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Integrated Quality Management in an Automotive Organization in Sibiu County

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Abstract: Within today's interconnected and evolving commercial landscape, companies grapple with intricate hurdles in safeguarding the caliber of their offerings. To address market pressures and sustain a competitive edge, the deployment of a unified quality administration framework has become indispensable. This investigation delves into the operationalization of a comprehensive quality management structure within an automotive firm situated in the Sibiu region. The inquiry centers on pinpointing the foundational tenets, strategic approaches, and operational procedures employed to guarantee comprehensive quality and client contentment. This paper underscores the significance of adopting a cohesive quality management model as a pivotal element for preserving market viability and fostering innovation in a fluctuating business milieu. The research elucidates the advantages accrued from enacting such systems, including enhanced customer loyalty, streamlined internal workflows, and bolstering corporate effectiveness. Employing a qualitative research paradigm, the study draws upon the scrutiny of documents and information furnished by the organization under examination. It also utilizes a comparative assessment against global quality benchmarks, encompassing ISO 9001, IATF 16949, and ISO/IEC 27001. The findings indicate that the Sibiu County enterprise has effectively established an integrated quality management platform, grounded in the philosophies of holistic quality and defect-free production. The integration of methodologies such as Lean Manufacturing, Six Sigma, and Kaizen has facilitated the refinement of manufacturing procedures and amplified consumer gratification. In conclusion, the study posits that the adoption of a consolidated quality management system is paramount for the prosperity of entities within the automotive sector.

Keywords: quality management, total quality, automotive industry, ISO 9001, IATF 16949, Lean Manufacturing, Six Sigma, Kaizen.

Introduction

Quality management has become a strategic imperative for organizations seeking to excel in a globalized and dynamic business environment. In the automotive industry, where competition is fierce and customer demands are constantly increasing, the implementation of an integrated quality management system is essential to ensure long-term success.

The specialized literature offers a wide range of perspectives on quality management, addressing various aspects, from fundamental principles to specific strategies and practices. Existing studies highlight the importance of adopting a holistic approach to quality management, which integrates all processes and activities of the organization.

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Research also emphasizes the crucial role of employee involvement, leadership, and organizational culture in achieving excellence in quality and reducing knowledge risks (Bratianu et al., 2020; Candea & Gabor, 2023; Bucholzer & Bibu, 20240.

The study by Fahmi et al. (2021) analyzes the impact of the ISO 9001:2015 standard on quality management practices in the automotive industry. The research by Laskurain-Iturbe et al. (2021) examines the implementation of the IATF 16949:2016 standard and its impact on organizational performance at an automotive supplier. The work of Sahmi et al. (2024) provides a systematic analysis of the literature on Kaizen implementation in the automotive industry. Otsuka and Ben-Mazwi (2022) conducted a study exploring the relationship between Kaizen and quality management systems in the context of the automotive industry.

Sá et al. (2022), in their article, propose a roadmap for integrating Kaizen and ISO 9001 for continuous improvement in the automotive industry. The research by Candea and Gabor (2023) analyzes the role of leadership in Kaizen implementation at an automotive company in Romania. The study by Kharub et al. (2023) examines the link between employee involvement and the success of Kaizen implementation in the automotive industry. Queiroz et al. (2023) focused on competitive priorities and lean-green practices, conducting a comparative study in the automotive chain's suppliers. The article by Buchholzer and Bibu (2024) analyzes the challenges and opportunities of Kaizen implementation in the Romanian automotive industry. Gajdzik (2023) explores the role of digital technologies in Kaizen implementation in a smart factory in the automotive industry. Regarding Odoyo (2023), their study analyzes the integration of environmental and social considerations in Kaizen continuous improvement initiatives in the automotive industry. The work by Santos et al. (2021) explores the synergies and challenges between Lean management and Kaizen in the automotive industry.

In their article, Ríos-Hernández et al. (2024) analyze the implications of Kaizen and Industry 4.0 for the automotive industry. The research by El Dardery et al. (2021) compares the impact of cultural factors on Kaizen implementation at automotive companies in Japan and Egypt. Medina et al. (2024) analyze the use of Kaizen for quality improvement in the automotive industry supply chain. Within the automotive sector, global benchmarks like ISO 9001 and IATF 16949 establish a reliable foundation for quality control deployment. Real-world examples and exemplary methodologies illustrate the advantages of adhering to these standards, including elevated customer loyalty, refined operational workflows, and enhanced corporate efficiency.

While a substantial body of literature exists concerning quality management, a persistent requirement remains for investigations that scrutinize the application of these principles and practices within distinct settings. Research concentrating on automotive entities within Romania is notably scarce. The paucity of comprehensive case studies examining the deployment of unified quality management systems in Romanian automotive firms necessitates an exploration of how these entities tailor international quality norms to the unique characteristics of the domestic market.

Identifying the pivotal elements that determine success in quality management implementation within this industry is crucial. This investigation provides a novel contribution by conducting an in-depth analysis of the integrated quality management approach employed by an automotive organization in Sibiu County, with a particular emphasis on the distinct aspects of Kaizen management implementation and its alignment with international quality standards. The research objectives include:

- Analysis of how the studied organization implements an integrated quality management system.
- Identification of the principles, strategies, and practices used to ensure total quality and customer satisfaction.

