

DOWN THE SEWER: HOW SEMI-INFORMAL TANNERIES MANAGEMENT POLICIES AFFECT RESIDUAL WATER DISPOSAL IN COLOMBIAN BUSINESS SCENARIOS

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DOWN THE SEWER: HOW SEMI-INFORMAL TANNERIES MANAGEMENT POLICIES AFFECT RESIDUAL WATER DISPOSAL IN COLOMBIAN BUSINESS SCENARIOS

ABSTRACT. In Colombia, the issue of waste discharges derived from the tanning process to water bodies is a scenario that has been widely documented. However, measurement exercises have failed to identify improvements in this process that integrates administrative knowledge with concepts of labor, social and environmental welfare. The present article is the culmination of research conducted within the framework of the project "Estudio comparativo de la administración y las repercusiones socio-ambientales en las empresas del sector de curtiembre. Case Bogotá (Barrio San Benito), Case Barranquilla and Case Villapinzón (Cundinamarca)" (Comparative study of the administration and the socio-environmental repercussions in tanning sector companies. Case Bogotá (Barrio San Benito), Case Barranquilla and Case Villapinzón (Cundinamarca)) concerning the administrative practices and the negative effects derived from the absence of management systems for negative externalities caused to the environment by companies in the tanning sector. The study was developed as follows: initially, a systematic documentary review of the laws, decrees and regulations that have a direct or indirect impact on the tanning sector was carried out, followed by field work using data collection instruments (questionnaires) in the San Benito neighborhood (Bogotá), in the town of Villapinzón (Cundinamarca) and in the city of Barranquilla (Atlántico), where there are formal and informal work clusters dedicated to the leather industry. The objective of this study was to identify the relationship between administrative styles and formal processes of strategic planning activities development with the adoption of dumping control systems and other aspects related to environmental management, oriented to the organizational level. Based on the above, the information was analyzed with emphasis on those companies with a common denominator in their control strategies in relation to those policies that were the result of administrative and business practices and that finally led to the desired effects in the social, environmental and economic spheres. Finally, the discussion section focuses on the recognition of these good practices and the possibility that they could be replicated by other actors on the global level.

KEY WORDS: strategic planning, regulations, socio-environmental effects

ÎN CANALIZARE: CUM AFECTEAZĂ POLITICILE SEMI-INFORMALE DE GESTIONARE A TĂBĂCĂRIILOR ELIMINAREA APEI REZIDUALE ÎN CONTEXTELUL DE AFACERI DIN COLOMBIA

REZUMAT. În Columbia, eliminarea deșeurilor derivate din procesul de tăbăcire a pieilor în corpurile de apă este un scenariu documentat pe larg. Totuși, în exercițiile de măsurare nu s-a reușit identificarea unor îmbunătățiri ale acestui proces care să integreze cunoștințele administrative cu conceptele de bunăstare socială, a muncii și a mediului. Acest articol reprezintă punctul culminant al cercetărilor desfășurate în cadrul proiectului „Studiu comparativ al administrației și repercusiunilor sociale și de mediu din cadrul companiilor din sectorul tăbăcării. Cazurile Bogotá (Barrio San Benito), Barranquilla și Villapinzón (Cundinamarca)” care vizează practicile administrative și efectele negative derivate din absența sistemelor de gestionare a externalităților negative cauzate mediului de către tăbăcării. Studiul a fost realizat după cum urmează: inițial, un studiu documentar sistematic al legilor, decretelor și reglementărilor care au un impact direct sau indirect asupra sectorului de tăbăcărie, ulterior s-a efectuat o lucrare pe teren aplicând instrumente de colectare a datelor (chestionar) în cartierul San Benito (Bogotá), în orașul Villapinzón (Cundinamarca) și în orașul Barranquilla (Atlántico), unde se găsesc grupări formale și informale de tăbăcării. Obiectivul acestui studiu a fost identificarea relației dintre stilurile administrative și procesele formale de dezvoltare a activităților de planificare strategică cu adoptarea sistemelor de control al deversărilor și a altor aspecte legate de gestionarea mediului, orientate la nivel organizațional. Pe baza celor de mai sus, informațiile au fost analizate punând accentul pe acele companii care au ca numitor comun strategiile de control în raport cu acele politici care au fost rezultatul practicilor administrative și de afaceri și care, în final, au avut efectele dorite în domeniile social, economic și de mediu. În cele din urmă, secțiunea de discuții este centrată pe recunoașterea acestor bune practici și posibilitatea ca acestea să fie replicate de alți actori din întreaga lume.

CUVINTE CHEIE: planificare strategică, reglementări, efecte sociale și de mediu

EN BAS DE L'ÉGOUT : COMMENT LES POLITIQUES SEMI-INFORMELLES DE GESTION DES TANNERIES AFFECTENT L'ÉLIMINATION DES EAUX RÉSIDUELLES DANS LES SCÉNARIOS D'AFFAIRES COLOMBIENS

RÉSUMÉ. En Colombie, le cas du déversement de déchets dérivés du processus de tannage des peaux dans les eaux est un scénario largement documenté. Cependant, l'exercice de mesure n'a pas permis d'identifier des améliorations qui intégreraient les connaissances administratives aux concepts de protection sociale, de travail et d'environnement. Cet article est le fruit d'une enquête menée dans le cadre du projet « Etude comparative de l'administration et des répercussions socio-environnementales sur les entreprises du secteur du cuir. Les cas de Bogotá (Barrio San Benito), Barranquilla et Villapinzón (Cundinamarca) » sur les pratiques administratives et les effets négatifs découlant de l'absence de systèmes de gestion des externalités négatives causées à l'environnement par les entreprises du secteur du cuir. L'étude a été réalisée comme suit : dans un premier temps, une revue documentaire systématique des lois, décrets et réglementations ayant un impact direct ou indirect sur le secteur du cuir, puis un travail de terrain a été effectué en utilisant des instruments de collecte de données (questionnaire) dans le quartier de San Benito (Bogotá), dans la ville de Villapinzón (Cundinamarca) et dans la ville de Barranquilla (Atlántico), où se trouvent des groupes de travail formels et informels dédiés au travail du cuir. L'objectif de cet exercice d'enquête était d'identifier la relation entre les styles administratifs et les processus formels de développement des activités de planification stratégique avec l'adoption de systèmes de contrôle des déversements et d'autres aspects liés à la gestion de l'environnement, orientés au niveau organisationnel. Sur la base de ce qui précède,

