Total quality management model aimed at MSMEs in the meat sector in cities with medium-low competitiveness

Modelo de gestión de calidad total dirigido a las MIPYMES del sector cárnico en ciudades de competitividad media-baja

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Abstract

The meat sector plays a crucial role in the economy, providing employment and contributing to regional food security. However, many Micro, Small, and Medium Enterprises (MSMEs) in this sector face challenges related to quality management, affecting their competitiveness and sustainability. This research focuses on developing a Total Quality Management Model for Micro and Small Enterprises (MSMEs) in the meat sector of cities with medium-low competitiveness. An analysis of the sector's situation was conducted, taking into account the principles of quality and total quality, as well as strategic management. The study used a descriptive and projective approach, combining field and documentary methods, with a sample of 15 MSME companies. This analysis provided the basis for developing the management model. The results of this analysis demonstrated the need to implement management models that enable these companies to adopt total quality, encompassing planning, design, product and service development, and human talent management. Therefore, a Total Quality Management Model was created, based on the principles of total quality and featuring a systemic approach. This model promotes a philosophy of teamwork, continuous process improvement, and ongoing staff training. This model aims to serve as a pillar for MSMEs in the agro-industrial sector, enhancing their competitiveness and sustainability through excellence in quality management.

Keywords: Agribusiness; competitiveness; medium-sized enterprise; product and service development; quality Management Model; strategic management.

Resumen

El sector cárnico desempeña un papel crucial en la economía, proporcionando empleo y contribuyendo a la seguridad alimentaria regional. Sin embargo, muchas Micro, Pequeñas y Medianas Empresas (MIPYMES) en este sector enfrentan desafíos relacionados con la gestión de la calidad, lo que afecta su competitividad y sostenibilidad. Esta investigación se centra en el desarrollo de un Modelo de Gestión de Calidad Total para las MIPYMES del sector cárnico en ciudades con competitividad media-baja. Se llevó a cabo un análisis de la situación del sector, considerando los principios de calidad y calidad total, así como la gestión estratégica. El estudio utilizó un enfoque descriptivo y proyectivo, combinando métodos de campo y documentales, con una muestra de 15 empresas MIPYMES. Este análisis proporcionó las bases para el desarrollo del modelo de gestión. Los resultados de este análisis demostraron la necesidad de implementar modelos de gestión que permitan a estas empresas adoptar la calidad total, incluyendo la planificación, el diseño, el desarrollo de productos y servicios, y la gestión del talento humano. Por lo tanto, se creó un Modelo de Gestión de Calidad Total basado en los principios de la calidad total y con un enfoque sistémico, donde se promueve una filosofía de trabajo en equipo, mejora continua de los procesos y capacitación constante del personal. Este modelo busca ser un pilar para que las MIPYMES del sector agroindustrial mejoren su competitividad y sostenibilidad a través de la excelencia en la gestión de la calidad.

Palabras clave: Agroindustria; competitividad; microempresa; mediana empresa; desarrollo de productos y servicios; modelo de gestión de calidad; gestión estratégica.

INTRODUCTION

The business sector comprises a large percentage of Micro, Small, and Medium Enterprises; among these, agroindustrial MSMEs can be found, a sector with significant demand for products and services within the Department. Currently, agroindustrial MSMEs face a challenging economic and financial environment, driven by the national crisis resulting from competition with prominent national and transnational companies, complicated access to financing, low levels of human resource training, poor technological development, insufficient market impact, rapid and unstable changes brought on by globalization, inflation, and devaluation. (López-Sandoval, 2020; Quintero, 2018)

Added to these problems, the current Covid-19 pandemic brought with it confinement and a lack of consumers, which has represented a challenge for small and medium-sized businesses that have been affected, especially those in the Caribbean Region, which, according to business surveys, of Asociación Colombiana de la Medianas y Pequeñas Empresas (ACOPI, 2021)They have been the most affected by the decrease in income, resulting from low consumption, staff reductions, and a decline in sales.

The research proposes a total quality management model for micro and small enterprises (MSMEs) in the meat sector as an alternative to enhance their quality and address current and future challenges in cities with medium-low competitiveness. It is expected that the results obtained will benefit MSMEs, highlighting the need to implement management models that strengthen total quality, addressing aspects such as planning, design, product and service development, and human talent management. (Camisón et al., 2011). The meat sector is mainly composed of three links: primary production, refrigeration plants, and the meat industry, becoming the most important sector for the Sucre department due to the large amount of land dedicated to livestock activities and the communities' vocation (Gobernación de Sucre, 2020; Ministerio de Agricultura y Desarrollo Rural, 2020).

