

Diagnosis of the Application of NTC ISO 9001: 2015 in SMES of the Leather, Footwear, and Leather Goods Industry

Diagnóstico de la aplicación de NTC ISO 9001: 2015 en PYMES del cuero, calzado y cuero industrial de bienes

Diagnóstico de Aplicação da NTC ISO 9001: 2015 nas PME de couro, calçado e couro bens industriais

Aury Janeth Ibarguen Rengifo¹
César Asdraldo Vargas Hernández²

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¹ Universidad Distrital Francisco José de Caldas, Bogotá, Colombia.

ORCID: <https://orcid.org/0000-0003-0824-5523>

E-mail: ajibarguenr@correo.udistrital.edu.co

² Universidad Distrital Francisco José de Caldas, Bogotá, Colombia

ORCID: <https://orcid.org/0000-0003-3869-7037>

Abstract

Introduction: The article is the product of the research "Application of the ISO 9001 standard version 2015 in the leather, footwear and leather goods industry of the Restrepo sector, Bogotá D.C." developed at the Francisco José de Caldas district university during the years 2018 and 2019.

Objective: Formulate strategies that allow SMEs to apply ISO 9001: 2015 in the leather, footwear and leather goods industry in SMEs of the Restrepo sector of the city of Bogotá-Colombia.

Methodology: Surveys and a bibliographic inquiry were carried out to characterize the subject of the study; make a comparison at an international, national and local level; make a diagnosis of the application of the standard, and propose strategies for its implementation.

Conclusion: About 78% of companies in the sector have the potential to be certified in the norm, although they must urgently implement information and communication technologies at the operational and documentary level, and those that are not legally formalized must register before the competent legal entities.

Originality: Through this research, strategies for the implementation of ISO 9001: 2015 for SMEs in the Restrepo sector in Bogotá are formulated for the first time.

Limitations: The results expose the problems found in a Bogotá cluster, which allow for making inferences for the case of Colombia, but it might not be the case for other countries with higher production or different conditions in the industry.

Keywords: Management, Quality, SMEs, Certification.

Resumen

Introducción: artículo es el producto de la investigación "Aplicación de la norma ISO 9001 versión 2015 en la industria del calzado, cuero y marroquinería del sector el Restrepo, Bogotá D.C." desarrollada en la Universidad del Distrito Francisco José de Caldas durante los años 2018 y 2019.

Objetivo: Formular estrategias que permitan a las PYME aplicar la norma ISO 9001: 2015 en la industria del cuero, calzado y artículos de cuero en las PYME del sector Restrepo de la ciudad de Bogotá-Colombia.

Metodología: Se elaboraron encuestas y arqueo bibliográfico para caracterizar a la industria sujeto del estudio; efectuar su comparación a nivel internacional, nacional y local; realizar el diagnóstico de la aplicación de la norma; y proponer estrategias para su implementación.

Conclusión: Cerca del 78% de las empresas del sector tienen potencial para certificarse en la norma, aunque para ello deben implementar de manera urgente tecnologías de información y comunicación a nivel operativo y documental, y aquellas que no están formalizadas legalmente deben realizar su registro ante las entidades legales competentes.

Originalidad: A través de esta investigación, se formulan por primera vez estrategias para la implementación de la ISO 9001:2015 en pymes del sector el Restrepo en Bogotá.

Limitaciones: Los resultados exponen las problemáticas encontradas en un clúster de Bogotá, las cuales permiten realizar inferencias para el caso de Colombia, pero podría no serlo para otros países con mayor producción o condiciones diferentes en la industria.

Palabras claves: Gestión, Calidad, PYME, Certificación.

Resumo

Introdução: Este artigo mostra os resultados da pesquisa realizada pelos autores durante 2018 e 2019; focou-se em um diagnóstico da situação atual do sistema de gestão da qualidade de acordo com a Norma Técnica

Colombiana (NTC) ISO 9001: 2015, na indústria de couro, calçados e artefatos de couro em PMEs.

Objetivo: Formular estratégias que permitam às PMEs aplicar a ISO 9001: 2015 na indústria de couro, calçados e artefatos de couro em PMEs do setor Restrepo da cidade de Bogotá-Colômbia.

Metodologia: Levantamentos e levantamento bibliográfico foram desenvolvidos para caracterizar a indústria objeto do estudo; fazer uma comparação nos níveis internacional, nacional e local; fazer o diagnóstico da aplicação do padrão; e propor estratégias para sua implementação.