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les informations ont été analysées en mettant l'accent sur les entreprises ayant un dénominateur commun dans leurs stratégies de contrôle par rapport aux politiques qui résultaient de pratiques administratives et commerciales et qui ont finalement abouti aux effets souhaités dans les domaines sociaux, environnemental et économique. Enfin, la section discussion se concentre sur la reconnaissance de ces bonnes pratiques et la possibilité pour elles d'être reproduites par d'autres acteurs à travers le monde.

MOTS CLÉS : planification stratégique, réglementation, effets socio-environnementaux

INTRODUCTION

As mentioned by Martínez & Romero [1], the inception of the leather industry coincided with the birth of the first civilizations, and already in pre-Hispanic American cultures animal skins were used as a means of protection. Over the years, hides continued to be used and in the case of Colombia, the first developments in this industry occurred with the colonization of Antioquiaⁱ. In the 1920's, this change occurred due to the increase in demand for tanned bovine hides. It was not until the 1950's that the first industries were installed in the municipality of Villapinzón (province of Almeidas, northeast of Cundinamarca)ⁱⁱ, and in the 1970's some of these producers moved to the south of Bogotá (Barrio San Benito, Municipality of Tunjuelito) to meet the demand for this raw material for the footwear and other leather goods in the capital city and because of the outbreaks of violence that afflicted the regions of Colombia due to internal conflict.

When the first fur producers who developed their activity in a semi-artisanal way began associating with academic and university institutions in Bogotá that had an academic line of business administration, what they found, as mentioned by Malaver [2], were professorships held by teachers qualified in different disciplines, such as lawyers and/or economists, who taught mostly theoretical approaches to the recently postulated administrative theories of authors like Taylor and Fayol. This situation contrasted with the family-based origin and conformation of the industries created in the sector. Moreover, the management styles of these industries, in their beginnings, were established and organized in an empirical way. Omaña & Briceño [3] list a series of common characteristics of these companies, among which the following stand out: the Family has total power over the property and exercises control over it; the Upper Management in the organization is given by a cession of power from the family to a member; and the primordial tradition consists of inheriting this control and power to the coming family generations.

The management styles of these industries have proven to have effects on society and the environment, which is why the development of this article describes those externalities that can be associated with negative effects, specifically with the disposal of process waste that directly affects the water resource; even more so in a city like Bogotá, since in proportion to the number of inhabitants it is the one that most requires the availability of drinking water in the country and which consequently requires the rationalization of its use.

The above situation is aggravated for the neighboring communities, if one takes into consideration statistics corresponding to uncontrolled water consumption in illegal neighborhoods in the study areas, where the phenomenon of extreme poverty occurs. Strata 2 and 3, which in Colombia are associated with social classes with low to moderate incomes, consume 50% of the water available for the city of Bogotá, and on the other hand there is the industrial sector, which consumes 5.8% of total consumption for estimates for the year 2014, showing a downward trend. This percentage represents 58 million cubic meters of water per day [4], which is enough to supply the Guajira department (one of Colombia's northern regions) for an entire year; the figures were calculated by the author based on studies by DANE & Solano [5, 6].

There are several initiatives in Colombia to rationalize the use of water in Bogotá, taking into account not only its location and consumption quota but also that it is upstream in the water cycle of the country's main river artery - the Magdalena River. More than 30% of the total population of the country depends on the Magdalena and its middle and lower tributaries, before it finally empties into the Caribbean Sea. An important initiative in this sense refers to the fact that the industrial sectors reuse their wastewater by means of physical, chemical and biological processes to obtain almost drinkable water, as mentioned by Peña-Guzmán, Melgarejo, & Prats: "Discharge zero industrial sector" [4, p. 67].

The above-mentioned authors consider that for these solutions to be effective, the organizational styles, the company policies and the productive processes must be considered in concert with the organizational styles of the companies, so that they are not felt to burdensome or too expensive, but rather as a strategic opportunity for the company, which in the Colombian case, corresponds, as already mentioned, to family structures shaped in an empirical way and with administrative practices centered in reactive models and little commitment to environmental safety.

Background

The development of an environmental management model for the processes and products of the tanning sector, implies the knowledge of the technical, operational, commercial, legal and financial aspects of the activity, and fundamentally, of the impact that the tanning industry generates on the environment. Animal skins have been linked to the daily life of human beings since prehistoric times; they have constituted a fundamental element, with various uses in the home and in industry, continuing to be in force at the same time as the enormous advances in technological processes that determine innovations in manufacturing and in the characteristics of products, including those of mass consumption such as footwear and more recently with respect to the high environmental impact produced by traditional leather tanning practices. A case to be taken into account in this respect is identified in the document carried

out by Cruz, Obregón and Puello-Socarrás [7], in which the Becattinian model is identified as an important experience of cluster work in the industrial districts of Baretta and San Mauro (Italy) where “(...) the specialization and cooperativism of a group of companies around a trade such as the manufacture of leather, footwear and leather goods led to the rise of this industry” and that was based on the productive transformation of family units, where one of its components was the organizational styles of these small productive units.