- Evaluation of the quality management system's performance and its impact on the organization.
- Formulation of recommendations for improving quality management in the studied organization.

The paper is structured into seven main sections. The introduction presents the general context of quality management and the research objectives. The theoretical framework provides a solid conceptual basis, analyzing quality management standards and methods. The section dedicated to presenting the studied organization describes its profile and activity in the automotive industry. The implementation of integrated quality management is analyzed in detail, with a focus on the Kaizen management system. The results and discussions highlight the performance of the quality management system and its impact on the organization. The conclusions and personal contributions summarize the main findings of the study and propose directions for future research

Theoretical framework

Quality: the foundation of competitiveness

Quality is a fundamental pillar for any organization wishing to stand out in a competitive business environment. The standards define quality as the totality of characteristics and properties of a product or service that give it the ability to satisfy the customer's explicit or implicit requirements. In a practical view, the quality of a product is reflected in the extent to which it is fit for use and the value it delivers for the price paid, with the ultimate goal of fully satisfying the customer. Quality is thus not only an attribute of the product, but also a determinant of a firm's competitiveness, along with the attractiveness of the offer and the competitive price.

From quality to total quality: A systemic vision

Total quality is an evolving concept, a management model that integrates practices, tools and methods designed to involve the entire organization in the effort to ensure customer satisfaction in a dynamic context. Total Quality is not limited to product quality control, but implies a systemic, integrated approach aimed at continuously improving all aspects of the organization. This includes as shown in Figure 1:

- Teamwork: Promote collaboration and synergy between departments and employees.
- Participative management: Encouraging the active involvement of employees in the decision-making process and in identifying solutions.
- Continuous improvement: Implement a constant process of optimization of processes and practices.
- Inter-Human Relations: Developing positive and constructive relationships between employees, customers and suppliers.
- Supplier-customer relationship: Understanding and optimizing this relationship both inside and outside the organization.

The goal of Total Quality is sustainable business development, profitability and customer loyalty, by satisfying customer needs and continuous improvement.

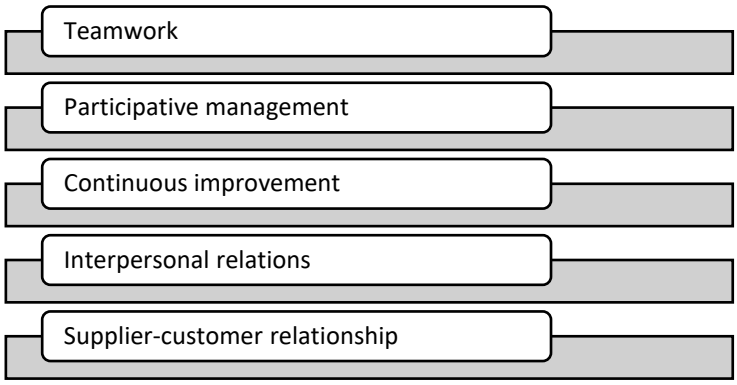

Figure 1. Continuous improvement of all aspects of the organization
(Source: Authors' research)

Total quality principles: A Reference Framework

Total Quality is based on a set of fundamental principles, which guide organizations in striving for excellence:

- Preventive attitude: Prioritize preventing problems rather than correcting them. This principle involves anticipating and avoiding errors, thus minimizing the costs and resources needed for corrections and ensuring an efficient production flow.
- Integrated quality vision: Assessing the quality of products and services by simultaneously considering costs, delivery times and performance. A holistic view enables organizations to improve quality, build trust with customers and remain competitive.
- Harmonizing influences: Integrate all stakeholders (suppliers, customers, etc.) in the quality management process. Close collaboration with all stakeholders is essential to achieve common quality improvement objectives.
- Develop an appropriate information system: Collect, analyze and effectively transmit relevant data to support informed decision-making and continuous improvement. An effective information system contributes to process transparency and effective communication within the organization.
- Combining directive and participative management: Integrate an authoritative approach with one based on employee involvement to ensure flexibility, organization and a collaborative working environment. This alignment enables the organization to respond quickly to market demands and encourages innovation.

Total quality and quality policy

Total quality principles are closely linked to an organization's quality policy. The quality policy should reflect the organization's commitment to problem prevention, customer satisfaction, stakeholder involvement, effective use of information and harmonization of management styles.

For example, the concern for a preventive attitude is reflected in the organization's policy using appropriate processes to achieve quality, environmental, energy efficiency, occupational health and safety objectives. Similarly, the importance given to customers is emphasized through the primary objective of achieving customer satisfaction in terms of quality, on-time delivery and the provision of economical and sustainable services.

