
- Se emplean 2500 personas en forma directa y unas 10000 de manera indirecta en Industrias vinculadas: fábricas de calzados, marroquinería, vestimenta, etc.
- Desde Avellaneda se realizan exportaciones a países como Estados Unidos, China, Italia, Brasil, Malasia, Alemania y España, entre otros.

NUESTRO OBJETIVO

- Resolver definitivamente, de manera ordenada y eficiente la problemática del sector curtidor y lograr una armonía con el desarrollo sustentable.
- Por ello, la concreción de la instalación de un Parque Industrial Curtidor en Avellaneda, tiene que hacerse realidad para el beneficio de toda la comunidad.
- Así mismo se beneficiarán nuestras Empresas, las cuales cumplirán más adecuadamente con las normas ecológicas que hoy exigen los Mercados Internacionales.
- La nueva localización de las Plantas permitirá adecuar los productos y procesos a las especificaciones de las normas ISO 9000 y 14000, esta última de protección ambiental.

SERVICIOS A PRESTAR POR EL PARQUE

Los parques industriales suelen proveer a las empresas, además, un conjunto de servicios:

- Vigilancia
- Servicios médicos de emergencia, de sanidad y de contralor ambiental.
- Asesoramiento tecnológico, en calidad, organización e informática.
- Laboratorios de control físico, químico o físico-químico
- Certificación de calidad.
- Servicios de capacitación.
- Asesoramiento legal, contable e impositivo.
- Depósito fiscal
- Servicios aduaneros
- Empresas de transporte o prestaciones logísticas integradas.
- Servicios administrativos. Servicios Bancarios.
- Centros de documentación técnica y económica.
- Monitoreo comercial, nacional e internacional y asesoramiento en comercio exterior.
- Protección contra incendios
- Estación de servicio, limpieza o reparación liviana de automotores.
- Centros de convenciones, exposiciones y auditorio.

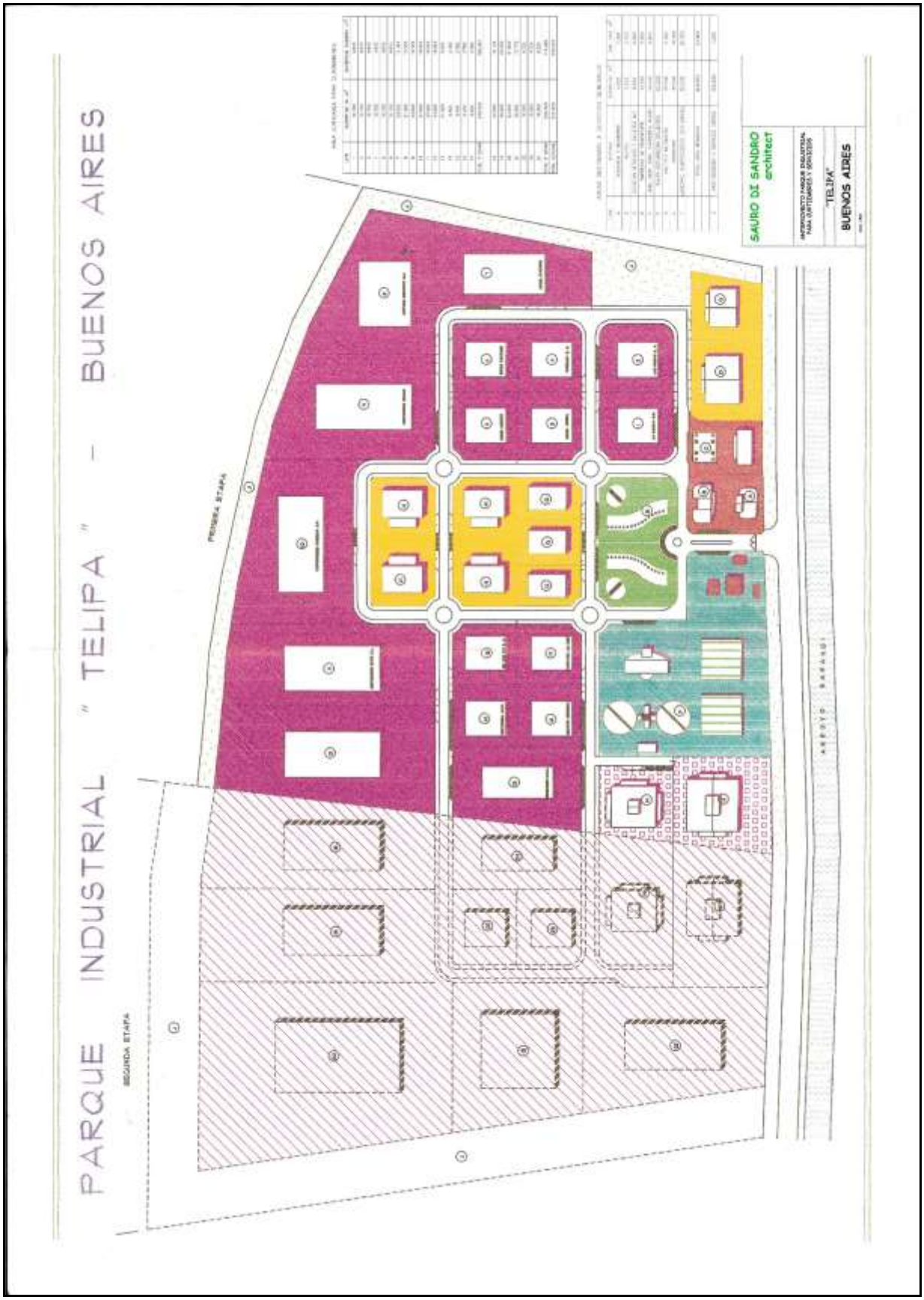
Planta de recuperacion del cromo realizata para ITALPROGETTI engineering