Globally, the tanning industry is on par with the worst polluters, and every year significant financial resources are spent in an attempt to repair the negative effects of its activities, and to a lesser extent in the prevention of these negative externalities. The funds allocated for this purpose are intended to comply with environmental parameters (such as what is strictly necessary at the administrative level to obtain environmental licenses) and to avoid penalties involving economic payment [8]. The Corredor study makes important reference to the treatment of liquid waste generated by tanneries that pollute the upper basin of the Bogotá River coming from the municipality of Villapinzón, Cundinamarca (where an important cluster associated with fur work is located), to the San Benito neighborhood in the city of Bogotá, where the waste from their activities is carried by the Tunjuelito River to the Bogotá River. In Figures 1 and 2, maps with the location of these tanneries around these tributaries are presented:



Figure 1. Location of Villapinzón Tanneries [9]

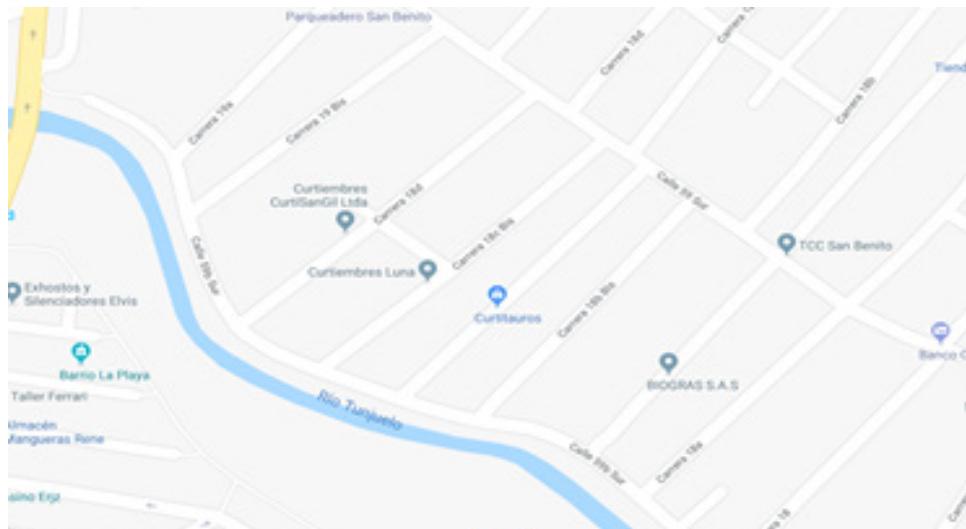


Figure 2. Location of San Benito Tanneries [9]

Similar studies that tangentially tackle the administrative styles associated with these family productive units include Cruz, Obregón and Puello-Socarrás [7], as well as in the work of Martínez and Romero [10], although in this last case the problem of tanneries is studied from the point of view of the relation of different aspects of the competitive environment, beyond the relation between administrative styles and their repercussion in the dumping management policies at the business level.

One element to take into account is the geographical location of the study area, since the city of Bogotá is politically and administratively divided into localities. The San Benito tanneries are located in locality 6 of Tunjuelito, bordering on locality 19 of Ciudad Bolívar to the south. Both locations are known for their high poverty rates and environmentally hazardous conditions, mostly due to administrative styles similar to those found in the case studied in the project, as well as similar problems in the development of their environmental policies and discharges and emissions management. Moreover, it is necessary to emphasize that this locality has very little vegetal area and small water discharges (as identified in Figure 3), which constitute water bodies that receive a high pollutant load due to the intervention and industrial activities described above, as it is in these water bodies where all types of solid waste are dumped. “Limas Creek, which spans 10.5 kilometers in length, runs through a large part of the town of Ciudad Bolívar and flows into the left side of the

Tunjuelo River. Since 1994, pollution has been reported in the middle and lower parts of the ravine.” [11, p. 98].

Current Status

It is essential to take into consideration the administrative and productive practices that have been implemented in the tanning sector in developed countries. Martínez [1] mentions Italy as the country with the highest production of hides and skins, corresponding to 60% of all European demand, and has very clear business policies regarding the development of “the highest quality standards in pollution prevention; it carries out good practices such as: substitution of polluting substances, integration of processes, management and treatment of waste water and final disposal of sludge.” [1, p. 115].

The business practices of companies in the tanning sector in Colombia are affected by the semi-artisanal characteristics of national production and the geographic distribution of these tanneries. Some of them are distributed in a cluster scheme, between Cundinamarca and Bogotá, which concentrate 80% of Colombian industries [1], and Barranquilla (northern Colombia), which contributes 0.30% of the national total. National production of hides and skins in 2010 amounted to 9,487 tons, which represents only 0.66% of Latin American production and 0.15% of global production. The first two baseline scenarios (Cundinamarca and Bogotá) contribute 36% and the third baseline scenario (Barranquilla) participates with 7% [13].