This sector faces various problems that affect its productivity and competitiveness, such as the lack of technical assistance and economic resources, traditional management and little innovation by producers, high input costs, vulnerability to diseases, chains of intermediaries, high informality, inefficient traceability systems, lack of business vision and poor implementation of quality systems, which limits the growth and positioning prospects of small and medium-sized producers. (Pertuz Martínez & Elías Caro, 2019)

SMEs in the agroindustrial sector require exceptional support and strengthening, as they often lack effective management that enables them to optimize resources, improve processes, and anticipate and respond to crises. According to ACOPI (2019) Small and medium-sized enterprises (SMEs) in Colombia play a crucial role, as they contribute approximately 40% to the country's national GDP. Hence, this research is pertinent and relevant because it has a socioeconomic impact by including an essential organizational sector of the municipality, represented by SMEs in the

agroindustrial sector, based on the need to evaluate their situation within the framework of the municipal market and in relation to the concepts of quality and total quality. (Varum & Rocha, 2013)

This article aims to present the development of a Total Quality Management (TQM) Model adapted for Micro, Small, and Medium Enterprises in the meat sector of cities with medium-low competitiveness. The document is structured into different sections, where the literature review introduces the theoretical foundation of Total Quality Management. The methodology applied in the study is then described, highlighting the systematic procedural model used. The results and analysis section presents the key findings that support the proposed model. Finally, the article concludes with recommendations and potential applications of the model for both the meat industry and other sectors.

LITERATURE REVIEW

Various international studies have examined the implementation of Total Quality Management in different sectors, offering valuable insights into continuous improvement and innovation, key factors in maintaining competitiveness. (Murrieta-Saavedra et al., 2019). One relevant international study is that of Velázquez Castro (2011), who investigated Total Quality Management (TQM) in small restaurant businesses. Although the tourism sector in Mexico has experienced innovations in service delivery and quality optimization, Velázquez Castro (2011) highlighted the scarcity of literature on the subject. His study aimed to fill this gap, establishing itself as a key reference for our research by emphasizing the importance of continuous improvement and innovation.

Similarly, Maranhao (2011) conducted pioneering research on TQM in complex organizations, using an airline as a case study. His work evaluated the effectiveness of Total Quality Management (TQM) in a dynamic and constantly changing organizational context, identifying the challenges and opportunities inherent in implementing this model in complex systems. Additionally, a literature review on Total Quality Management and excellence models was conducted, providing an important basis for developing a TQM model tailored to agro-industrial SMEs.

Another important reference is the study by Herrera-Mendoza (2008), which focused on implementing quality management systems in microenterprises. This research demonstrated how quality can become a strategic tool for achieving success and fostering economic growth. Herrera-Mendoza's work (2008) emphasizes the relevance of quality in microenterprises and offers a model for designing and implementing quality management systems tailored to their specific needs, a crucial perspective given the economic contribution and job creation represented by SMEs.

Additionally, Vilar Hernández et al. (2004) conducted a study on quality management systems in the agri-food sector, integrating economic, process

engineering, and food safety perspectives. Their findings emphasize that quality, viewed from multiple angles, is essential for achieving excellence, sustainability, and profitability in a competitive and rapidly evolving agri-food market. This multidimensional view of quality is particularly relevant for our research, as it invites a rethinking of quality in SMEs not only from a theoretical standpoint but also from practical aspects such as raw material quality, customer expectations, technological innovation, and the human factor. (Mazacón Solano et al., 2021; Sanmartín Dávila, 2024)

Furthermore, Landini (2020), and Acosta Velarde et al. (2019) Contribute to the theoretical foundation by exploring the multidimensional nature of quality and proposing specific methodologies for implementing quality management systems. Landini's work (2020) challenges the traditional, one-dimensional view of quality, while Acosta Velarde et al. (2019) and their colleagues offer a practical framework for identifying and evaluating critical aspects of production and decision-making processes using indicators and statistical techniques.

Lastly, at the national level, the research conducted by Mejía and Escobar (2017) focused on designing a marketing plan to improve the processing, packaging, and distribution of meat in SMEs. This study highlights the need to enhance the competitiveness of the meat sector by addressing deficiencies in marketing strategies and offers practical solutions that complement the general objective of improving SME performance.