Consulto para el projecto de la urbanizacion archistudio Via S.Tommaso, 12 S.Croce sull'Arno - Pisa Arch. Sauro di Sandro

Chrome recovery plant during the activities

Chrome recovery plant during the activities

The masterplan included areas for the tanneries and also for all of the complementary activities including administrative offices, customs offices, mechanic garages, byproduct manufacturing, warehouses, transport and general services.



The surface area of the park was 72 hectares of which 60 were reserved for the tanneries.

By March of 1999 the Consortium for Environmental Management of Avellaneda had bought 90% of the area necessary to realize the new leather park.

The other project in the Lanus area that only involved the construction of the treatment plant, connected by a sewage system to all of the tanneries, encountered great difficulties during the construction of the sewers as they would have put the entire neighborhood in shambles.

Between the two projects, the Avellaneda one was essentially more realistic and it came about through the collaboration within a Consortium of Tanners, while Lanus seemed to have been created to make the municipality believe that the tanners were dealing with the problem of contaminating waste.

Some time after the presentation and approval of the new Ecological Industrial Park, Argentina unfortunately fell into a grave economic, political and financial crisis culminating in the default of the nation in 2001 with severe consequences on all of the productive activities in the nation. A period of political instability followed for about a decade. All of this practically froze every tannery relocation project and at the same time many tanneries felt the negative effects of the crisis and were forced to close.

11.3. The current situation

After the great crisis there were signs of recovery starting in 2006, but by then the conditions were no longer the same:

- Tanners are no longer united in the project to create and construct an industrial park.
- The elevated costs of relocation are made even worse in periods of crisis where the government cannot help; A radical intervention such as this cannot be materialized without consistent financial support;
- Closing of the most importante tanneries: Becas, Fonseca, Esposito, Curtarsa.. that were a driving force in the creation of the industrial park;
- Resistance to relocation and scarce awareness of environmental problems;
- New political leaders with little authority and lack of ability in forcing tannery owners to meet benchmarks on polluting discharges and effluents discharge.

The case has further evolved and the latest news is that the industrial park will not be realized (in fact, the Cr-recycling plant that was built 20 years ago has since been demolished) and that the realization of single, private treatment plants for each tannery has been approved. In the last months some of the biggest tanneries have been building or have just finished building their own treatment plants and in some rare cases even the Cr-recycling plant.