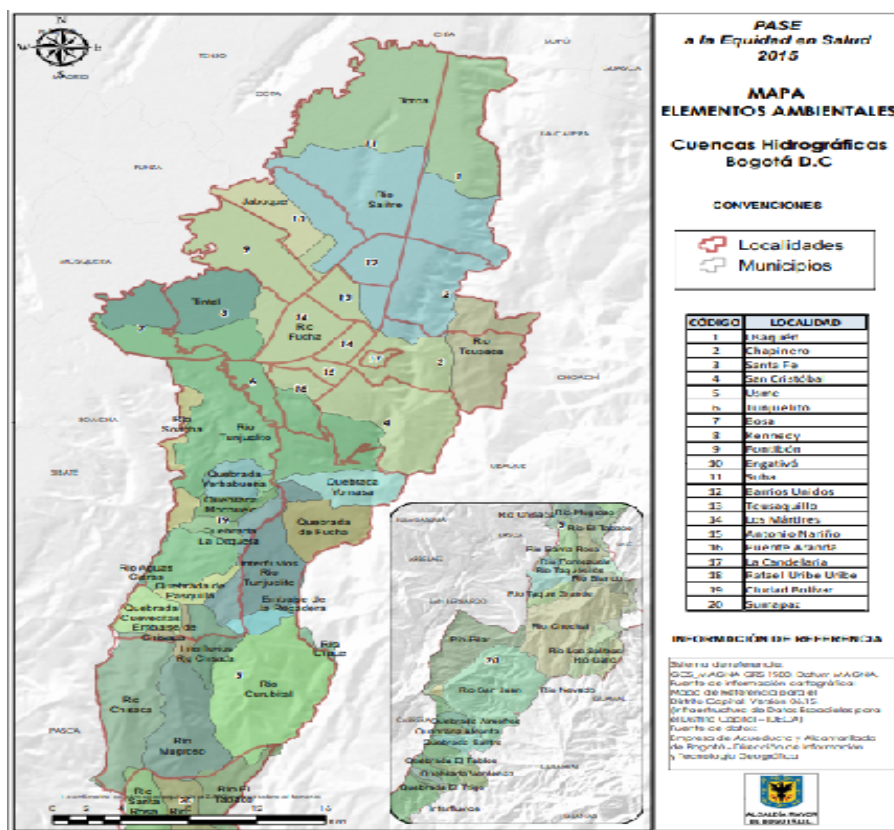


Figure 3. Water basins of Bogotá [12]

Theoretical Reference

Various environmental studies talk about the contamination of the Bogotá river and as one of its main causes the dumping of waste (solid and liquid) to river tributaries in the companies that are dedicated to the tanning process from Villapinzón-Cundinamarca, to the San Benito-Tunjuelito-Bogotá neighborhood. Artuz, Martinez, & Morales [14] mention that it is necessary to create environmental preservation guidelines for the sector's industries and also to emphasize the direct relationship between productivity and the state of river pollution. On the other hand, they make reference to externalities between companies, and the type of job training these industries can implement for pollution prevention. In that sense, the main issue at the core of this study is the relation between administrative styles and organizational policies of management that impact the environment as a by-product of trying to remain competitive in the industry. Other important elements to be taken into account in these relationships are organizational culture and communication, as well as personnel administration and the creation and maintenance of human capital,

which are part of the administrative styles that predominate in the sector.

It is from these experiences that it is possible to suggest that the way in which management styles are applied and developed has positive effects on the company's environmental management and financial performance. Martinez [1] also mentions that of the productive costs in Italian tanneries, 30% are used in chemical products, for energy and waste treatment, clarifying that there are also financial commitments assumed by the companies as a way to achieve a productive transformation committed to the environment where they operate. This raises the promise of value and its possibility to add and capture value for the product they market.

As mentioned above, the administrative theories found in the universities were those of Taylor and Fayol, who in their treatises on "Principles of Scientific Management & Industrial and General Management" respectively mentioned different aspects such as scientific studies to jobs, specialization of functions, the need for permanent supervision, unity of command, remuneration, hierarchy

and components of the administrative cycle: Forecasting, Organization, Execution, coordination and Control. In addition, they also mentioned the psychology of the worker and it is in this field where the article intends to shed other theoretical light on the research [15].

Additionally, it is necessary to identify some theoretical guidelines that are relevant to this study and which provide important elements in exploration, including: externalities between companies, labor learning and personnel management, organizational culture and organizational communication, as can be seen below:

Externalities between Companies

Olivera & Fernandes [16] mention that these externalities can be negative because no one is responsible for the costs involved, but the good intentions of management are to promote positive externalities and that increasing the productivity of a company is the engine for the benefit of another organization that is included in the process.

Workplace Learning (WL)

WL is essentially a process that implemented inside the organizations, with the intention of training the employees in the specific tasks of the organization, methods and methodology. The same work in two companies can have very different procedures. But for Cano, Chamizo, & Martín [17], WL is characterized by two aspects: informal learning, which is carried out in the organization in an empirical way, by imitation, and by trial and error; and organizational training processes of a structured nature, with objectives, goals and evaluations, where once employees pass these stages they are qualified to perform these tasks, as well as future reconditioning or retraining processes.

Personnel Management

Another element mentioned above as a component of the type of management of companies is that which refers to personnel management. In the tanning sector industries, this is handled without stopping to review the current situation mentioned by Morales & Salvador [18], where they comment that

companies must be prepared to face the information age and be able to see that employee management is the dynamic that involves companies in the vanguard, facilitating their continual transformation on par with the accelerated development of current technology.

The organizational culture-OC

The OC is, in essence, all the elements of a system, composed of organs and links. If culture alone is everything that has records, history, and folklore among others, the OC reviews these elements within a company, Alvarado & Monroy [19] states that the collective behaviors of any organization can be of a formal nature, expressed in a strategic plan, where the records and history are in mission, vision, goals, objectives and policies; in some organizations there are even hymns and other cultural expressions as well as other behaviors of an informal nature, such as the customs that have been nested in the companies and are part of the budgets and other administrative processes.

Organizational Communication

An integrated element within the organizational culture is organizational communication. As mentioned by Medina [20], communication as a business discipline is based on three components: orality, persuasion and discourse. Orality is the day-to-day life of an organization, as a social entity, as a group of people; this orality is transformed into writing as memos and circulars as a formality of communication. The second component is the communication between the company and its customers, all the elements of marketing and advertising to promote purchase persuasion. The speech component speaks of oratory – essentially, the power of love that the company has over its employees.