Conclusão: Cerca de 78% das empresas do setor têm potencial para serem certificadas no padrão, embora devam implementar urgentemente tecnologias de informação e comunicação no nível operacional e documental, e aquelas que não são legalmente formalizadas devem se registrar antes as entidades jurídicas competentes.

Originalidade: Através desta pesquisa, estratégias para a implementação da ISO 9001: 2015 para PMEs no setor Restrepo em Bogotá são formuladas pela primeira vez.

Limitações: Os resultados expõem os problemas encontrados em um cluster de Bogotá, que permitem fazer inferências para o caso da Colômbia, mas não poderia ser para outros países com maior produção ou condições diferentes na indústria.

Palavras-chave: Gestão, Qualidade, PME, Certificação.

1. INTRODUCTION

The globalization of markets has encouraged entrepreneurs from all economic sectors to choose to implement an added value in their organizations that have been gaining strength over the years [1], quality management and certifications have allowed companies to expand their business forms to the international level and generate a greater degree of trust in users. At present, Colombia has 19 commercial agreements in force with different countries [2], among which the USA and the European Union stand out, which, due to their type of economy, have captured a vast percentage of the Colombian industry of leather, footwear and leather goods.

China, according to data from the DANE (National Administrative Department of Statistics), is the country with the largest share in leather goods imports with 83.3% [3] [4], causing the need for Colombian small and medium-sized enterprises (SMEs) to restructure their methodologies of business and implement quality management systems to increase their competitive capability and achieve positioning in national and international markets.

The quality management system (QMS) is a tool that allows organizations to plan, execute and control activities that guarantee the fulfillment of their missions, with quality standards subject to the requirements of the client / interested parties and the current markets [5]. ISO¹ 9001: 2015, the latest update of the Colombian technical

1 ISO: International Organization for Standardization

norm (NTC) ISO 9001², has the support of the IAF (International Accreditation Forum) and its adoption in the different industries of the country is of preeminent importance because it is the largest certification system in the world and adopted as a quality management standard by nearly 200 countries. [6] [7]

The purpose of this research was to analyze and evaluate the applicability of the ISO 9001-2015 standard in the leather, footwear and leather goods industry in SMEs of the Restrepo sector in Bogotá DC, to generate improvement strategies, and thus mitigate or permanently eliminate the problems generated by not applying the norm.

2. LITERATURE REVIEW

2.1 The manufacturing industry in the world

The manufacturing industry has been characterized as a promoter of economic growth in first world countries. This is driven by its high levels of productivity, industrial development, research and technology which have promoted the development of innovative manufacturing models, encouraged by competitive pressure, that have been generated due to the increasingly demanding needs of customers.

These countries tend to prioritize the integration of innovation with market forces and the forces of global policies, which generate a variety of competitiveness factors. Manufacturing experts point to talent as the most important factor in a country's ability to compete, since it facilitates a shift towards innovation and advanced manufacturing strategies, followed by the cost competitiveness factor (which is usually stronger in countries with emerging economies, because their labor force is usually cheaper), labor productivity, provider network, legal and regulatory systems, educational infrastructure, physical infrastructure, among others. The combination of a country's performance in each of these factors will determine how competitive a country is regarding other manufacturing nations. [8] [9] [10]

The following graphic shows the ranking of the countries with the highest competitiveness index in the manufacturing industry using 2016 data and the outlook for the year 2020.

2 The NTC ISO 9001: 2015 is the fifth version of the ISO 9001 standard, which is subject to permanent updates and through it, the principles of quality management of organizations are adopted. [6]

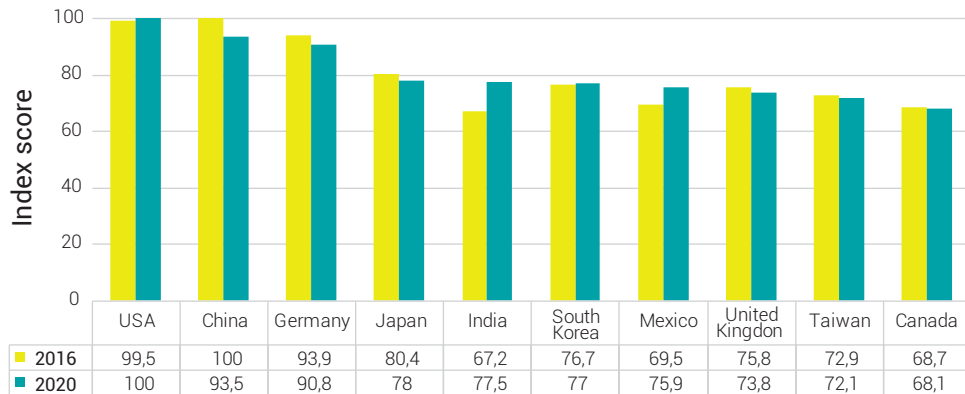


Figure 1. Global competitiveness index in the manufacturing industry 2016-2020

Source: own work. Adapted from [9]

