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Determination of the Technological Advantage of the footwear industry of the Plaza Azul, San Mateo Atenco, State of Mexico

Determinación de la Capacidad Tecnológica como fuente generadora de valor, de la industria del calzado de la Plaza Azul, San Mateo Atenco, Estado de México

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Abstract

The manufacture of footwear in the State of Mexico is an activity of the utmost importance since it represents an important source of income for the community of San Mateo Atenco; in the last ten years, just over 40% of family workshops have closed. Plaza Azul has also been affected by a considerable decrease in sales volume, a situation that today is considered critical. The purpose of this research is to determine the technological capacity, understood as the ability to design, buy, manufacture, and sell products. Technological competence is defined as the results of the evaluation of the 7 variables mentioned below: Differentiated and exclusive products, value-added process, mastery of technology, innovation capacity, strategic assets that are difficult to imitate, productive flexibility, and quality system. The results of the research show that productive flexibility is the main strength and differentiated and exclusive products are the greatest area of opportunity.

Competitive advantage, Technological capacity, Footwear industry

Resumen

La fabricación de calzado en el Estado de México es una actividad de suma importancia, toda vez que representa una fuente de ingresos importante para la comunidad de San Mateo Atenco; en los últimos diez años poco más del 40% de los talleres familiares han cerrado. La Plaza Azul igualmente se ha visto afectada con una disminución considerable del volumen de ventas, situación que hoy día se considera crítica. Esta investigación tiene como propósito determinar la capacidad tecnológica, entendiéndose ésta como la capacidad para diseñar, comprar, fabricar y vender. La competencia tecnológica se define como resultados de la evaluación de las 7 variables que se mencionan a continuación: Productos diferenciados y exclusivos, Proceso de valor añadido, Dominio de tecnología, Capacidad de Innovación, Activos estratégicos difíciles de imitar, Flexibilidad productiva, Sistema de Calidad. Los resultados de la investigación muestran que es la Flexibilidad productiva donde se encuentra la principal fortaleza y Productos Diferenciados y Exclusivos la mayor área de oportunidad.

Ventaja competitiva, Capacidad tecnológica, Industria del calzado

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Introduction

The competitiveness of the footwear conglomerate "Plaza Azul" in the state of México is being challenged by foreign imports as well as by other states´ competition. One of the available strategies that can be used to face the competition is to apply the resources and capabilities theory which states that, based on an analysis of resources and capabilities, the organization is able to select the opportunities for which it is best endowed and to define a sustainable competitive advantage based on its competences.

This paper is organized as follows. In the first part, the background of the footwear industry at the national and regional levels as well as the impact of the covid-19 pandemic in this sector are described, Then, the theoretical fundamentals of the competitive potential and the situational SWOT analysis are explained. Afterward, the problems related to the importance of knowing the technological competitive position of the footwear industry are detailed.

The methodology used is descriptive transactional describing the variables that relate to the nuclear competencies of the manufacturers through the analysis of primary data. The study variables were differentiated and exclusive products, value-added process, technology mastering, innovation capacity, strategic technological assets that are difficult to imitate, productive flexibility and quality system.

Through the SWOT situational analysis, it was possible to determine the strategic balance for each of the variables described; Finally, the conclusions on the position of the Plaza Azul of San Mateo Atenco and several proposals of strategies that support the improvement of its technological competitiveness are presented. It should be noted that this article is the product of a research project focused on the Plaza Azul footwear industry in San Mateo Atenco, Mexico, concluded this year.

For this reason, the background of this sector described in the frame of reference in this paper was taken from the article Zenteno *et al* (2019), Strategies of the Marketing Mix of the Footwear Industry in San Mateo Atenco Plaza Azul, because the scenario is the same.

Frame of Reference

The first antecedents of the manufacture of footwear in Mexico correspond to the seventeenth century, in the state of Guanajuato, the oldest data that the Municipal Historical Archive has regarding the manufacture of footwear in the Villa de León is from the year 1645. Andrés González Cabildo is the name of the oldest shoemaker, according to information from the archive of the Chamber of the Footwear Industry of the State of Guanajuato (CICEG).

It is important to return to the history and evolution of the footwear industry in Mexico highlighting some facts from the CIGEC archive. In the year of 1719, when the first census of the Villa de León was undertaken, the data shows the existence of 36 houses in which shoes were manufactured, both by Spaniards, as well as by Indians and mulattos. Later, in 1869, there were 50 "zapaterías", that is, workshop houses in which families formed artisanal production units. The first formal shoe factory on record began work in 1872. By 1900, 17% of the economically active population of León worked in the footwear industry, becoming, along with the textile industry, the most important economic activity in León.

Small-scale manufacturing establishments were the pivot for the development of the footwear industry in Mexico between 1920 and 1930. Productive workshops started to be created in a vertiginous way due to the demand, where local investors were mainly responsible that from then on, Guanajuato and Leon in particular, became the main regions of the national footwear industry. On May 24, 1926, the Union of Footwear Manufacturers of León was constituted, whose founding president was Mr. José Padilla Moreno, and the first secretary was Mr. Ignacio L. Hernández.

In the 50's the mechanization of the production process begins, and the technical principles brought from abroad are integrated. Footwear manufacturers individually promoted their products. At the end of the decade, the directors of the National Chamber of the Footwear Industry began to organize a sample of the product, following the example of the North American model of trade fairs. The first national exhibition was held in Mexico City in 1956.