In conclusion and apart from the previous elements central to the analysis, Cruz, Obregón and Puello-Socarrás [7] carried out an analysis of the administrative theories applied to the administrative styles of the leather sector that is congruent with the results of the study in the tannery sector:

Table 1: Administrative theories applied to the administrative styles of companies in the footwear and leather goods sector in Colombia [7]

Year of development	Administrative theory	Characteristics associated with the MSMEs of the cluster studied
1911	Scientific Theory (Taylor)	Division of labor between managers and workers, when circumstances allowed. The other elements (replacement of informal methods of work, selection and training, preparation of machines and arrangement of machines and materials, control and planning were not adequately achieved, so the work was carried out in a semi-formal way)
1916	Classical Theory (Fayol)	Of the 14 principles proposed by Fayol, only a few were applied in a reactive manner to what was established in the large companies that were related to the cluster in Colombia: Division of labor , in an incomplete manner, Authority derived from units of command (bosses - owners) but without responsibilities towards collaborators, hierarchization with a notable development of the vertical hierarchy, characterized by a hypercentralization of decisions and command processes. The other elements (discipline , unity of direction , subordination of individual interest to the general , remuneration , order , equity , stability , initiative , esprit de corps) are still not adequately complied with, which keeps companies in a state of labor semi-formality vis-à-vis their employees or collaborators.
1930s	Human Relations Theory (Mayo)	The companies are characterized by being constituted as family productive units, the hierarchies and relations are given by the family structure and influenced by these relations and family dynamics. Of the main elements (authority, communication, behavioral structure, formalization structure) only the first one was deeply developed; the others were not adequately developed. There was no reduction in labor, as this sector is labor intensive and has no automation of processes.
1940s	Structuralist theory (Dahrendorff, Mayntz, Selznick, Barnard, Etzioni and ECLAC)	
1950s	Neo-classical theory (O'Donell, Dale Koontz, Drucker)	
1960s	Behavior theory (Simon, Barnard, Likertt, Argyris)	There is no approach that integrates the behavior of individuals from incentives and motivation. Administrative theories from this point on are not applicable to the productive units studied, assuming a stagnation in administrative styles with some incomplete developments of classical administrative theories.
1970s	Total Quality and Z-Theory (McGregor, Blake) Contingency - Environmental Impact (Woodward, Lawrence, Lorsh)	There is no application of these theories in the administrative styles of the productive units studied. Neither total quality nor environmental impact management are taken into account.

METHODOLOGY

The research conducted will be a mixed case study and analysis with all the seriousness of a scientific investigation as argued by Coria, Roman, & Torres [21]. It should be characterized taking into account many different aspects and perspectives, some of those classified in the works of Sierra [22], and developed through a transversal research method, allowing the discussion to become a descriptive one. Mainly focused upon qualitative primary sources the authors consider and analyze the results from the baseline scenario as a whole, as does Sandin

[23], also relying on secondary sources in a quantitative manner. Bottomline, this was a pre-experimental study, designed to understand the situation prior to intervene with some good practices and strategies in the field to solve some managerial issues that affect residual water discharges from these tanneries.

After defining exactly which entities will be the subject of this study, the writing of the case helps to consolidate the good practices and improvement options in the management - environment relationship of the tanning sector.

The techniques used will be: structured observation, interviews, surveys (questionnaires), and printed information in articles. The references of the topics that apply to management can be the study of the business innovation of several companies, while combining the management style of the same companies – which, in essence, is the objective of this article.

Research Variables

Demographic: know the size of the tanneries.

Social factors: number of employees, type of company, seniority.

Environmental factors: dumping management, solid waste controls, handling of hazardous materials, management system and safety at work.

Economic factors: current and past financial situation, as well as portfolio collection and cancellation of obligations with third parties and net sales.

Operational and organizational factors: types of employee responsibilities (managerial and operational), type of organizational structure (roles and hierarchies).

Administrative factors: strategic plan, policies, incentives, motivation, organizational school.

The subject population of the study are the companies dedicated to the tanning of skins, in Villapinzón Cundinamarca, San Benito Bogotá and Barranquilla, with the method of probabilistic sampling, of a universe of 483 industries (active and in suspension), the population of which includes 336 operating industries. This study narrowed the sample to 34 companies, with a margin of error of 5% and a level of confidence of 95%.

RESULTS AND DISCUSSIONS

Time Line

The documentary review, including the Ministry of the Environment of the Republic of Colombia, the Secretary of Health of Bogotá, the Congress of the Republic of Colombia and regional entities such as the Regional Autonomous Corporation (CAR), yielded the following results

regarding the review of regulations related to the obligations of companies in their environmental administration and management:

Decree 2811 of 1974: The preservation of renewable natural resources is of public utility and social interest and is provided for in the National Code of Renewable Natural Resources and Environmental Protection.

Law 99 of 1993: Creation of the Ministry of the Environment, which reorganizes the public sector in charge of the environment and its conservation.

Decree 1401 of 1997: Assigned to the Ministry of the Environment, as the Administrative Authority of Colombia that initially establishes the issuance of permits and certificates of CITES (Convention on International Trade in Wild Fauna and Flora Endangered Species), it establishes measures related to the management of tanneries and wildlife traders.

Decree 3100 of 2003: Regulates the retributive rates for the direct use of water as a receiver of the punctual discharges.

Decree 190 of the year 2004: By means of which the dispositions contained in the district decrees 619 of the year 2000 are compiled, (Environmental aspects, hydric resource and soil).

Decree 3440 of 2004: Modifies decree 3440 of 2003 and establishes new fees for direct water use.

Resolution 1433 of 2004: Determines Discharge Management and Sanitation Plans, (PSMV), necessary investments to advance in the sanitation and treatment of discharges, including the collection, transportation, treatment and final disposal of wastewater discharged into the public sewage system.

Agreement 043 of 2006: Establishes water quality objectives for the Bogotá River Basin.

Decree 3930 of the year 2010: By which title I of law 9a of 1979 is partially regulated, regarding the use of water and liquid waste and other provisions that are issued.

Legal Concept No 199 of November 16, 2011: The District Secretary of Environment as an environmental authority within the Capital District has the competence to require the respective discharge permit to those who generate discharges of sanitary interest.

Resolution 631 2015, Ministry of the

Environment and Sustainable Development: Establishes the parameters and maximum permissible limits to be met by those who perform specific discharges into surface water bodies and public sewerage systems. It also establishes the parameters that are subject to analysis and reporting by industrial, commercial, or service activities.

Decree 050 of 2018: Partially modifies Decree 1076 of 2015, the Sole Regulatory Decree for the Environment and Sustainable Development Sector, regarding the permit, requirements and study of the discharge application, as well as its environmental evaluation. It also establishes that no dumping will be allowed [24].