Essentially we’re talking about a genuine, entire failure because over and beyond all of the limits that a private plant can be faced with, not all of the tanneries are able to realize their own. We don’t know where the treatment sludge will end up and what kind of waste

control and management will come about. This is also another example of how this industry is carrying on whilst make-believing that they are facing environmental issues.

Argentina is a country which almost by definition is profoundly politically and economically unstable, and totally unpredictable. However, because of its more than 55 million head of cattle, a traditional export oriented and well known tanning industry, it has always been a player in the global leather industry.

Private individual treatment plant recently built

Tannery along Riachuelo river

12. MAIN GENERAL CONCLUSIONS

12.1. Problems common to all leather parks

This study of district analysis is based not only on data collections, documents and photos, but also on interviews with operators involved in the process of creating leather parks.
The main characteristics common to all of the parks analyzed are:

- The long period of time necessary from the phase of creating the project of the new park to the effective realization; for all of the parks analyzed more than 20 years had gone by.
- Resistance by tannery owners to take the relocation program seriously; contrasting interests between small and large enterprises
- Long delays due to complicated studies carried out to evaluate the environmental impact of the new master plan, which favored and even justified delays in relocation and caused unending controversy and squabble between all of the entities involved in the planning
- Delays in defining incentives for relocation and compensation for the abandoned areas
- Scarce authoritativeness of government policies which pose limits and parameters for wastewater
- Limited awareness of the "ecological bomb" that is in fact a tanning district without a centralized waste treatment facility
- Lagging in defining the governance, and in attributing the necessary decision making powers to them

The current states of the sites in this study, each with their own specific differences, allow for the following evaluative conclusions:

- Not all of the planning processes started for the relocation and concentration of tanning activities in a single district have been successful.
- The amount of time it takes to have an up and running LIP, starting from the urban planning of the new district to the effective transfer of production activities, is always more than 20 years.
- The best example in terms of efficiency, treatment and waste treatment, recycling of by-products and environmental protection is without a doubt the Italian district of Santa Croce sull'Arno.
- The most representative failure is the Argentinian district of Buenos Aires where the chrome recovery plant, built in 1996 and representative of the first building block of the "Parque Industrial Ecologico di Avellaneda" was actually closed.

12.2. Fundamental Characteristics for Funding a Wholly Functional Industrial Leather Park

1. Site location and land-use planning

The correct localization and dimensions of the new park is the first fundamental, basic condition where errors should not be made as to avoid justifications in delaying relocation.

The case of Tuzla in Turkey is emblematic of this point: As of today the park is fully occupied by businesses related to the tanning industry and not, and the park is completely surrounded by residential areas therefore no other tanning companies will be able to settle in the area.

In some parks the insufficient number of lots for ancillary services to tanneries is a relevant defect; these include byproduct processing, maintenance, warehouses, a logistics center, offices and utilities.

Incorrect rules on the ratio of covered and uncovered lots in the park: the ratio should never exceed 40% ground occupation ratio and tight maximum 50%. Failure to comply with these parameters has led to the construction of buildings that take up almost all of the available space leaving no space for maneuvering. Inadequate space dedicated to parking lots and green areas inside the parks.

2. Social impact of relocation on micro-businesses

Relocation always represents upheaval, especially for the micro-businesses around the production area that lack the strength to relocate and are generally destined to close. This causes considerable social damage to much of the population living on the margins of the main activities.

The new districts should include specific areas for the construction of multi-purpose buildings that can be partitioned into smaller spaces for artisan or family businesses with the idea that over time they could become subcontractors like in the Santa Croce model. The realization of the buildings should be included in the plan for the financial expenses necessary for relocation.

3. Urban planning for brownfield sites and abandoned areas and defining compensation.

Each relocation program must begin with an accurate definition of compensation for the areas that are left behind as well as the costs for land purchase in the new park; delays in quantifying these elements results in disputes, lagging and ultimately prolongation of time to realize the project.