Countries with a high global competitiveness index in the manufacturing industry tend to have a competitive advantage in their commercial exports, “which is a key determinant of the country’s overall competitiveness and prosperity. Nations that are able to competitively export higher-value products, advanced manufacturing, and intensive technology have greater overall prosperity (for example, Germany, the United States, and Japan) “[7] [9], and this is one of the most important reasons of why countries are choosing to certify their industrial processes, whether at the organizational, quality management or production level, among others; Even more so now that “costs related to consultancy and the certification body were cheaper now than in the past” [11].

At present, within the databases consulted (IEEE, SCOPUS, SCIENCE DIRECT and, WEB OF SCIENCE), there are no studies concerning the application of the ISO 9001 standard in the manufacturing industry of leather in first world countries, except for two pieces of research [7], [10] and, [11] developed in Spain, Ethiopia and Italy.

2.2 Colombian industry

Colombia initiated its process of industrialization during the crisis of the thirties, a period in which it showed great growth which, due to factors such as domestic demand and the variability of external sectors, shaped and structured the characteristics of the country’s industry during the twentieth century, showing variations in relation to the existing dependencies between the manufacturing industry and the behavior of gross domestic product. As a result, the sectors of products with greater elaboration take greater participation in the industrial employment rate, leaving behind the agricultural, textile, tobacco and food sectors. [12]

2.3 Colombian manufacturing industry

The manufacturing industry is composed of companies dedicated to the transformation of raw materials into new products, manufactured either by manual or mechanized processes. This type of industry not only provides an added value to the economy of a country but also is of great relevance for the social development of this. In Colombia, the regions with the highest concentration of manufacturing industrial activity are Bogotá and Cundinamarca, Valle del Cauca, Antioquia, Atlántico and Santander. [12] [13]

The percentage of participation of the manufacturing industry in gross domestic product (GDP) is only 10%, however, the companies that make up this industry "are part of value chains that represent a much larger portion of the country's economic activity. A value chain is the sum of the aggregated values along the productive chain of a final good, which includes firms in different sectors of the economy and, in the case of global value chains, different parts of the world". Graphic 2 shows that although the added value of the manufacturing industry is small in comparison with the other sectors, its gross production is the largest in the country. [1]

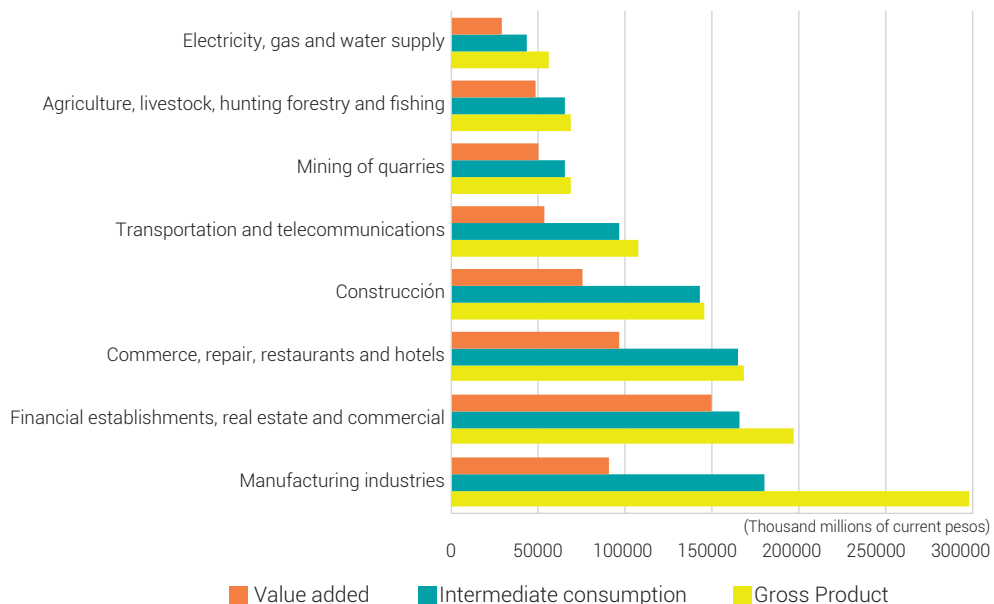


Figure 2. Sectoral gross product, the net product of intermediate consumption of the same sector and sectoral value-added, 2015