Taking into account the above, the previous legislative analysis revolves around sentence 479 of 2014 of the Council of State, the main legal guideline, which has made it possible to adopt a series of measures that seek to protect the Bogotá river basin. Known as the “Ruling of the Bogotá River”, this ruling contains the design and implementation of measures to decontaminate the river and prevent future contamination. The decision was made in the face of the environmental, ecological and economic-social catastrophe of the Bogotá river basin, caused by the high degree of contamination due to domestic and industrial wastewater discharges, bad agricultural practices and inadequate waste management by the inhabitants and neighboring industries, as well as the omission of the authorities from these situations for more than thirty years [25].

The judgment adopted a series of orders of a national, regional and local nature, involving different authorities. Some orders are of an immediate nature and others extend for a maximum of 3 years. The sentence declares the inhabitants and industries of the basin responsible for the pollution of the river and its tributaries. The authorities that have not taken measures for decontamination and pollution prevention are also declared responsible.

The judicial decision of the Council of State seeks to protect, among others, the following rights [26]:

- Rights related to water and the enjoyment of a healthy environment.

- The existence of an ecological balance and the management and rational use of natural resources to guarantee their sustainable development, conservation, restoration or replacement.

- The conservation of animal and plant species.

- Protection of areas of special ecological importance and of ecosystems located in border areas

- Other interests of the community related to the preservation and restoration of the environment

- The enjoyment of public space and the use and defense of public goods.

- Defending the public heritage.

- Defending the cultural heritage of the Nation.

- Public safety and health.

- Access to a service infrastructure that guarantees public health

- Access to public services and their efficient and timely delivery.

- The right to security and prevention of technically foreseeable disasters.

- Access to public services and their efficient and timely delivery.

- Consumer and user rights.

In this sense, companies are not only obliged by morality to maintain healthy conditions in the ecological environments where they develop, but there are also legal norms that oblige them to control these negative externalities with the threat of sanctions and economic effects of their activities in case of non-compliance.

Business Census

In an interview with Vladimir Fernandez (Plant Manager, Industria de Curtidos la Sabana Ltda.), an initial proposal within the improvement plan would be to raise awareness in the production units in order to propose plans within the tanning companies that would also document all of their activities (financial and administrative) [27].

Another interview was conducted with Dr. Gloria Silva, (Manager, Cooperativa Integral de Curtidores), since 25 years ago the rules protecting the environment issue came out and the companies took other ways, some very few

took the necessary precautions and were making the required adjustments and investments. The role of the cooperative in the early days was to act as an intermediary between suppliers and companies, and today it helps with the entire commercial chain and permanent training processes [28].

In the interviews and visits, the following was found:

- San Benito Neighborhood Census - Bogotá
 - Initial census of companies in the sector: 325
 - Census of operating companies (formal and informal): 216
 - Companies with certification of treatment of waste and water disposal sites: 62
 - Companies affiliated to the cooperative: 24
- Census of the sector - Barranquilla
 - Initial census of companies in the sector: 25
 - Census of operating companies (formal and informal): 10
 - Companies with certification of treatment of waste and water disposal sites: 4
- Census of the sector - Villapinzon

During our field work, 133 tanneries were located, 23 of which were found to have no production infrastructure whatsoever and 110 were found to have open production

infrastructure (74 in Villapinzón and 36 in Chocontá).

There are three associations ACURTIR, ASECHI and ICOLPIELES. Approximately half of the tanners are affiliated to some tannery associations and 75% have been affiliated at some time; 61% show an interest in joining to share processes, machinery or to obtain favorable prices in the purchase of raw materials.

It is recorded that tanners wish to join these associations in order to seek shared benefits and improve their processes and ways of operation.

Environmental Cost

Attributing economic value to the environment is a complex task, but if the effects of the damage to the environment can be measured and quantified, the decontamination of the Bogotá River is a priority for government agencies. The Mayor's Office of Bogotá has put into operation a water treatment plant called El Salitre for two billion pesos (\$USD 572 million), and a second plant called Canoas is in the process of being awarded 430 million USD), which only guarantees 60% of the river's decontamination.



Figure 4. El Salitre treatment plant [29]

Measuring the health effects of a contaminated environment is also a complex investigation. Effects on the respiratory tract are identified in the community due to the odors generated by the chemical reactions of the raw materials used, and it is a task for the health secretary who is more concerned about the costs of treating the diseases than the costs of preventing them.

The truth is that the judiciary takes measures for which the government did not train or finance. Colombia is obliged to comply

with the Sustainable Development Goals (SDG), namely of the SDG 12 on responsible and sustainable production and consumption, which must be linked with the SDG 11 on Sustainable Cities and Communities, and finally with SDG 3 on Health and Welfare [30].

Fresh water is an abundant natural resource in Colombia, which ranks 6th in the world in most absolute water reserves, only surpassed by Brazil, Russia, the United States, Canada and China. The relative reserves by number of inhabitants are an unknown figure.

The 58 million cubic meters of water (from the industrial sector) amount to \$240 billion pesos (67 million USD), according to the tariffs of the Bogotá water company [31].

The situation in Latin America is not very different. Operational costs are consumed in fines, recovery and repair work. However, the situation does not improve when the global participation in the sector is reviewed, which for 2010 in the case of bovine leather in relation to the effective world production forecast was 6,214 thousand tons, in which Latin America participated with 1,439 thousand tons, representing 23.15%, where the majority participation of this value is contributed by Argentina [32].

The business practices of companies in the sector in Colombia are affected by national production and the geographic distribution of these tanneries. Between Cundinamarca and Bogotá, 80% of the industries are concentrated

[1], and Barranquilla contributes 0.30%. National leather production in 2010 was 9,487 tons, which is only 0.66% of Latin American production and 0.15% of world production. The first two countries account for 36% and the third participates with 7% [13].