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In 1966, when it was necessary to reactivate the sale of footwear, the X National Footwear Exhibition was held in León, already known as the Exhibition of the Mexican Footwear Industry, an event that the local press announced as the one that would show "all its industrial potential in the most ambitious exhibition held until then". The event, the result of the efforts of several visionaries, ceased to take place due to differences between the representatives of the different Chambers. However, the model was so successful, that the Leonese producers decided to continue it.

Also, the manufacturers of the Chamber of Footwear of the State of Jalisco began in 1977 with their "National Spring Exhibition", being headquartered in the city of Guadalajara, Jalisco. Five years after opening its doors in León the Five years after the opening of the Salon of Leather and Footwear (SAPICA) in Leon, the first international fair of supply ANPIC was born in 1979., the first international fair of supply.

Thanks to this path walked and the structure that over the years was established, the Chamber of the Footwear Industry of the State of Guanajuato planned and programmed the implementation of a special department to support the activities that the committee in turn determined to carry out. Based on this program, in 1980 the first steps were taken for the incorporation of human and material resources, which would come to constitute the department in charge of the exhibition.

Thus, from the 8th SAPICA Event, the Chamber already had the foundations to achieve the intended objective. It is in 1982 that SAPICA is called the National Footwear Fair. Such is the acceptance of this product in the domestic market, that the National Chamber of the Footwear Industry (CNIC) reaches its maximum historical level of production by producing 317 million pairs of footwear, of which 7.5% were exported to the US market.

However, the crisis at the national level that occurs in the eighties irremediably affected this sector and according to Zarur (1993) "While in 1980 per capita consumption was estimated at 5.6 pairs per year; in 1989, at the end of the decade it was 2.5 pairs of shoes, this derived from the loss of the purchasing power of consumers while the prices of footwear rose markedly, given the increases in production costs."

In 1999, when it turned 25 years old, SAPICA expected 10 thousand buyers with visitors from 25 countries of the world, and signed an agreement with CUOROMODA, then the first fair in Latin America, to publicize the two fairs in the surrounding countries and in their own.

According to figures from the National Institute of Statistics, Geography and Informatics (INEGI), at the end of the 90's, 70 million pairs of shoes were produced per year and there were 73,439 workers employed directly to position the sector as a globally recognized producer. Businessmen, chambers, research centers, and the government took several actions to promote the footwear industry. Because it is a basic consumer item and an important source of employment in the country, the footwear industry occupied a priority place within the National Industrial Development Plan of the Federal Government 2000-2006, in the period of President Vicente Fox Quezada.

The economic censuses of 2009 (INEGI) recorded 7,398 economic units dedicated to the manufacture of footwear representing 1.7% of the total manufacturing industries which employed 112,727 people, contributing 2.4% of the total occupation of the manufacturing sector. Micro-establishments in this sector accounted for 78.5%, employing 19% of the total labor and generated 6.2% of total gross production, compared to large companies, which only accounted for 1% of the manufacturing sector and employed three out of ten employed people and generated almost 40% of production. As for the total production of footwear, 87% was destined for private consumption and the rest was for intermediate demand (national or foreign) referring to trade, cargo transport, fabric manufacturing, footwear manufacturing, manufacture of paint, coatings, adhesives, and sealants, among others.

During the years 2013, 2014 and 2015, the footwear industry only generated revenues in the amounts of $17,436, $17,462 and $18,013 (million pesos) and as for the employed personnel, the figures were 93,291; 92,877 and 94,601, respectively. Observing a decrease in its contribution to GDP, since on average in those years it was 0.6% according to data provided by the federal government.

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The slowdown in the economic figures generated by the footwear industry is evident, and some situations can be observed that have contributed to it. The first important event is China's entry to the World Trade Organization (WTO) at the end of 2001 and the other, Mexico's entry into the Trans-Pacific Partnership on February 4, 2016, called the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (TPP).

Referring to China and its incursion into the WTO, this country has managed to venture and maintain important advantages in sectors such as footwear, textiles, electronics, toys, information technologies, among others. The strategy that this country generated according to Kerber (2002) "[...] in the case of labor-intensive industries, it often focused on learning the *modus operandi* to replace external producers with domestic producers in the medium term and displace them from the markets they dominate. This is the case of the footwear industry where Chinese brands have been progressively incorporated." Other data that is highlighted are listed below.

In accordance with Esquivel (2015) "China is the world's leading footwear producer, manufacturing 5.5 billion pairs of footwear exporting 3.1 billion pairs annually. Regarding exports, China occupies the first place, followed by India with 682 million, Brazil with 520 million, Italy with 425 million, Indonesia with 318 million, Turkey with 270 million and Mexico occupies the seventh place with 170 million. Ten years ago, Mexico imported only 3.0% of its domestic footwear consumption now that consumption has increased to 20% of the total."

However, Olvera (2018) emphasizes "Trade between Mexico and the United States fell from 81 percent in the 90s to 63 in 2016, a year after Republican President Trump gave a protectionist speech in his presidential campaign. In contrast, Mexico's trade with China rose from -1 percent to 10 percent in 2016, according to the Center for China-Mexico Studies at the National Autonomous University of Mexico that has investigated the U.S.-China-Mexico trilateral relationship.

And it adds that in 2017 while China sold us 67 thousand 741 million dollars (computer products and communication technologies, clothing, footwear, electrical appliances), Mexico only exported to China 6 thousand 61 million dollars (computer products, electronics, communication, and auto parts).