Overall, the reviewed studies help to understand the complexity and multidimensionality of implementing Total Quality Management (TQM) in various sectors. The literature emphasizes the importance of continuous improvement, the integration of innovation, and adapting models to the specific characteristics of each organization. (Juárez-Jiménez et al., 2023). However, there is a noticeable lack of research that integratively addresses the application of Total Quality Management (TQM) in agro-industrial Small and Medium Enterprises (SMEs) in the meat sector, which underscores the need to design a specific model that considers both the particularities of the sector and the challenges faced by micro, small, and medium-sized enterprises. (Kuznik et al., 2014). This multidimensional approach will not only strengthen the competitiveness of SMEs but will also contribute to generating knowledge applicable to other sectors with similar dynamics, laying the groundwork for future research and developments in the field of quality management. (Marín Álvarez & Bermúdez, 2021)

After reviewing the literature, it is evident that Total Quality Management has evolved through various approaches that emphasize continuous improvement, strategic quality planning, and error prevention in processes. In the agro-industrial context, quality is not only associated with operational efficiency but also with food safety, traceability, and process sustainability. However, the implementation of TQM in SMEs within the meat sector remains a challenge, especially in medium- to

low-competitiveness cities, where there are limitations in technological resources, training, and regulatory compliance.

Although various studies have addressed the implementation of quality management systems in small businesses, a gap persists in the literature regarding specific models that integrate the particularities of these companies, taking into account their production structure, organizational capabilities, and adaptation to market demands. Therefore, this study aims to contribute to the development of a Total Quality Management (TQM) model tailored to Small and Medium-sized Enterprises (SMEs) in the meat sector, based on the sector's specific needs and the integration of management tools that enhance their competitiveness and long-term sustainability.

METHODOLOGY

To design a Total Quality Management model adapted to the needs of the meat sector in cities with medium-low competitiveness, this research focuses on qualitative variables, emphasizing the strategic role of quality in business management. A detailed analysis of the current panorama of micro, small, and medium-sized enterprises in the meat sector was conducted, considering the concepts of quality and total quality to enhance their competitiveness. (Hurtado, 2008).

A representative sample of 15 MSMEs was selected based on specific criteria to ensure the relevance of the collected data. A structured questionnaire with 25 scale-based questions was applied to these companies, facilitating data collection for the study. The survey design considered key dimensions and indicators relevant to quality management. With the support of experts, documentary research, and field studies, a descriptive analysis was conducted to identify critical quality indicators in the sector. (Hernández-Sampieri, et al., 2014).

The questionnaire questions were structured into three main dimensions: quality, total quality, and indicators in a total quality model. Table 1 presents the five questions corresponding to the quality dimension, which were designed to assess the application of Total Quality principles, continuous improvement activities, financial support for quality management, the adoption of recognized quality systems, and customer satisfaction measurement.

Table 1.

Questions for the quality dimension

	Item	Question
Quality dimension	1	Are Total Quality principles applied in a committed manner, providing and receiving training on them?
	2	Are improvement activities encouraged and supported within the organization, as well as with customers, suppliers, and other external entities?
	3	Is efficient financing available, with key financial parameters effectively controlled and financial resources utilized to support the organization's strategic plans?
	4	Do you have a quality system based on ISO 9001 standard or some specific model in your sector?
	5	Do you have a system in place to measure customer satisfaction through surveys that cover aspects such as quality, delivery, flexibility, communication, and other key areas?

Source: Author elaboration

In Table 2, the questions for the total quality dimension are presented. These questions were designed to assess the systematic incorporation of information into organizational planning, the periodic review of plans, the control of key processes, continuous improvement, and the use of customer satisfaction indicators.

Table 2.

Questions for the total quality dimension

	Item	Question
Total quality dimension	6	Is all relevant information systematically taken into account when formulating organizational plans, such as customer expectations, the competitive landscape, economic indicators, and talent expectations, among others?
	7	Are plans systematically reviewed, comparing results with objectives and involving all stakeholders in necessary changes?
	8	Are key processes identified, and are the most important parameters controlled to ensure the regular delivery of products and/or services?
	9	Is there a continuous improvement program that enables the organization to utilize practical tools to set and achieve improvement objectives?
	10	Do you use indicators to measure customer satisfaction, such as organization image, complaint levels, customer loyalty, among others?

Source: Author elaboration

In Table 3, the questions related to the dimension of indicators in a total quality model are presented. These focus on evaluating human talent management, customer satisfaction, supply chain optimization, and business sustainability.