Administrative Characteristics of Tanneries

The administrative characteristics of organizations are the response to policies adapted and implemented from administrative theories, which can be of many tendencies: the bureaucratic type, personnel welfare, total quality, scientific administration or the administrative cycle. In Colombia, the strategic planning scheme has become a tool for administrative control.

Strategic planning in an organization is composed of three levels based on time horizon and scope.

Table 2: Planning levels [33]

Planning	Time horizon	Scope	Content
Strategic	Long Term	Macro-oriented, ontological organization	Generic
Tactics	Medium Term	For each area of the organization	Detailed
Operation	Short Term	Exclusive by task	Specific

Tanneries apply classical management theories in terms of the following:

- Specialization of the worker's functions, although there are employees with 'super-numerary' level characteristics, who are trained to perform functions in different areas.
- Training strictly of a practical level, there are no formal training processes. In Colombia there are no technical studies or higher studies of the tanning profession. The processes have some main operators and some auxiliary operators, the latter through observation and assistance of the former, are 'learning' the work.
- The need for a supervisor is evident, which would entail reviewing processes, results, work safety, scheduling preventive maintenance, supplying inputs (chemical formulas for tanning).
- The control of times and movements is fundamental because 90% of the payroll is

piecework; it is the employees themselves who determine its value.

- In the sector it is clear that in the absence of strategic plans and partnership, the work becomes a daily solution to problems, and there is no planning or future budgets, production costs are completely variable upwards.

CONCLUSIONS AND DISCUSSIONS

The leather industry has occupied a prominent place in the Colombian national economy. The treatment of skins and, in general, all its process is one of the trades of greater rooting and tradition in Colombia. The structure and generalities of the productive chain of the leather are composed of five processes that even when they are not always in the hands of the same productive unit, however, they should be articulated closely to achieve a final result of satisfactory quality: 1) breeding of the cattle,

2) slaughter of the animal, 3) tanning process, 4) manufacture of the footwear, and the 5) manufacture of other leather products. In this way, the industrial process of the chain evolves with the tanning of leather, shoe making, leather goods and saddlery.

In economic terms, the tanneries are micro enterprises, both in terms of employment and sales and assets: 70% of the tanneries are micro enterprises, 27% are small enterprises, and only 1.8% are classified as medium enterprises; 79% of the tanneries stated to establish a verbal contract, and only 21% a formal contract; 57% are temporary or piece-rate, and only 43% are permanent. The employment is low skilled and dedicated to the operation, men are the most hired (87%); 89% of the tanneries in the sector are family owned.

As for their technological level, the tanneries in the sector have a low technology penetration. Nearly 80% of the tanneries do not have standardized or automated processes, despite the fact that they process hides with traditional equipment (buffers and downgraders).

A majority of 80% of the tanneries are run by people of mature age and with a maximum level of education of full secondary school, and their employees have a similar level of education. 67% of the tanneries report selling less than \$25,000,000 per month (7.000 USD); 29% report monthly sales between \$25,000,000 and \$250,000,000 (7.000 - 70.0000 USD); 80% of the sales are destined to Bogota and 15% to the rest of the country. It is worth noting that 96% of the tanners expressed interest in learning to export.

The management and technological capabilities of the tanneries' human resources are also deficient. The characterization reflected that the level of managerial training is low. The educational and technical background of the decision makers is very low, with only 8% having attended college and the predominant 89% having passed only basic and secondary education. To this must be added the advanced age of the managers. More than half of the tanners are over 45 years old. In addition to the management training level, there is a low level of technical training at the operational level (89% have a high school diploma and 2%

have a technology-related or other professional degree). All this is configured as a structural barrier to change in the management style.

In the tanning sector, companies should not only think about their economic sustainability, but also comply with environmental and ecological regulations, taking their socio-economic impact on the community where they are located. As Duque says [34], the business competitiveness of the leather processing industries has an additional challenge to keep up in the sector, and that is to adopt productive measures that use the latest technologies in the ecological evolution of the processes. This subsequently increases their operating costs, posing a clear obstacle to sustainability.

REFERENCES

1. Martínez, S., Romero, J., Revisión del estado actual de la industria de las curtiembres. Un análisis de su competitividad, *Investigación y Reflexión*, **2018**, 26, 1, 113-124, <https://doi.org/10.18359/rfce.2357>.
2. Malaver, F., La investigación sobre la administración en Colombia (1965-2015): Balances y Perspectivas, *Cuadernos de Administración*, **2016**, 141-166, <https://doi.org/10.11144/Javeriana.cao29-52.iacb>.
3. Omaña, L., Briceño, M.A., Gerencia de las empresas familiares y no familiares: Análisis Comparativo, *Estudios Gerenciales*, **2013**, 293-302, <https://doi.org/10.1016/j.estger.2013.09.003>.
4. Peña-Guzmán, C., Melgarejo, J., Prats, D., El ciclo urbano del agua en Bogotá, Colombia, *Tecnología y Ciencias del Agua*, **2016**, VII, 6, 57-71.
5. DANE, Obtenido de Censo Nacional de Población: www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/centso-nacional-de-poblacion-y-vivenda-2018, **2018**.
6. Solano-Vargas, M., Los departamentos de la Costa son los que más consumen agua, pero los que menos producen, *La República*, **2014**, pág. Virtual.
7. Cruz, R., Obregón, A., Puello-Socarrás, G., Modelo de mejoramiento productivo para las MiPyMEs: Siete claves para el desarrollo empresarial sostenible, Bogotá, D.C. Centro Editorial UNIMINUTO, **2020**.