The TP (for its acronym in English), Trans-Pacific Partnership Agreement, initially made up of the following countries: Australia, Brunei, Canada, Chile, United States, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Vietnam accounted for about 40% of global GDP and 25% of international trade and intended to create a new economic bloc in the Pacific by reducing approximately 18,000 customs tariffs. The goal was to change the rules on the exchange of goods and services. However, at the end of January 2017, the United States causing a rearrangement of the treaty and on March 8, 2018, it is signed again, now under the name of Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), with the remaining eleven countries.

In an interview with Expansión Magazine in February 2018 with Mr. Alejandro Gómez, executive president of the Chamber of Industry of the State of Guanajuato, commented "We are much more concerned about the CPTPP, because as it is drafted it will allow Vietnam to produce footwear using inputs from China (which are up to 50% cheaper than those obtained in Mexico) and export them to the Mexican market duty-free. In addition, in Vietnam salaries are up to 50% lower than those paid in the sector. We're not going to be able to compete with this mix of cheap inputs and low wages."

It is highlighted in the published article that Vietnam is the second footwear manufacturer globally, only after China and the bulk of its production is for export. So far, Vietnamese footwear pays a tariff to enter Mexico, which allows to balance the low costs. But once the CPTPP is signed, Vietnamese footwear will enter a phase of tariff relief. This has Mexican manufacturers worried, as the Asian product could displace the 235 million pairs sold by Mexican manufacturers in Mexico.

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Despite this and, to address this scenario, Ernesto Acevedo Fernández, Undersecretary of Industry and Commerce of Mexico, said in a conference (February 25, 2019) that in the face of the adverse situation faced by the economic activity of footwear, the following actions were immediately proposed: the signing of two Presidential Decrees that would temporarily establish a tariff of 25 percent or 30 percent on footwear imports which was published in the Official Gazette of the Federation on April 10, 2019.

After this report of antecedents that have impacted the footwear industry at the national level and to know the competitiveness of companies in this sector at the regional level, we proceed to describe the object of study of this research that is composed of 366 manufacturers and merchants of footwear established in the Plaza Azul, of the Municipality of San Mateo Atenco, State of Mexico.

The State of Mexico is divided into 125 municipalities, of which only 6 contribute to the footwear economic sector, which house 81% of the establishments and 80% of the employment. These municipalities are Cuautitlán, Cuautitlán Izcalli, Naucalpan, Tlalnepantla, San Mateo Atenco and Toluca, the most important of them being San Mateo Atenco because of the number of establishments and the generated employment.

According to the Secretary of Economy, 87% of the companies in the footwear industry in the State of Mexico are classified as microenterprises, almost 7% as small companies, 4.55% are medium-sized and 1% are large. San Mateo Atenco is home to just over 40% of the footwear industry in the State of Mexico.

This municipality has an approximate population of 73,000 inhabitants and 75% of the families are dedicated to the manufacture of shoes, both artisanal and industrial. Regarding the history of the shoe in this jurisdiction is divided into three periods:

1) 1900-1912, the elaboration was generated manually.
2) 1913-1931, mechanical machines are used: the first, to sew the cut, the second, to sew the sole and the third, a machine with pedal.
3) 1932-1959, electric machines are used, and the first shoe factories are established.

San Mateo Atenco has also suffered from the events described above concerning China and treaties with other countries. The impact is visualized in the serious decrease in sales. The president of the group of Footwear Producers of San Mateo Atenco (Procasma), at the end of June 2019 declared to the media that the footwear industry in this municipality is at risk due to the floods of the area and the sale of counterfait footwear from China, which has led to the closure of 20% of shoe workshops.

"It has been very complicated to shield a border so that shoes do not enter clandestinely because, with the tariff measures, if it entered legally, prices would rise, but since it is smuggling, it constitutes unfair competition because we have to pay taxes, insurance, affiliations, and other obligations as taxpayers" said the representative of Procasma. Regarding the contingency situation caused by SARS-CoV-2 that causes the COVID-19 disease, the representative of Plaza Azul, pointed out and explained that, despite carrying out all the sanitary measures imposed by the Mexican Ministry of Health, the business does not rebound yet business the most important of them being San Mateo Atenco because of the number of establishments and the generated employment. (Perez, 2020).

In addition to this, the Plaza Azul representative added: "The situation will not improve in the short term, since no improvement in buyer attendance and product sales is foreseen". The shoes manufacturers are still waiting for the local council to Transfer the funds it committed to manufacture 4,500 pairs of shoes for Atequense students of preschool, primary and secondary in the framework of this pandemic to reactivate the economy of footwear workers and other merchants in the municipality. The sellers of Plaza Azul are responsible for the manufacture of those 4,500 pairs of shoes of the almost 10 thousand that the mayor's office requested from other manufacturers at a uniform cost of 350 mexican pesos per pair; however, the prolongation of the entrance to classes in a hitherto indefinite form also caused the postponement of the funds' transfer to the shoemakers. So, the picture becomes quite bleak.

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In a globalized world where services and products are highly diversified and available in virtual markets, companies compete in the search for those differentiating elements that allow them to generate a competitive advantage and thus continue in the preference of customers. Some studies on the subject are listed below.

Publishing, Marketing, (2007) "In order to survive in a competitive market, companies must necessarily outperform their competitors and, because of them, need to create and consolidate sustainable competitive advantages". Competitiveness for this author includes three aspects: economic rationality, capacity for coordination and adaptation with the environment and capacity for direction and organization.