Source: J.E Carranza [13]

"The manufacturing industry in Colombia has gained a lot of strength thanks to the trade agreements established with countries such as Costa Rica, Korea, Canada,

Chile, United States, Mexico, among others. With these agreements, the country has managed to preferentially access more than 1,500 million consumers. In addition to this, the geographical location has also made Colombia a center of distribution and production of great importance for international markets". [14]

Currently the manufacturing industry has shown a favorable trend in its installed capacity, production and manufacturing sales, which had a growth of 2.5% in production, 2.2% in sales and 2.0% in sales to the market internal. Table 1 shows that "In the international context, the Colombian industry in 2018 grew above most Latin American countries, reversing what was recorded in the previous year", since Colombia went from a percentage growth of -1.1 in the year 2017 to 2.6 by the end of 2018. [15] [16] [17]

Table 1. Manufacturing industry growth percentages

País	Año 2017	Enero-noviembre 2018
Uruguay	-11,8	13,8
Turquía**	7,9	6,5
China*	6,6	6,2
Japón	4,6	3,1
Unión Europea	3,3	2,8
Italia	3,6	2,8
Colombia (EOIC)*	-1,1	2,6
Chile*	-1,0	2,5
Eurozona	3,0	2,5
España	3,3	2,5
Perú	1,8	2,4
Estados Unidos*	1,3	2,3
Reino Unido	2,6	2,0
Francia	2,7	1,9
Portugal	4,2	1,7
México**	3,4	1,7
Brasil	1,9	1,7
Alemania	3,2	-2,5

Fuente: Departamento de Estadística de los diferentes países

* Datos a diciembre

** Datos a octubre

Source: ANDI [8]

2.3.1 The implementation of the standard in other sectors of the economy and manufacturing.

Colombia is the second country with the highest number of companies certified in ISO 9001: 2015 in South America. 12324 companies are certified in the country under the said standard, of which 27% belong to the manufacturing sector (within which less than the 1% belong to leather and leather goods companies), 71% to the services sector (of which construction companies with more than 1497 certifications in the standard stand out), education with 1119 (due to higher education institutions implementing their QMS as a strategy for the production of technology and knowledge) and transport, storage and communication with 1107. The sectors of agriculture, fisheries, forestry, mining and extraction have a percentage of 1% in participation. [18]

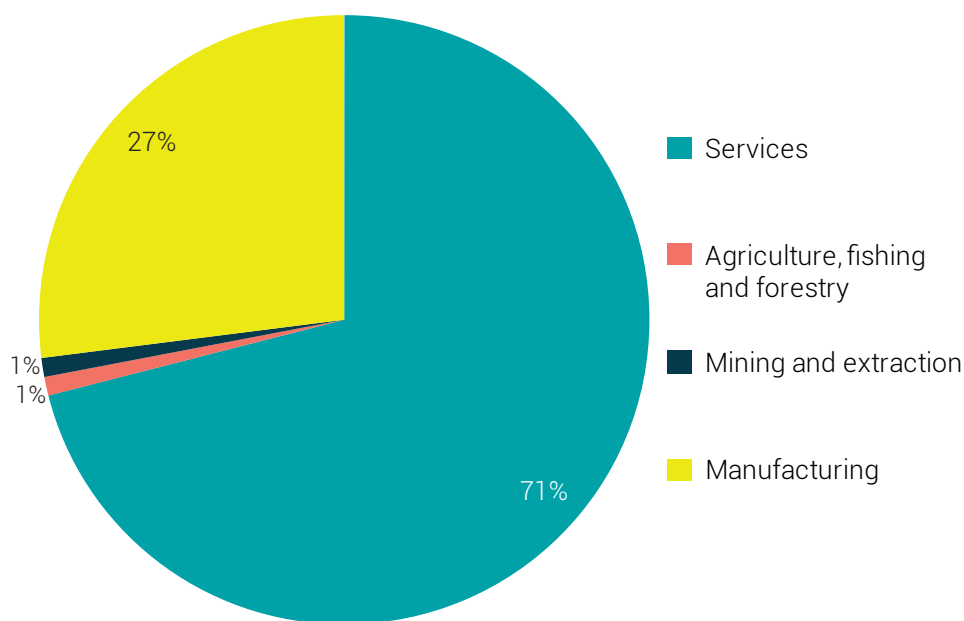


Figure 3. Colombian Companies certified in ISO 9001: 2015

Source: Own work. Adapted from [18]