Table 3.

Questions for the dimension of indicators in a total quality model

	Item	Question
Dimensions of indicators in a total quality model	11	Are the achievements and commitment of human talent who strive to improve recognized?
	12	Does the human talent know the organization's plans and objectives?
	13	Is the participation of human talent allowed in the formulation of organizational objectives?
	14	Are plans made for human talent (recruitment, training, development, among others)?
	15	Are the performance and development needs of all individuals comprising human talent evaluated?
	16	Are processes oriented towards customers, obtaining information from them to measure their level of satisfaction?
	17	Is the satisfaction of human talent systematically measured, taking into account factors such as work environment, promotion opportunities, communication, training, recognition, and other relevant aspects?
	18	Are absenteeism rates, turnover rates, among others, used to measure the satisfaction of human talent?
	19	Is there effective communication in both upward and downward directions? And among all human talent, with their real participation in improvement activities?
	20	Is there an information system that provides human talent with adequate and precise information to perform their work effectively?
	21	Is the selection and evaluation of suppliers systematically managed?
	22	Is the supply chain optimized, with inventories and material rotation minimized, and waste minimized?
	23	Is there effective management of teams, buildings, and other resources, using the most appropriate and current technologies?
	24	Are cooperative relationships developed with suppliers?
	25	Is active involvement in environmental issues, participation in social activities, and charitable works undertaken by the organization?

Source: Author elaboration

Additionally, a projective phase was included to develop a model based on the diagnosis of sectoral needs and initial conditions. The model was inspired by TQM principles and supported by four fundamental elements, integrating the Deming Cycle for continuous improvement and problem resolution specific to the sector. (Irurita Alzueta, 2012). Key indicators were also defined to assess strategy implementation and facilitate decision-making, ensuring a structured approach to enhancing the competitiveness and sustainability of MSMEs in the meat industry. (Santamaría-Escobar & Pertuz-Martínez, 2013).

RESULTS AND DISCUSSION

According to the results obtained from the survey conducted with 15 selected companies, the investigated organizations demonstrate a concern for understanding their customers and their expectations of the company. This is essential since total quality focuses on customer needs, as business objectives are determined based on them. To achieve this, continuous communication is essential through various tools, including surveys, interviews, meetings, external research, correspondence, suggestion boxes, and visits to their facilities. (Pérez et al., 2021). Regarding companies that do not carry out these practices, it is relevant to mention what was stated by Acosta Velarde et al.(2019), who analyzed three companies in the industrial sector, concluded that these companies focused more on technical development than on human development, neglecting their commitment to continuous improvement among employees, customers, and suppliers.

The results obtained in the total quality dimension reveal that most of the analyzed companies in the meat sector view improvement as a growth opportunity. In contrast, 10% of the surveyed companies will require support in designing their quality model to visualize their processes, set objectives, and achieve better results. The raison d'être of a company is defined by the needs it seeks to satisfy in its customers; therefore, the implementation of total quality models will serve as a guide to achieve these results. According to Hernandez Chavez et al. (2022), meeting customer needs is the key to market success.

The results obtained in the dimension of indicators in a total quality model suggest that companies apply certain aspects of total quality. It is important to highlight that, according to Zayas Barreras et al. (2021). The inclusion of total quality principles is vital for organizations, as it enables timely adjustments to corrective or preventive actions, consolidates loyal and satisfied customers, and, in turn, fosters well-structured production processes. Likewise, it is relevant to note that adopting total quality principles entails guiding a company by international quality standards. Therefore, if a company aims to achieve its business objectives, it is essential to invest in developing comprehensive strategic action plans and formulating both short-term and long-term goals. (Diaz Muñoz & Salazar Duque, 2021)

The following table presents the statistical information obtained from the 25 survey questions according to the chosen response option. It shows the range, mean, standard deviation, and skewness, among other indicators (see Table 4).

Table 4.

Descriptive statistics of items 1 to 25.