Finally, being competitive implies permanently creating barriers against competitors, taking the initiative and the necessary steps to achieve high levels of productivity and efficiency in the management of resources to achieve high levels of competitiveness.

For Hamel & Prahalad (2005) precursors of the theory of resources, in their article "Strategic Purpose" they mention that competitive advantage is the need to accelerate the learning of the organization to overcome competitors in the construction of new advantages. And they emphasize that the goal of the strategist is not to find a niche within the industry, but to create a new space that adapts to the strengths and resources of the company, that is, a space not yet explored.

It is a process of mastering essential skills and jumping the barriers of the environment until you reach an advantage that allows you to achieve the objectives, although these may take a long time.

According to Garcia, Prieto, & Sanz (2014), analyze the factors that impact on the competitiveness of organizations, using hermeneutics through bibliographic review, which allowed to determine the elements that strengthen competitiveness.

They conclude that the human factor, innovation, financial resources, information and communication technology, environmental management and differentiating factors are competitiveness factors whose proper management strengthens the sustainability of companies over time.

The same authors cite Sarmiento, Sánchez, and Cruz, (2009), who define competitiveness as the company's ability to penetrate, consolidate or expand its market share.

This ability can be seen in the skills, administrative actions, timely use of installed capacity, proper management of financial, human, and material resources, but above all in the perception of market signals, which when instrumented in a timely manner allow you to identify the needs of consumers, resize the scale of production or offer of services, and redesign market strategies for positioning.

Sáez de Viteri (2000) presents a dynamic model for the study of competitive advantage, based on the theory of resources and capabilities, which postulates that in the generators of value lies the sustained competitive advantage of companies, understanding by these the resources, capabilities and routines that underpin core competencies.

These distinctive core competencies must be sought from the internal and external point of view. The introspection to realize what the company does and how to do it as well as assess the appreciation that the customers have about the value that the organization is adding. Sometimes, the customer's esteem for the company's products does not coincide with what the company believes is a source of differentiation or technological excellence. The concept and component of the distinctive core competencies are shown in table1.

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Strategic Competence	
Concept	Components
Project of Management and coordination of value generators to build a competitive strategy that meets the demands of stakeholders and creates added value to customers in multiple markets	– What the company wants to be and where it wants to go = Vision, mission, and objectives. – What the company is and what it knows to do = Resources – What the company is capable of being and doing = Capabilities – Management and coordination of value generators
Technological Competence	
Concept	Components
The ability to design, buy, manufacture, and sell	– Stock of technologies – Know-how to apply the technologies – Capacity for innovation
Staff Competence	
Concept	Components
The ethos, of the organization, set of capabilities of people, known or not and used or not.	– Aptitude or knowledge – Trade or skills – Attitude or behaviors
Organizational Competence	
Concept	Components
The coordination of value generators through the organizational structure of the company	– Task design – Routines or methods – Power structure – Production and information system

Table 1 Concept and components of nuclear competences
Source: Adapted from Sáez de Viteri (2000)

The author also mentions that value generators must be valuable in such a way that they can exploit an opportunity or neutralize a threat, uncommon in the sense that they are not owned by other companies, inimitable because they have been formed in the internal scope of the organization and are, therefore, unique, and irreplaceable.

Taking into consideration the proposal of Sáez de Viteri *(op. cit.)* regarding the distinctive basic competences, this research focuses on the technological competency. Below are the components of this competency which will serve as the basis for the design of the data collection instrument:

Stock of technologies.

In production organizations, technological management not only tends to reduce the gap between man and his productive tool, but also induces him to seek maximum use of it. The proper use of technological resources is supported by the existence of qualified personnel.

Navarro, Romero, Bauza & Granadillo (2006) mention that in the current organization, the greatest results of business growth are obtained by focusing changes towards the incorporation of technologies and the improvement of the capabilities of human resources, an issue that is essential to improve productivity and competitiveness in companies.

Sáezde Vietri (*idem)* highlights are the best assets available to a company to achieve a positioning different from that conferred by its patrimonial situation.

In agreement with Navarro *et al.* (2006) In the current organization, the greatest results of business growth are obtained by focusing changes on the incorporation of technologies and the improvement of the capabilities of its human resources, an issue that is essential to improve productivity and competitiveness in companies.

Know-how to apply them

The concept of know-how as an idiomatic expression with a business connotation dates back, as reported in books and research, to the early eighteenth century. It is an abbreviated form of the American expression "to know how do it" , that is, to know how to do a certain thing. The knowledge we are talking about refers to knowledge in the technical, specific and specialized sense to carry out a process, company or industry, which has its base and has been developed through the experience of years of daily and professional exercise of the activity.

However, Narváez (1990) points out that the know-how contract: "deals with the provision of knowledge relating to objects (test parts, unregistered models, machines, apparatus, tools, mechanization facilities, non-patented inventions, etc.), data , and technical background including calculations, formulas, plans, specifications, drawings or designs, etc.

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As well as instructions for manufacturing, producing, exploiting a product; or obout manufacturing processes; or communication of exploitation experiences; or, practical advice and explanations on a given patent; or indications to plan production, distribution or direct sale and others that are considered complementary".

Capacity for innovation

Barton (1992) indicates that technological innovation is a consequence of the increase in the knowledge base in the company. This knowledge, for the most part, is developed and accumulated within the company and incorporated into individuals and groups, structures, technical and management systems, and into standards, values, procedures and patterns of behaviour.