2.4 Leather, footwear and leather goods industry

2.4.1 Productive chain of leather, footwear and leather goods

A Productive Chain is the relation of a set of economic actors linked by the market from its primary production (inputs, production, transformation, marketing, etc.), to

the consumer. Generally, a productive chain is known as a succession of stages or links that are interrelated.³ The footwear and leather goods industry is one sectors that generates the most jobs in Colombia and its production chain includes activities from agricultural production in livestock herds and refrigeration centers, tanneries, to the manufacture and marketing of leather, footwear, belts, portfolios, etc. [19] [20] [21] [22]

The following illustration shows the structure of the productive chain of leather, footwear and leather goods to generate a better understanding of the stages described above.

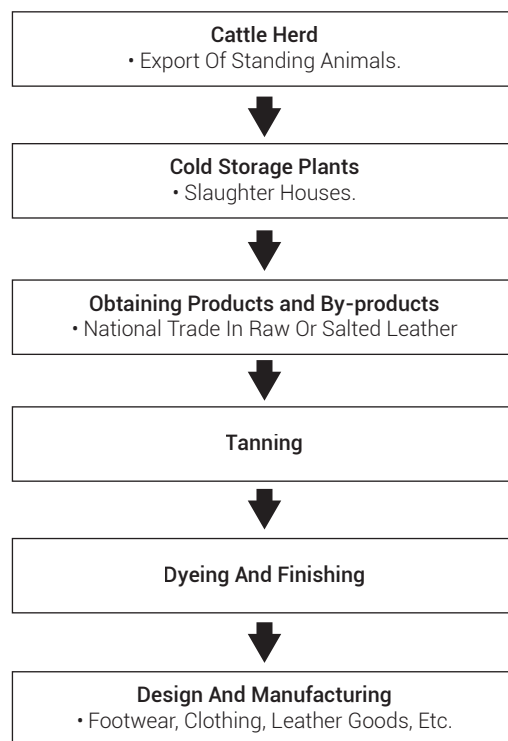


Figure 4. Structure of the productive chain of leather, footwear and leather goods

Source: Own work. Adapted from [13] [17]

3 The existence of a productive chain does not indicate that there are local productive systems, which are agglomerations of organizations that together make possible the production and commercialization of a product and/or services in the same territory. [23]

2.4.2 Bogotá compared to other productive sectors of leather, footwear and leather goods of the country

Bogotá and Cundinamarca is the region with the highest participation in exports of leather, footwear and leather goods in the country. According to the Colombian association of leather, footwear, leather goods and their manufacturing industries (ACICAM), Bogotá and Cundinamarca, Atlántico, Antioquia, Santander, and Valle del Cauca are the departments with the highest level of exports in the leather industry in the country. Bogotá and Cundinamarca is the region that occupies first place (with an estimated 73.9 million dollars in leather articles, 35.7 in footwear and 57.1 in leather goods), followed by Antioquia, Atlántico, Valle del Cauca and Santander. [3] [17]

The comparative graphics with the areas of the country with the highest percentage of participation in the exports of the country's leather, footwear and leather goods industry are shown below.