8. Corredor-Rivera, J., El Residuo Líquido De Las Curtiembres Estudio De Caso: Cuenca Alta Del Río Bogotá, *Ciencia E Ingeniería Neogranadina*, **2006**, 16, 2, 14-28, <https://doi.org/10.18359/rcin.1230>.
9. Google-Maps, Mapa de San Benito (Bogotá), Obtenido de Mapa de San Benito (Bogotá), **2019**, <https://www.google.com/maps/@4.5630419,-74.1361826,18.25z>.
10. Buitrago, M., Yulier, S., Coca, R., Alexander, J., Revisión Del Estado Actual De La Industria De Las Curtiembres En Sus Procesos Y Productos: Un Análisis De Su Competitividad, *Rev Fac Cienc Econ*, **2018**, 26, 1, 113-124 [cited 2020-05-11], available from: <http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0121-68052018000100113&lng=en&nrm=iso>. ISSN 0121-6805, <https://doi.org/10.18359/rfce.2357>.
11. Santos-Rayó, J., Niño-Sandoval, J., Vargas-Puentes, L., Caracterización de las acciones para la separación de los residuos en la fuente de los barrios Caracolí, Potosí y Tres Esquinas de la localidad Ciudad Bolívar, *Inclusión y Desarrollo*, **2017**, 4, 2, 94-101, <https://doi.org/10.26620/uniminuto.inclusion.4.2.2017.94-101>.
12. Alcaldía Mayor De Bogotá, Mapa de Localidades, Obtenido de Cuencas Hídricas, **2015**, www.saludcapital.gov.co/DSP/.../Mapa.%20Cuencas%20hidrográficas%202015.pdf.
13. CAR., Obtenido de Corporación Autónoma Regional, **2015**, <https://www.car.gov.co/>
14. Artuz, L., Martínez, M., Morales, C., Las industrias curtiembres y su incidencia en la contaminación del Río Bogotá, *ISOCUANTA*, **2011**, 43-53.
15. Taylor, F.W., Fayol, H., Principios de la Administración Científica Administración Industrial y General, 9ª edición, Editorial El Ateneo, Buenos Aires (Argentina), **1973**.
16. Olivera, P., Fernandes, R., Externalidades Positivas Em Aglomerações De Empresas: Um Estudo No Aglomerado De Fundação Da Cidade De Cláudio/Mg, *Gestão & Regionalidade* (Online); Sao Caetano do Sul, **2014**, Tomo 30, N.º 89, 49-62, <https://doi.org/10.13037/gr.vol30n89.1961>.
17. Cano, E., Chamizo, J., Martín, T., Coherencia interna del grado en Administración y Dirección de Empresas: Resultados de Aprendizaje como herramienta de gobernanza, *Red de Docencia Universitaria*, **2016**, 321-346, <https://doi.org/10.4995/redu.2016.5756>.
18. Morales-Calderón, J., Salvador-García, S., Dirección y administración de personal en el siglo XXI - Actualidad y Desafíos, *Administración y Organizaciones*, **2006**, 9, 17, 135-152.
19. Alvarado-Muñoz, O., Monroy-del-Castillo, R., Cultura Organizacional en una empresa propiedad de sus trabajadores, *Cuadernos de Administración*, **2013**, 26, 47, 59-283.
20. Medina, H., Comunicación Organizacional: Matrices teóricas y enfoques comunicativos, *Revista Latina de Comunicación Social*, **2005**, 8, 60, 1-7.
21. Coria, P., Román, I., Torres, H., Propuesta de metodología para elaborar una investigación científica en el área de administración de negocios, *Pensamiento y Gestión*, **2013**, 1-24.
22. Sierra, R., Técnicas de investigación social: Teoría y Ejercicios, Madrid-España: Thompson, **2008**.
23. Sandin, E., Investigación cualitativa en educación: Fundamentos y Tradiciones, Madrid-España: McGrawHill, **2003**.
24. Serrano, C., Borda, O., Gestión Del Conocimiento y Administración Sostenible en las Empresas del Sector de Curtiembre, Colección Cuadernillos de Investigación Serie 5 Innovación Social Cuadernillo 2, Corporación Universitaria Minuto de Dios, **2020**.
25. Ministerio del Medio Ambiente, Observatorio Colombiano de Gobernanza del Agua, Obtenido de Ideam, **2014**, <http://www.ideam.gov.co/web/ocga/sentencia>.
26. Sentencia del Río Bogotá, 479 del 2014 (Consejo de Estado 28 de marzo de 2014), **2014**.
27. Fernández, V., Propuestas Preliminares de mejora (O. Borda, Entrevistador), **2019**.
28. Silva, G., Funciones de COOPICUR (O. Borda, Entrevistador), **2019**.
29. CAR, Estudio de las aguas residuales de Villapinzón y de los Curtiembres, Obtenido de

- Estudio de las aguas residuales de Villapinzón y de los Curtiembres, **2018**, <http://sie.car.gov.co/handle/20.500.11786/36038>.
30. Organización de Naciones Unidas, Programa de las Naciones Unidas para el Desarrollo, Obtenido de Objetivos de Desarrollo Sostenible, **2015**, <https://www.undp.org/content/undp/es/home/sustainable-development-goals.html>
31. Empresa de Acueducto y Alcantarillado de Bogotá, Tarifas servicios de Acueducto Y Alcantarillado, Obtenido de Estructura Tarifaria Para Los Suscriptores Atendidos En Bogotá D. C. Por La Empresa De Acueducto, **2019**, <https://www.acueducto.com.co/wps/portal/EAB/!ut/p/z1>.
32. FAO., Recuperado el 16 de Febrero de 2018, de FAO, **2012**, <http://www.fao.org/documents>.
33. Chiavenato, I., Sapiro, A., Planeación Estratégica Fundamentos y Aplicaciones, Rio de Janeiro: Mc Graw Hill, **2010**.
34. Duque, O., Evolución Ecológica de los productos químicos utilizados en la industria del cuero, *Producción más limpia*, **2007**, 2, 2, 47-56.

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ⁱ The colonization of Antioquia took place in part of the central mountains of Colombia since the late nineteenth century and until the early twentieth century, is so named because the colonists came from the region of Colombia called Antioquia, which is located in the west of the country.

ⁱⁱ Cundinamarca is one of the departments in central Colombia and is the region around the capital, Bogotá.