Barney (1991) Therefore, knowledge-based resources offer to be socially complex. If such knowledge is incorporated into an individual, the organization cannot appropriate or use it without the cooperation of the individual, but if that knowledge is contained in a collectivity of people and rooted in a specific organizational context, the enterprise is less vulnerable. In addition, knowledge-based resources are dependent on the historical trajectory of the company (path dependent) since they result from the experience accumulated by the company due to the successes and failures experienced in the past. Therefore, these resources are difficult to acquire by a company that has not followed the same trajectory.

In the methodological part, the SWOT matrix will be used, so it is necessary to review its origin. Betancourt Guerrero, (2014) refers that the basic model proposed in the early sixties by a group of professors from Harvard Business University, in a first phase, the formulation of strategies rests on the well-known SWOT model," which records the alignment that must exist between the strengths and weaknesses of the organization, derived from its internal evaluation, and the opportunities and threats of the environment, derived from its external evaluation. In the words of the proponents of this model, the economic strategy will be considered as the adaptation between the qualifications and the opportunity that positions a company in its environment.

Once the strategy has been evaluated and selected, the next phase corresponds to its implementation according to the resources allocated in the previous phase.

For a competitive advantage to be really useful, it must also be sustainable; that is, the company can maintain it for a reasonable period of time; to achieve this, the advantages identified must meet two criteria: a) have their origin in a strength of the company, not in a temporary conjunctural event and b) possess such characteristics that make it difficult for the competition to imitate the advantage in the short term.

Problem Statement

The manufacture of footwear in Mexico has a history of more than 400 years, according to data published by the Ministry of Economy, and has been perfected to become a nationally and internationally renowned and prestigious industrial chain supply-leather-footwear. The main states where production is concentrated are Guanajuato, with 78%, Jalisco 12%, 3.5% in the State of Mexico and Mexico City, with 2.4%.

However, and according to figures from the National Institute of Statistics and Geography (INEGI), in 2017 the total factor productivity and contribution to Mexico's economic growth of this sector had a rate of -0.33% annual growth and in January 2019, based on the Monthly Survey of the Manufacturing Industry (EMIM), the percentages of personnel employed in the production of footwear decreased -1.5 and, the plant capacity used increased 0.5. An alarming situation that highlights the crisis facing this economic activity.

The footwear industry in Mexico has been seriously affected by the crises of 1982 and 1994 as well as the activation of various international trade agreements. Footwear is one of the productive sectors that most resented the process of trade opening of Mexico, which caused both its installed capacity and its production to fall. A situation that has been worsening in recent years.

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And if to this scenario, we add the worldwide contingency that began in 2020 caused by SARS-CoV-2 that causes the COVID-19 disease, the economic consequences are shocking and the footwear industry object of study of this research was no exception originating as consequence an exacerbation of the decrease in sales problem.

Therefore, this research poses the need to determine the competitive potential, based on the basic technological competence (Sáez, 2000) in order to conduct the strategic balance of the Plaza Azul footwear sector based on the optimization and risk factors, and from them establish the strategies that support the increase in sales of the footwear industry.

The variables considered were differentiated and exclusive products, value-added problems, technology efficiency, innovation capacity, strategic objectives that are difficult to imitate, productive flexibility and quality system.

Methodology

In the present work, the research design is of a descriptive translational type because, through the analysis, the description of the variables that determine the strategic competitiveness of the footwear manufacturers of the Plaza Azul of San Mateo Atenco will be carried out, for which primary data are obtained. According to Hernández, Fernández and Baptista (2010) the type of study corresponds to the descriptive analysis which seeks to specify the properties, characteristics and profiles of people, groups, communities, or any other phenomenon that is subjected to analysis.

On the other hand, descriptive translational designs that aim to investigate the incidence of the modalities or levels of one or more variables in a population are purely descriptive studies.

The procedure consists of locating one or several variables to a group of people, living beings, objects, situations, contexts, phenomena, communities, etc. and providing their description. As for the references or primary sources, these provide first-hand data, such as interviews or surveys.

Based on the problem of study and in agreement with the state of the art, the principles proposed by Ramirez (2009) will be followed. The procedure does not contemplate the necessary elements to give statistical validity to the research, elements that are incorporated in the present research. In addition to the determination of the strategic balance, the SWOT matrix is elaborated where the proposals of strategies in favor of improving the strategic competitiveness of the footwear manufacturers of Plaza Azul are developed.

To facilitate its understanding and practical application, the detailed procedure that was carried out is shown below:

1. Identification of the analysis criteria. According to Sáez de Vierti (2000), the technological competitive position is the result of comparing the key competences required by the competition (external analysis) with the key competence that the company possesses (internal analysis). Technological competence is defined as an outcome of the following 7 variables:

1. Differentiated and exclusive products.
2. Products with great added value.
3. Mastery of technology.
4. Capacity for innovation.
5. Strategic assets difficult to imitate.
6. Productive flexibility.
7. Quality systems.

2. Determination of the real conditions of performance in relation to the internal and external variables of the analysis.

a. Delimitation of the field of action. The study will be carried out taking as a universe the footwear producers of the Plaza Azul of San Matero Atenco. There are currently a total of 324 manufacturers, according to information provided by the president of the Plaza Azul Association in an interview with a member of the research group.

b. Determination of the sample size. Since the number of footwear manufacturers in the Plaza Azul de San Mateo Atenco is known, the formula used to determine the sample size of a finite population was. (Munch & Angeles, 1998) .