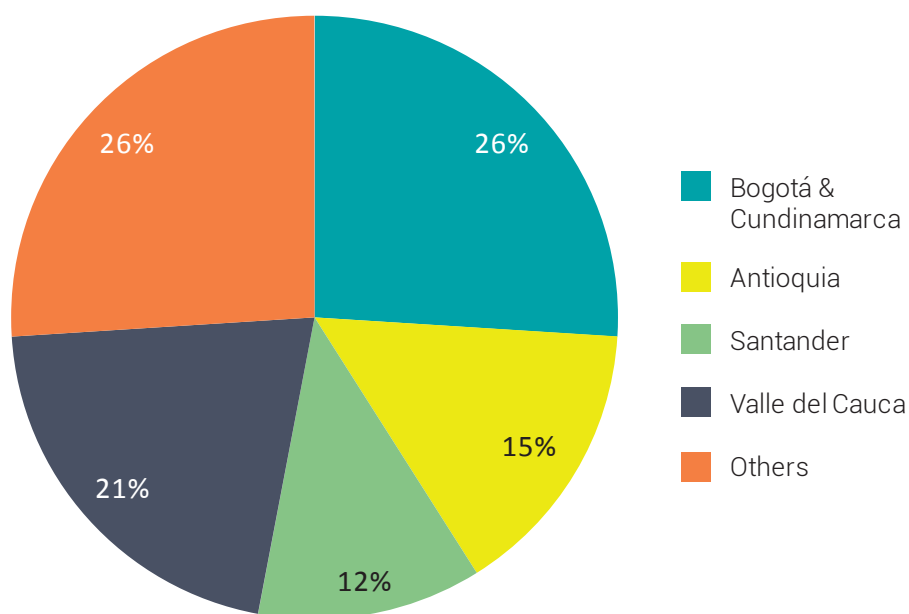


Figure 5. Main footwear exporting regions in Colombia

Source: Own work. Adapted from [2]

2.4.3 Characterization of the Cluster of leather, footwear and leather goods in the Restrepo

The following table shows the characterization made of the sector in geographical, commercial, productive, regulatory and institutional aspects and shows the current condition of the sector (advantages and disadvantages) [6] [21] [22] [23].

Table 2. Advantages and disadvantages of the sector

CHARACTERIZATION	
Geographical	
<p>Advantages. Belonging to the locality N° 15 (Antonio Nariño), Restrepo is a neighborhood located between the southwestern and central areas of the city. As a popular gathering area, it is easy to access through public or private transportation methods. Aside from the recognition on a district and national level, it is a hallmark as far as leather, footwear and leather goods go.</p>	<p>Disadvantages. The development of the city has led to the insertion of several large and diverse shopping centers which are more attractive to the population whose demand lies in the sector thereby reducing its sales.</p>
Commercial and productive	
<p>Advantages. The participation of companies in the sector in different international and national fairs has allowed its products to become better known in other markets. Additionally, there are not only producers but also marketers and suppliers for the different products offered where footwear stands out more than the others.</p>	<p>Disadvantages. The productive chain is weak and poorly structured in many cases. Plus, the leather industry has been showing slow growth worldwide in markets. This is related to the trends imposed by the factors related to animal awareness, raised in the last few years, forcing the producers of accessories made in leather to seek alternatives such as polyurethane and synthetic and natural fibers, which are a threat to the industry since they are very easy to produce, process and have lost value on the market.</p> <p>The organizations of the sector do not have quality certificates that can improve the perception of foreign investors and the demanding public which leads to losing opportunities to export and customers preferring chain stores with more commercial recognition.</p>
Institutional regulations	
<p>Advantages. The local government (Office for economic development) has been creating programs that benefit local marketers as is the case of the program “Yo compro Bogotá” or the seal “Hecho en el Restrepo” which seeks to activate hallmark clusters in the city.</p>	<p>Disadvantages. The industry’s processes of products made in leather are not properly regulated, although they are regulated in terms of the quality of the products.</p>

Source: own work. Adapted from [15] [17] [20]

3. MATERIALS AND METHODS

Based on the research obtained after the bibliographic inventory, Bogotá was selected as the study city due to its high level of participation in the footwear and leather goods industry of the country, as well as being an economic strength that contributes about 25% of GDP. Subsequently, the SMEs of the Restrepo was chosen as the area for evaluation of the sector, since it is one of the most productive agglomerations and high economic concentration in the city, contributing about 36.2% of the supply of goods from the productive chain. [21] [24]

With the study areas selected, the necessary sample size was calculated and a fieldwork was carried out based on interviews and surveys to the businessmen of the sector. This process yielded qualitative and quantitative data provided an insight into

the current situation of the sector and make a global diagnosis about the application of the NTC ISO 9001 version 2015 in the SMEs of the sector and its main problems. Additionally, an investigation was carried out before the different institutions that are in charge of the monitoring of the companies and their participation in the Colombian industry such as the Chamber of Commerce of Bogotá, DANE, FEDECUERO, and ACICAM, among others. The surveys were conducted directly by the researcher to the owners of SMEs in the sector, bosses or personnel in charge.

Subsequently, the diagnosis of the application of the standard was made of the companies that were surveyed, and the main existing problems related to the performance of the companies concerning the norm were identified.