4. Efficient Taskforce and Governance

While in industrialized countries the solutions for environmental problems associated with the tanning industry are continually improved, updated and implemented, in underdeveloped countries there is an urgent and indispensable need for a real taskforce comprised of the following members: tannery owners, stakeholders, public and private entities connected to the tannery industry and international organizations like UNIDO. Such a governance could create a time efficient method of centralizing tanning activities in a single district.

5. Environmental Sustainability

Today, environmental sustainability plays a central role in the leather market, environmental certification of both the production process and the finished product represents an important competitive factor in today's international tanning industry.
An important future development will be certifications based on the life cycle of the products like LCA (Life Cycle Assessment).

The most important international fashion brands as well as the automotive industry are aware of their customers' ever-growing interest in environmental sustainability and are therefore interested in buying from producers and suppliers who have specific environmental certification. In this context, important are the latest statements made by ADIDAS managers, Austin Davidsen, that believes the leather supply chain needs be headed to remain key partners to brands such as ADIDAS in the future:

"…We also expect our partner tanneries will operate to world class environmental standards, and implement controls that minimise energy use, water consumption, and waste discharge…"

The is a one-way street in that there is no turning back, we are rapidly approaching a phase where environmental certification will be indispensable and this will undoubtedly have big repercussions on the entire leather production system. It is thought that for the first time in history, it may be the actual tannery owners who are motivated to adapt to environmental norms in order to survive and maintain their levels of production.

13. LIPs SUMMARY DATA

	TURKEY (TUZLA)	TURKEY (BURSA)	ITALY (S.CROCE)	EGYPT (ROBBIKI)	ETHIOPIA (MODJO)	BANGL. (SAVAR)	MEXICO (LEON)	ARGENTINA (B. AIRES)	SRI LANKA (BATA ATHA)	TUNISIA (EL FEJJA)
MASTERPLAN STATUS										
NOT YET APPROVED					X					
APPROVED	X	X	X	X		X	X	X	X	X
ACTUAL SITUATION										
NOT STARTED					appraisal stage			failed		
WORK IN PROGRESS						final stage			interrupted	initial stage
FINISHED (1ST PHASE)	X saturated	X	X	X			X			
TOT. SURFACE (hectares)	64	173	270	249*	290*	80	90	114*	30*	10*
AREA FOR SERVICES AND FACILITIES (hectares)	21	109	150	131*	120*	24	27	56*	_	4*
AREA FOR TANNERIES (hectares)	43	64	120	108*	170*	56	63	58*	_	6*
NUMBER OF TANNERIES (year 2015)	43	29	474	300*	90*	220*	230	_	_	20*
PRODUCTION (t/day)	300	180	800	150*	250*	700*	N.A.	_	_	33*
NUMBER OF WORKERS	2.000	1.200	6.000	3.500*	5.000*	20.000*	5.000*	_	_	1.200*
CETP CAPACITY (mc/day)	36.000	8.000	30.000	8.000*	16.000*	21.600*	not connected	_	_	1.500*
WATER TREATED (mc/day)	12.000	3.000	16.500	4.000*	8.000*	N.A.	N.A.	_	_	N.A.
SUPPLY WATER COST (€/mc)	0,21	0,3	private supply	N.A.	N.A.	N.A.	N.A.	_	_	N.A.
COST OF TREATMENT (€/mc)	0,35	0,6	7,5	N.A.	N.A.	N.A.	N.A.	_	_	N.A.
CENTRALIZED CHROME RECOVERY PLANT (quantity)	YES	YES	YES (21 t/day)	YES	YES	YES	NO	_	_	YES
INDIVIDUAL CHROME RECOVERY STATION	NO	NO	NO	NO	NO	NO	N.A.	_	_	NO
RECYCLING BY-PRODUCTS	30%	25%	100%	20%	YES	?	15%	_	_	YES
FINAL DESTINATION OF SLUDGE	no special landfill	no special landfill	totally recycled	special sanitary landfill	special sanitary landfill	special sanitary landfill	no special landfill	_	_	special sanitary landfill

* Extimated values or 1st phase

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Telephone: (+43-1) 26026-0, Fax: (+43-1) 26926-69
E-mail: unido@unido.org, Internet: http://www.unido.org