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

Where:
N = 324
k = 1.96 Z value for a 95% confidence level
p = 0.5 probability of success (determine Strategic Competitiveness)
q = 0.5 probability of failure (determine Strategic Competitiveness)
e = 0.05 maximum permissible error

$$n = \frac{(1.96)^2 * (0.5) * (0.5) * (324)}{((0.05)^2(324-1)) + (1.96)^2 * (0.5) * (0.5)} = 176.01 \quad (2)$$

Given the impossibility of carrying out the surveys previously calculated due to the current conditions of the Covid 19 pandemic we chose to work with a confidence level of 90% and accept a 20% error. So, the determination of the sample size was as follows:

$$n = \frac{(1.645)^2 * (0.5) * (0.5) * (324)}{((0.20)^2(324-1)) + (1.96)^2 * (0.5) * (0.5)} = 16.12 \quad (3)$$

$n = 16$

Where:
N = 394
k = 1,645 Z-value for a 90% confidence level
p = 0.5 probability of success (determine Technological competence)
q = 0.5 probability of failure (not to determine Technological competence)
e = 0. 20 maximum permissible error

c. Information collection. The structured interview technique was used designing a questionnaire with strategically planned questions regarding the variables to be measured. (Hernández, Fernández, & Baptista, 2010). The interviews were carried out by the available means: Google Duo platform, WhatsApp and Zoom.

Since the list of strengths (S), weaknesses (W), opportunities (O) and threats (T) can be very extensive, it was limited to considering only the two most relevant in each section. For the selection of the elements that make up the sample (footwear manufacturers), a suitable sampling was used, in which the elements to be sampled are selected because they are accessible through the existing contacts. (Munch & Angeles, 1998).

3. Assigning a weight for each of the strengths, opportunities, weaknesses, and threats.

For each of the factors mentioned in point 1, the interviewees were asked to assign a score of 1, 3 or 5 where 5 denotes the highest level of performance, 3 the average level and 1 the lowest level. Using this scale, the differences among the factors can be clearly established facilitating their hierarchization.

4. Calculation of results. Based on the average score obtained in each variable, a matrix was elaborated with the totals and the individual contribution of each of them.
5. Determination of the strategic balance. The strategic balance (SB) is the relationship between the optimization factor (OF) and the risk factor (RF)

The optimization factor indicates the favorable position of the organization with respect to its competitive assets and the circumstances or events that may potentially be the source of a competitive advantage in the short term. The risk factor shows an unfavorable position of the organization, that is, it shows a competitive liability coupled with conditions that limit the competitive position of the organization.

OF = S + O

RF = W + T

EB = OF – RF

The strategic balance of an organization is better if the difference between the optimization factor exceeds the risk factor.

6. Preparation of the SWOT matrix and presentation of proposals. The respondents' answers were concentrated in a matrix and then graphed. Based on the previous results, the SWOT matrix was elaborated. Using the SWOT matrix, conclusions regarding the general situation of the footwear industry with respect to technological competition and the individual contribution of the studied variables were drawn

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Finally, the SWOT matrix constitutes the basis for the elaboration of proposals for competitive strategies in order to potentiate technological competition to contribute to the success of the footwear industry of Plaza Azul, San Mateo Atenco, Estado de México.

Results

The findings presented in this section describe the technological variables, emphasizing those that are considered relevant to the company's performance, represent a risk or an opportunity in the future and impact on the technological competence of the footwear manufacturers of the Plaza Azul in San Mateo Atenco. The results presented are the product of the information obtained through the structured interviews.

The results matrix was elaborated based on the average score obtained in each variable. Table 2 presents the total weighting of strengths, weaknesses, opportunities, and threats.

Strategic variables	S	W	O	T
1. Differentiated and exclusive products	50	62	46	70
	22%	27%	20%	31%
2. High value-added products	54	16	44	72
	29%	9%	24%	39%
3. Mastery of technology	58	28	52	66
	28%	14%	25%	32%
4. Capacity for innovation	48	56	54	46
	24%	27%	26%	23%
5. Strategic assets difficult to imitate	54	64	54	46
	25%	29%	25%	21%
6. Productive flexibility	70	32	32	54
	37%	17%	17%	29%
7. Quality systems	48	52	66	52
	22%	24%	30%	24%
TOTAL	382	310	348	406
	26%	21%	24%	28%

Table 2 Global and variable situational analysis
Source: Own Elaboration

The concentrate of information in table 2 is analyzed horizontally showing the percentage of participation that the internal and external conditions of the company have for each of the 7 variables that determine technological competitiveness. For example, for variable 1 differentiated and exclusive products, their strengths represent 22%; their weaknesses 27%; opportunities represent 20% and threats 31%.

On the other hand, if the analysis is carried out vertically, the strengths, weaknesses, opportunities, and threats of the company can be determined in a general way. These are shown in graph 1.

SWOT global situational analysis

Graph 1 Global SWOT situational analysis
Source: Own Elaboration

Subsequently, the determination of the global strategic balance (SB) and by variable which is the relationship between the optimization factor (OF) and the risk factor (RF) was carried out. The results are shown in table 3. In the tables and graphs presented below, to enhance understanding, the technological variables are listed from 1 to 7 and correspond in numbering to those presented in table 2, the above for a better visualization of the data.