3.1 Calculation of the sample size

To determine the sample size of the population that was to be surveyed, the following formula was used, taking into account that the total population of companies in the sector dedicated to the leather and leather goods industry is around 1500. [25] [26] [27]

$$n = \frac{N * Z_a^2 * p * q}{e^2 * (N - 1) + Z_a^2 * p * q} \quad (1)$$

Where,

N: Is the size of the population.

Za: Confidence level (a standard confidence level of 95% was selected).

e: Is the desired sampling error (oscillates between 5%).

p: Is the probability of success (as this data is unknown it was assumed as 0.5).

q: Is the probability of failure.

n: Is the size of the sample (number of surveys to be performed).

$$306 = \frac{1500 * 1.96^2 * 0.5 * 0.5}{0.05^2 * (1500 - 1) + 1.96^2 * 0.5 * 0.5}$$

3.2 Diagnosis

For the elaboration of the diagnosis, we opted for the application of a system of evaluation of the numerals from 4 to 10, exposed in the NTC ISO: 9001 version 2015, in

which the following evaluation criteria were defined (the qualification of which were assigned to the judgment of the evaluator). [6] [7]

- A: 10 (Completely complies with the stated criteria)
- B: 5 (Partially complies with the stated criteria)
- C: 3 (Complies with the minimum of the stated criteria)
- D: 0 (Does not meet the stated criteria)

Each criterion or structure of the numeral was assigned a rating according to the judgment of the evaluator, based on the information collected in the surveys. Subsequently, the value of the numeral was calculated giving a percentage rating and assigning to this an action to be performed, as shown below:

Ve: Value structure of the numeral.

na: Number of activities in the numeral of the norm.

$$Ve = \frac{\sum A + \sum B \sum C}{10 * na} \quad (2)$$

Implement: $Ve < 50\%$

Improve: $50\% \leq Ve < 80\%$

Keep: $Ve > 80\%$

Once all the structural values of the evaluated numerals were obtained, the overall assessment was generated (on the evaluation diagnosis of the Quality Management System according to NTC ISO 9001 2015 in the organizations of the sector), with which the total percentage of implementation of the standard (TRI) was calculated using the following formula:

n: numerals evaluated of the NTC ISO 90001 version 2015.

TRI: Total implementation result

$$TRI = \frac{\sum Ve}{n} \quad (3)$$

Where,

Low: $TRI < 50\%$

Medium: $50\% \leq TRI < 80\%$

High: $80\% \leq TRI \leq 100\%$

4. RESULTS

4.1 Analysis of the results of the survey applied to the businessmen cluster

The analysis of the answers, given by the people surveyed in the companies, to a set of 19 questions resulting from the validation of the instrument, about the characterization of the company and its performance, limitations and perception in quality management systems, especially the NTC ISO 9001: 2015, was performed.

After surveying the 306 establishments between production and sales points, it was observed that about 74% have knowledge of at least one quality certification system and that 14% currently have a quality certificate, but only 3% are in ISO 9001 version 2015.

Of the above establishments, close to 31% reported the lack of management as the main impediment to be certified in quality, because they do not give greater importance to this type of paperwork. On the other hand, 22% attribute it to a lack of knowledge and 14% to economic causes. The remaining 33% attributed 19% and 14% to other factors or none since in some establishments they claim to have some type of certification at present. The most important of these is the "Hecho en El Restrepo" stamp. Others simply have no interest in certification.

Thus, only 69% of the surveyed establishments reported knowing minimum quality standards, and 62% considered that quality certification would generate greater support and / or contributions within their organization. For its part, 87% would choose to certify the NTC ISO 9001 version 2015 as it is an improvement tool for its production process and affordable for the business economy.

4.2 Results of the diagnosis

Table 3. Assessment diagnosis of the quality management system according to CTN ISO 9001.

MANAGEMENT RESULTS IN QUALITY		
Numeral of the norm	% Obtained from implementation	Actions to be taken
4. Context of the organization	14%	Implement
5. Leadership	15%	Implement
6. Planning	12%	Implement

(continúa)

(viene)

MANAGEMENT RESULTS IN QUALITY		
Numeral of the norm	% Obtained from implementation	Actions to be taken
7. Support	11%	Implement
8. Operation	47%	Implement
9. Performance evaluation	23%	Implement
10. Improvement	33%	Implement
Total result of implementation	22%	
Global score in quality management		Low

Source: own work

4.3 Problematics of the cluster

The analysis of the context of the organizations in the sector shows that the problems with the greatest impact -which are due to internal and external factors- limit the functioning and growth of more than 93% [28] of the companies in the sector and that, moreover, they obstruct the due development and/or implementation of the management systems. The most representative variables of these problems are shown in the following diagram.