	N	Rang	Min	Max.	Mean		Stand Desv.	Variance	Skewness		Curtosis	
		Stat		Stat		Stand error	Stat	Stat	Stat	Stand error	Stat	Stand error
Hardly ever performed	25	7	0	7	3.72	0.96	2.03	4.13	0.058	0.015	-0.91	-0.23
Partially performed (on occasional occasions)	25	6	1	7	3.68	0.95	1.75	3.06	0.231	0.060	-0.71	-0.18
Systematically performed and in almost all areas	25	5	0	5	2.48	0.64	1.48	2.18	0.085	0.022	-0.47	-0.12
Always performed completely, and we are an example for the sector	25	9	1	10	5.12	1.32	2.74	7.53	0.193	0.050	-1.31	-0.34

Source: Author elaboration

The analysis of the results reveals significant variability among the studied companies. For instance, those not carrying out the process show a range of 7 points, with a mean of 3.72 and a standard deviation of 2.03, indicating significant dispersion in their execution. On the other hand, companies systematically conducting it in almost all areas present a narrower range of 5 points, with a mean of 2.48 and a standard deviation of 1.48, suggesting greater consistency in their application. In contrast, companies that wholly and consistently implement it exhibit the widest range of 9 points, with a mean of 5.12 and a standard deviation of 2.74, reflecting significant variability in the quality of their implementation. The table provides skewness and kurtosis metrics for different levels of activity execution. Skewness, a statistical measure evaluating the symmetry of a data distribution, reflects the degree of deviation from perfect symmetry.

Positive values indicate right-skewedness, while negative values indicate left-skewedness. In this context, all levels of execution show positive skewness, denoting a rightward tendency in the distribution. This tendency is most notable in the category "Partially performed (on occasional occasions)," which exhibits the highest skewness value. On the other hand, negative kurtosis values indicate a distribution less concentrated around the mean than the normal distribution, while positive values indicate a more concentrated distribution. In this case, all levels of execution exhibit negative kurtosis, indicating a distribution that is relatively less concentrated than normal. It is noteworthy that the category "Performed always

and completely, and we are an example for the sector" exhibits the most negative kurtosis, implying a flatter distribution compared to the other categories.

The research results indicate the need for developing a total quality management model for Micro, Small, and Medium Enterprises in the meat sector. This model could improve consistency in quality practices and transparency in the presentation of operational data.

The design of this model offers new perspectives to the human talent of MSMEs, helping to avoid crises and counteract improvisation in critical situations. To achieve this, evaluations are required to allow a real diagnosis of the current situation, identifying strengths, weaknesses, opportunities, and threats (Carreño et al., 2021). This model can be applied in companies of any size or structure since it is based on four fundamental elements. These elements can be observed in the following figure:

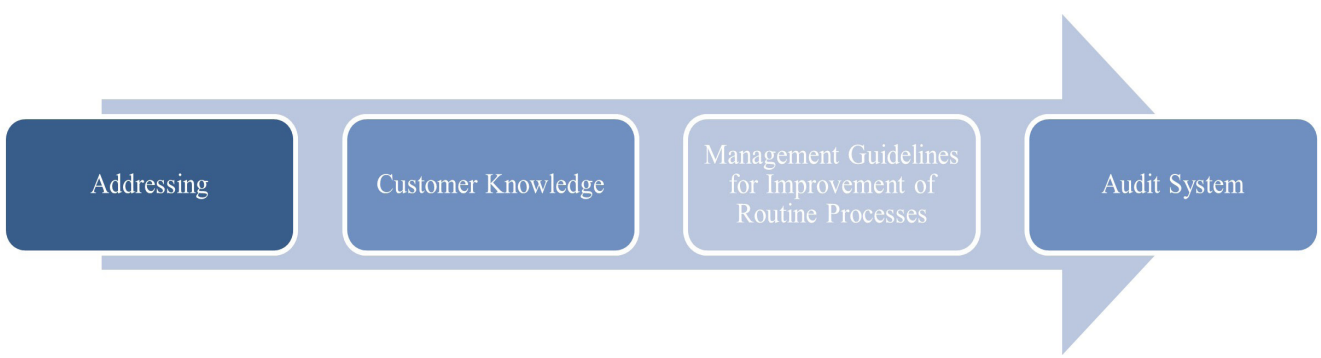

Figure 1. Elements of the Total Quality Management Model aimed at MSMEs in the meat sector. Source: Author elaboration

Furthermore, within the proposed framework, one of the essential elements is the active involvement of human talent. This aspect is essential for the model's success, as human capital represents one of the most valuable resources of any organization. Promoting an environment in which employees feel valued, listened to, and motivated to contribute their skills and knowledge is essential to achieving the quality and efficiency objectives set. Additionally, the importance of adapting the work environment to enable employees to perform at their maximum potential is emphasized. This model is also based on five directions, which serve as a guide to form the basic steps that effectively facilitate the better development of the organization. These guidelines are mentioned in Figure 2.