Strategic variables	Optimization factor (FO)	Risk factor (FR)	Balance (BE)
1. Differentiated and exclusive products	6.00	8.25	-2.25
	0.42	0.58	-0.16
2. High value-added products	6.13	5.50	0.63
	0.53	0.47	0.05
3. Mastery of technology	6.88	5.88	1.00
	0.54	0.46	0.08
4. Capacity for innovation	6.38	6.38	0.00
	0.50	0.50	0.00
5. Strategic assets that are difficult to imitate	6.75	6.875	-0.13
	0.50	0.50	-0.01
6. Productive flexibility	6.38	5.38	1.00
	0.54	0.46	0.09
7. Quality systems	7.13	6.50	0.63
	0.52	0.48	0.05
Total	45.63	44.75	0.88
	0.50	0.50	0.01

Table 3 Global and factor strategic balance
Source: Own Elaboration

Graph 2 shows the impact of the strategic balance by variable and its contribution to the overall strategic balance; to the right of the graph the variables with a positive strategic balance and on the left side of the graph you can see those variables that represent a risk with a negative strategic balance.

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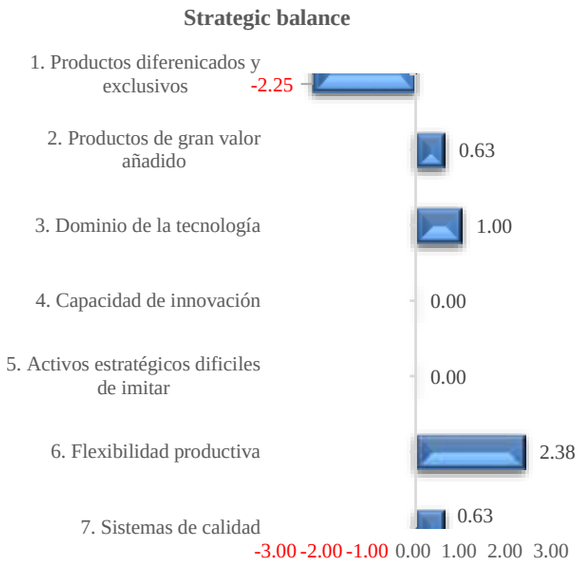
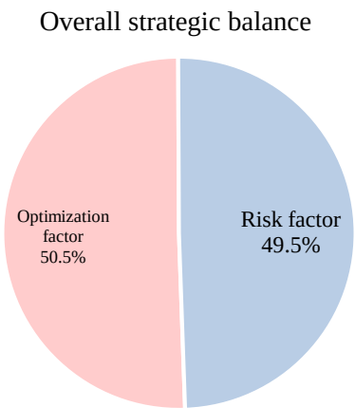


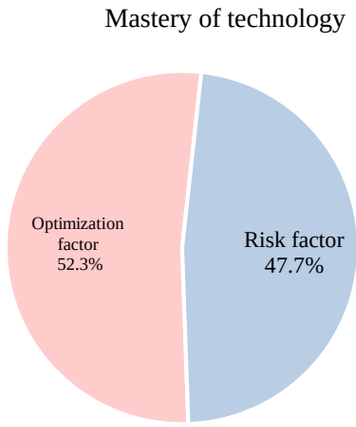
Graph 2 Impact of strategic balance by variable
Source: Own Elaboration

Graph 3 shows the overall strategic balance

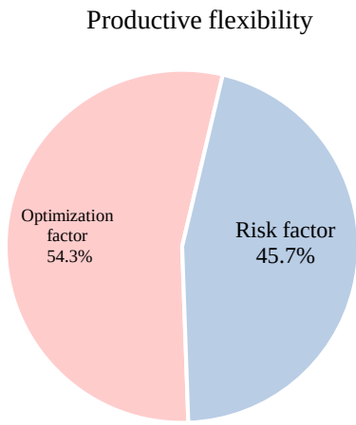


Graph 3 Global strategic balance
Source: Own Elaboration

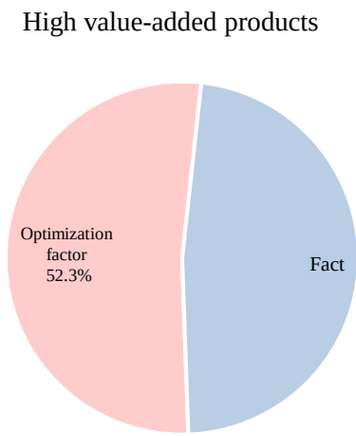
Graphs 4, 5, 6 and 7 show the variables that present the optimization factors in order of greater to lesser strength in the overall balance of technological competitiveness, of the footwear manufacturers of the Plaza Azul.