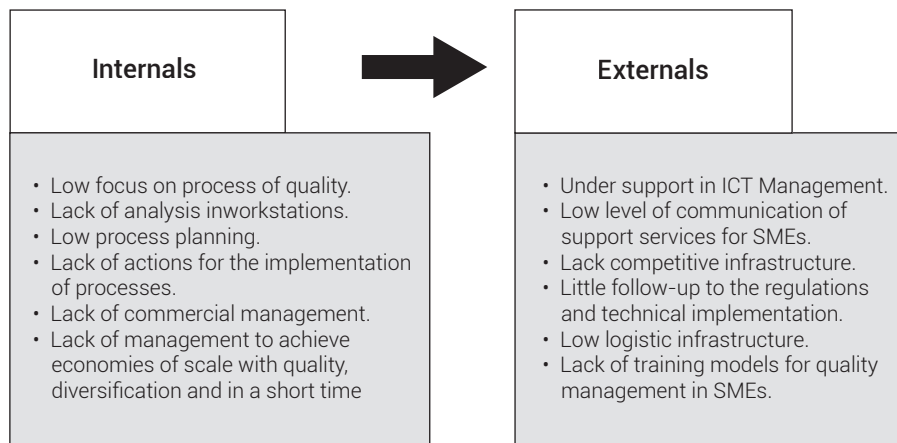


Figure 6. Variables

Source: own work

5. DISCUSSION AND CONCLUSIONS

The implementation of information and communication technologies (ICTs) is needed at an operational and documentary level to mitigate several of the internal problems

of the sector that prevent the application of the rule due to the failure to comply with the numerals corresponding to planning; support, operation, and evaluation of performance. Although sometimes the acquisition of ICTs can be an investment that for a single SME is very expensive, entrepreneurs could acquire them in a shared and organized manner thus decreasing the economic impact and acquiring the same benefit with its use. [29] [30] [31]

Although the sector does not represent an industrial district but a local productive system, it was found to have a high potential because it includes companies whose economic activities are related to the productive chain of footwear and leather goods, except for leather tanning. Thus, it would be beneficial for entrepreneurs in the sector because it would allow them to specialize in specific processes of the chain and increase their production capacity, eliminating those that could be developed by other SMEs in the sector, improving their economy and financial performance. [32]

The creation of a brand would provide opportunities for innovation, competition, and recognition to entrepreneurs in the sector, of which about 14.4% are dedicated to producing goods for other national companies that do have quality certifications. For quality certification it is a requirement that SMEs are up-to-date on legal and regulatory aspects [33]; An important aspect that must be improved. During the fieldwork and investigations and before the chamber of commerce of Bogotá it was possible to demonstrate that near to 18% of SMEs in the sector are not registered legally. This implies that they are not generating formal jobs and are not paying the taxes that are pertinent to their economic activity. That is why it is of great importance that SMEs interested in certification register before the chamber of commerce of Bogotá and other competent legal entities.

The SMEs of the sector would benefit at the organizational level after the implementation of the regulation because they would acquire greater prestige before consumers and national and international investors, and acquire a higher opportunity for competition and expansion [11]. Also, the non-quality costs that SMEs infer from the sector will also be reduced due to the lack of planning, management, and control in their processes for which applicability scores are between 12-47% as is shown in the Table 3.

The results of the analysis and diagnostic stage allow us to infer that around 78% of the companies in the sector have the potential or profile to be certified, as long as the changes in their business structures or production processes are made. For that, the application of the norm in at least this percentage of SMEs would be pertinent.

6. PROBLEMATICS AND EXPERIENCES

The data collection started in the high production season and around 97 establishments refused to carry out the survey.

In many of the establishments, somebody who knew the administrative part of the organization was present.

There were cases of skepticism from owners, bosses or personnel in charge of providing information regarding the organization for fear of tax increases, and even suspicion that the interviewer was an agent of DANE or other agencies, which could affect the legal or other organization. Certain companies were apathetic to the intention of being surveyed.

It is worth mentioning that it was always stressed to all the respondents that the purpose of the survey was of an academic and investigative nature and that such research would not be used for other purposes. During the bibliographic archiving stage, it was observed that there is no periodic update in work with research purposes, and although there are entities such as DANE and ACICAM that make reports regarding the industry and its current situation, these reports are made from surveys to employers of the sector and due to the low participation in some occasions it is not possible to have data with a higher level of confidence.

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