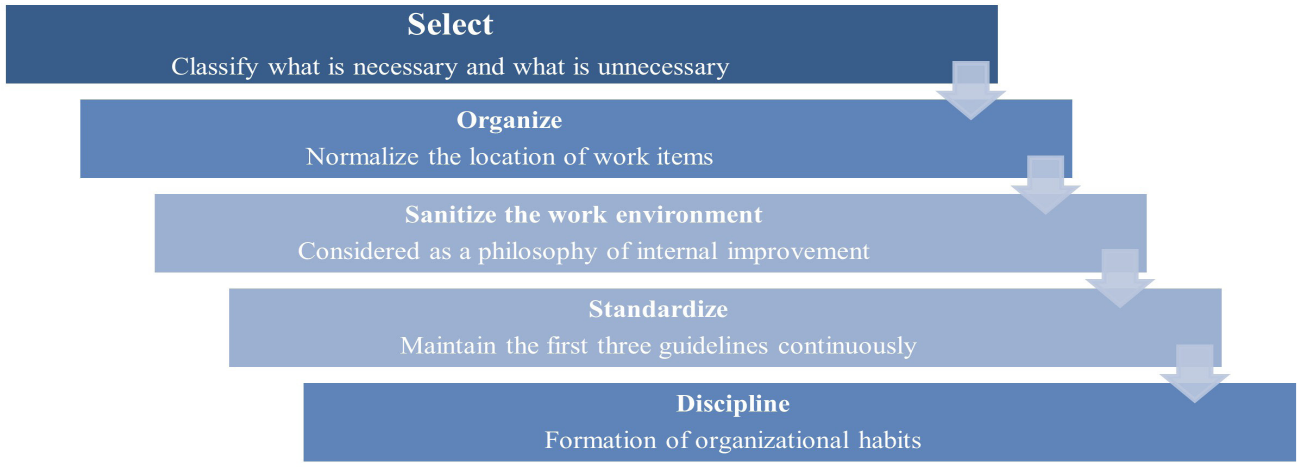

Figure. 2. Main guidelines of the steps of the Total Quality Management Model aimed at MSMEs in the meat sector.
Source: Author elaboration

With clear guidelines in place, the Deming cycle (Shewhart, 1939; Shewhart & Deming, 1986) served as a basis for proposing a management approach to continuous improvement and problem resolution in business management and the meat sector's production chain. Based on this conception, four activities are identified that form a continuously repetitive cycle, which is seen in Figure 3:

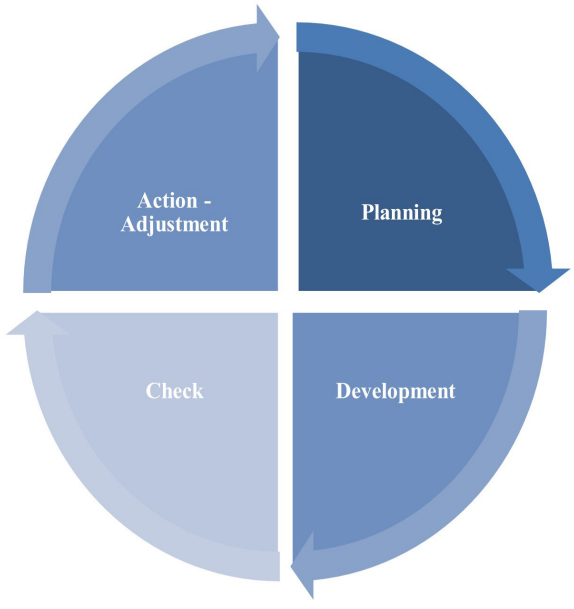

Figure 3. Activities based on Walter A. Shewart's Deming cycle to propose continuous improvement management.
Source: Author elaboration based on the postulates of Shewhart (1939)

Based on this conception, the greatest challenge evident in the Total Quality Management Model aimed at MSMEs in the meat sector, Sucre, is being able to undertake change in companies during implementation. Given this, various specialized authors, who were considered in this research, have presented different approaches to achieve a fundamental transformation within MSMEs, which can be structured as follows, as presented in Figure 4.