Graph 4 Mastery of technology
Source: Own Elaboration



Graph 5 Productive flexibility is the most robust
Source: Own Elaboration



Graph 6 High value-added products
Source: Own Elaboration

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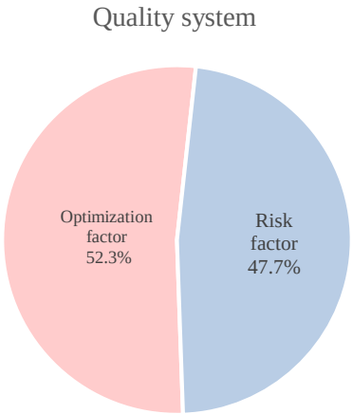
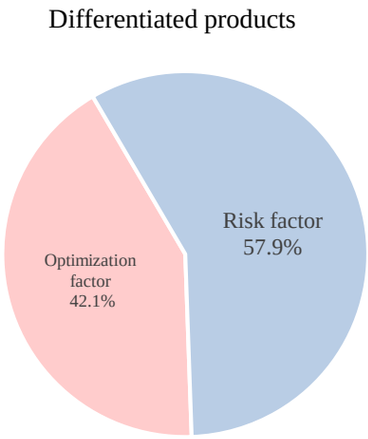
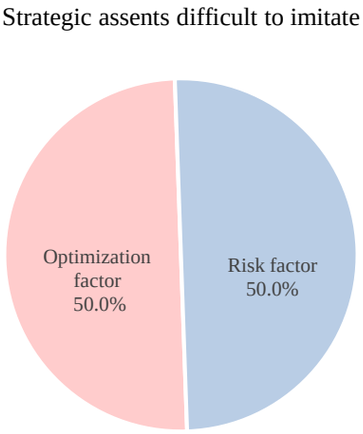


Graph 7 Quality systems
Source: Own Elaboration

Graphs 8 and 9 on the other hand, show the variables with high risk factor that must be addressed urgently, since they present a considerable vulnerability.

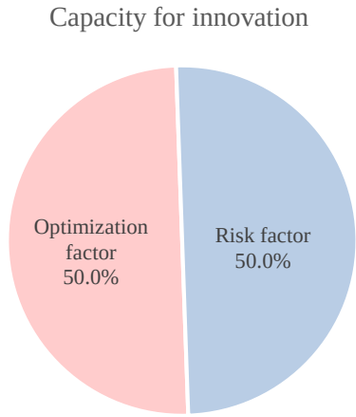


Graph 8 Differentiated products
Source: Own Elaboration



Graph 9 Strategic assets difficult to imitate
Source: Own Elaboration

The factor that presents a balance between optimization and risk factors is presented in graph 10.



Graph 10 Capacity for innovation
Source: Own Elaboration

Finally, the SWOT matrix, shown in table 4, displays the most representative elements of the situation analysis prepared based on the results obtained.

	Strengths	**Weaknesses**
Internal Factors **External Factors**	F1. Flexible production processes are available. F2. In the manufacturing process. F3. There are trained personnel for the use of technologies.	D1. Lack of innovation and creativity to improve products or processes on the part of workers. D2. Production and distribution processes are easily imitated by the competition. D3. The footwear models that are manufactured are traditional. D4. No actions are taken to measure the quality of the products.
Opportunities O1. Offer of different entities to implement the QS in the company. O2. There is economical support from the government and different entities for the promotion of innovation. O3. There ae investment opportunities in new machinery and process innovation.	Maxi-Maxi F1-O1. Hire a certifying body to implement the QS and thus respond to market demands. F3-O2. Participate in the calls issued by government entities for the promotion of innovation focused on technology.	Maxi-Mini D3-O3. Obtain financing to invest in machinery that allows innovation in footwear models. D4-O1. Have a QS to measure the quality of the products.
Threats A1. There is an offer of footwear with exclusive and innovative models by the competition. A2. The competition offers footwear that meets market expectations. A3. The competition applies technology in its production processes. A4. Competition responds quickly to changes in consumer demand.	Mini - Maxi F1-A1. Hire a designer to generate innovative models to meet what the market demands. F3-A3. Invest in state-of-the-art technology since the staff is trained in the use of these.	Mini -Mini D3-A1. Participate in innovation training programs offered by the government. D4-A4. Carry out a market study that allows to identify the areas of opportunity that the product has.

Table 4 SWOT matrix
Source: Own Elaboration

Conclusions

In the present investigation, as a result of the application of the proposed methodology, it was possible to determine technological competence as a source of competitive advantage for the footwear producers of the Plaza Azul. With 90% confidence it is concluded that the overall balance is between 0.8 and 1.2; as mentioned above, the ideal strategic balance between optimization and risk factors in each case is 50%, that is, there is a balance between optimization factors and risk factors, which results in a strategic balance of 0; in this case it can be observed that the strategic balance even when the difference is minimal, only 1%, shows that footwear manufacturers are making appropriate use of their technological capabilities to counteract risk factors.

The analysis by variable shows that the most outstanding optimization factors are mastery of technology and productive flexibility with 1% each and the variable that shows the greatest weakness is differentiated and exclusive products followed by strategic assets difficult to imitate.

Based on the SWOT matrix results and with the purpose of improving technological competition so that it becomes a competitive advantage for the manufacturers of footwear of the Plaza Azul, the following strategies are proposed:

- Hire a certifying body to implement the QMS that contributes to ensuring the quality of the products in terms of raw materials used, having robust production processes, and improving administrative processes to achieve customer satisfaction and improve their competitive position.
- It is imperative to acquire state-of-the-art technology to produce footwear with innovative and avant-garde models, for which it is proposed to participate in the calls issued by the Support Fund for Micro, Small and Medium Enterprises (SME Fund) for the granting of preferential economic support.
- Hire and / or create a strategic alliance with educational institutions that have the career of Design to generate innovative models that meet the changing needs of the market.
- To minimize weaknesses and avoid threats, it is proposed to participate in training and innovation programs, offered by the different levels of government to have adequately trained personnel both in the strategic and operational part. It is suggested to carry out a market study to identify the competitive advantage of the product and make it known to generate preference towards the brand.

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