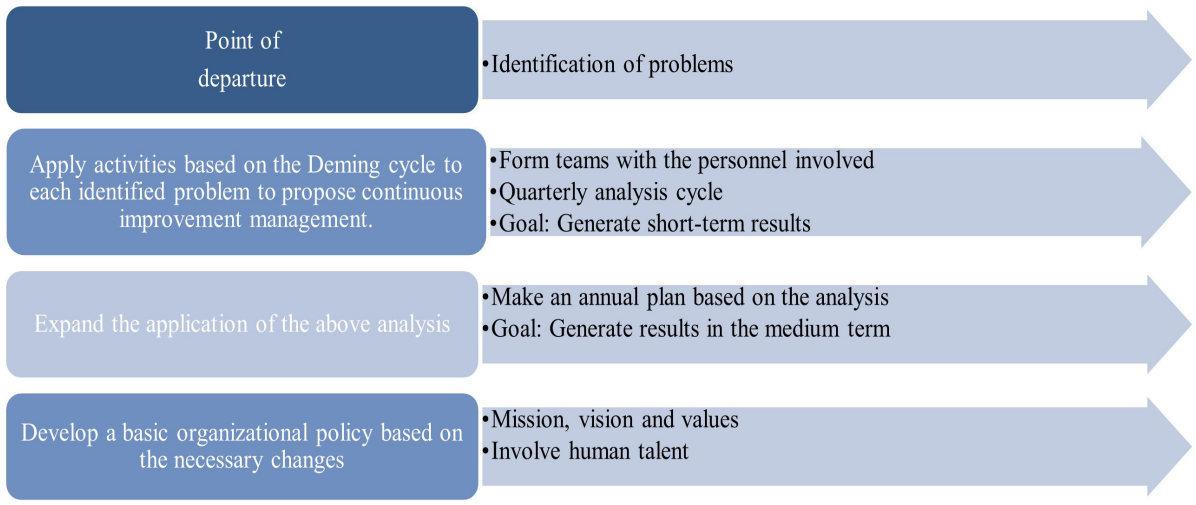

Figure 4. Basic approaches for the initial transformation of MSMEs in the meat sector.
Source: Author elaboration

After having these approaches clear, the design of the Total Quality Management Model begins, proposed for MSMEs in the meat sector, which is shown in Figure 5:

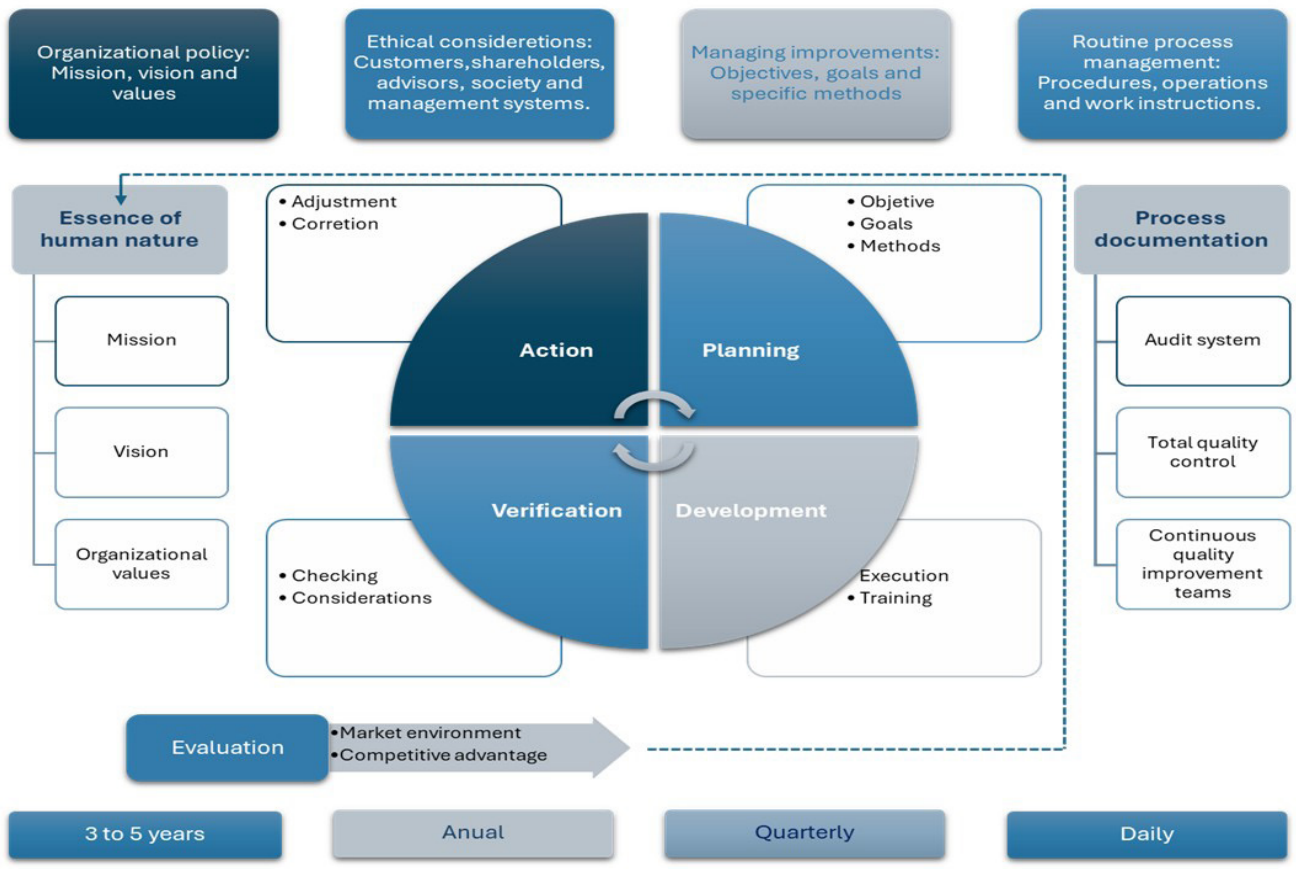

Figure 5. Total quality management model for MSMEs in the meat sector.
Source: Author elaboration

The proposed model of total quality management for Micro, Small, and Medium Enterprises in the meat sector represents an invaluable opportunity for the growth of these companies, thereby increasing their competitive advantage. This model is established within an action plan that covers both the short-term, medium-term,

and long-term objectives. It is crucial to consider the availability of resources to ensure the timely application of this model, as these organizations have limited resources that must be managed efficiently.

CONCLUSIONS

The implementation of the Total Quality Management Model for MSMEs can be essential for the survival and growth of these companies in the current competitive environment. It is highlighted that the model is not only adaptable to the specific needs of the meat sector but also to other industrial sectors, which demonstrates its versatility. The study highlights the importance of fostering a culture of total quality that encompasses all aspects of the company, from planning and execution to control and continuous process improvement, with a strong emphasis on training and developing human talent. Furthermore, adopting this quality management model enables companies not only to improve their internal processes but also to enhance their competitiveness in the market. This is achieved through the continuous improvement of products and services, which in turn increases customer satisfaction and bolsters the company's image.

The document concludes that the proposed management model has the potential to generate a significant economic and social impact in the region by improving the operational efficiency and profitability of MSMEs while simultaneously strengthening the local economy. The successful implementation of this model can serve as a catalyst for the sustainable growth of MSMEs, not only in the meat sector but also in other industrial sectors. The adoption of a total quality culture is revealed to be a critical factor in guaranteeing the effectiveness and sustainability of this model.

By integrating a continuous improvement mindset into all aspects of the business, a solid foundation for innovation and long-term growth is established. This culture fosters adaptability and responsiveness, enabling MSMEs to meet changing market challenges effectively. Furthermore, continuous improvement not only pertains to optimizing internal processes but also to enhancing the quality of products and services offered, which leads to higher customer satisfaction and, ultimately, greater client loyalty. The economic and social impact of this model is undeniable, as improving the operational efficiency and profitability of MSMEs strengthens the local economy and creates a positive effect on the community. The implementation of this model not only drives economic growth but also contributes to social development by promoting job creation and improving working conditions.

In this sense, it is essential that management assumes a proactive role and becomes an agent of change, promoting and supporting the implementation of the Total Quality Management Model. Additionally, training and human talent development programs must be developed to ensure that staff are adequately equipped with the skills and knowledge necessary to apply the model effectively.

It is vital that management closely supervises the application of the model at all stages and fosters an organizational culture oriented towards total quality.

Finally, it is important to acknowledge certain limitations in this study. The research was conducted with a limited sample from a specific sector, which may affect the generalizability of the findings. Future studies should consider exploring broader samples, diverse industrial sectors, and different geographic contexts to validate and extend these results. Additionally, longitudinal research could offer deeper insights into the long-term impact of the model. At the same time, further investigation into other influencing variables would encourage new, more comprehensive, or replicative studies in the field of quality management.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Torregroza-Espinoza: Visualization, research, conceptualization, methodology. Rojas-Rodríguez: Methodology, data curation, writing - preparation of original draft. Salgado-Ordosgoitia: Writing, proofreading, and editing.

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