The prevention concept: a proactive approach

Prevention is a fundamental strategy in quality management, focusing on identifying and eliminating potential causes of defects before they occur. This proactive approach involves the aspects shown in Figure 2:

- Root Cause Analysis (RCA): Identify and eliminate the root causes of quality problems.
- Design for Quality (Design for Quality): Integrating quality requirements from the product design phase, using techniques such as Failure Mode and Effects Analysis (FMEA) to anticipate and prevent defects.
- Statistical Process Control (SPC): Monitoring and controlling the variability of production processes to prevent the occurrence of defects.

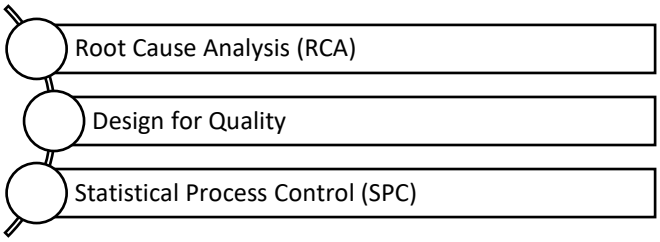

Figure 2. Proactive approach
(Source: Authors' research)

Non-quality measure: Cost evaluation

Nonquality is a measure of the costs associated with products and processes that do not meet quality requirements. These costs can be categorized into:

- Internal costs: Costs associated with defects detected before the product reaches the customer (scrap, repairs).
- External costs: Costs associated with defects detected after the product has been delivered to the customer (warranties, returns).
- Prevention costs: Investments necessary to prevent defects (training of employees, technologies).
- Assessment costs: Costs related to inspections and testing to verify conformity.

Kaizen Management: Continuous Improvement

Kaizen management is a continuous improvement strategy, inspired by Japanese practices, aimed at increasing productivity, efficiency, quality and business excellence. Kaizen is based on the involvement of all employees, from managers to executives, and the implementation of small, incremental but continuous changes.

Fundamental principles of Kaizen:

- Continuous improvement: Perfection is a goal to reach, not an end point.
- Engagement at all organizational levels: Every employee has an important role in identifying and implementing improvements.
- Thinking based on facts and data: Decisions should be made based on objective data and information, not gut instinct or opinion.
- System and process approach: Improving the whole system, not just optimizing individual components.
- Create a balanced and stable work environment: Establish clear standards, standardized procedures and effective work practices.

The PDCA cycle (Plan-Do-Check-Act) is an essential tool in Kaizen management, used to improve processes, solve problems and ensure continuous improvement.

Plan: Establish objectives, analyze existing processes, plan resources and methodology.

Do: Implementing planned solutions, piloting changes (if necessary).

Check: Monitor and analyze performance, review feedback.

Act: Standardize improvements, start a new PDCA cycle.

Integrated quality management systems

Establishing a cohesive quality administration framework necessitates the assimilation of a spectrum of norms and operational procedures that encompass diverse organizational facets, including, but not limited to, quality assurance, ecological stewardship, employee well-being, and data protection. Pertinent benchmarks for a consolidated quality management approach include:

- ISO 9001:2015: Stipulations for quality management platforms.
- IATF 16949:2016: Quality management paradigms within the automotive sector.
- ISO/IEC 27001:2023: Systems governing information security.
- SR EN 61508-6:2011: Operational safety of critical electrical, electronic, and programmable electronic systems.
- ISO TS 16949: Quality administration systems relevant to the car manufacturing industry.
- BSCI (Business Social Compliance Initiative): Standards for corporate social responsibility.

The implementation of these standards contributes to improving organizational performance, reducing risks, increasing customer satisfaction and reinforcing an organizational culture oriented towards quality and excellence.

Presentation of the studied organization

Profile of the organization and its work in the automotive industry

The company studied is an international company with a rich history, founded in Germany in 1925, and specializes in the production of electronic components for the automotive industry. With a significant global presence, the Company operates in various countries, including Germany, France, Switzerland, Romania, USA, Tunisia, China and India, with approximately 5,000 employees worldwide. This international expansion emphasizes the importance and recognition of the Company in the global market.

In Romania, the Company has made considerable investments in its production facility in Sibiu, where it employs approximately 1,100 people. This unit plays an important role in the production of components for car access systems and other control systems essential for modern vehicles. The company continues to invest in research and development to maintain its leading position in the global automotive industry. The company has a broad customer base, mainly major manufacturers in the automotive industry, but also in other industrial sectors. Customers in the automotive industry include renowned brands such as Volkswagen, BMW, Mercedes-Benz, Audi, Porsche, Toyota, Ford and General Motors. The company also works with companies in areas such as energy, consumer electronics, telecommunications and industrial automation, supplying electronic solutions and components for various applications, including vehicle control systems, user interfaces and electric vehicle solutions.

The company occupies a strong position in the global market as a supplier of electronic and control solutions, especially in the automotive industry. The company is recognized as one of the leading suppliers of automotive electronic components, ranking among the top global rankings of technology solution providers to premium and massive automotive manufacturers. The Company's market position is strengthened by an international manufacturing and distribution network, enabling it to respond quickly to global market demands, and by its excellent reputation for product innovation and reliability. The Company continually invests in research and development, focusing on emerging technologies such as electric vehicles and industrial automation solutions to remain competitive and adapt to changing market demands.

SWOT analysis of the organization

SWOT analysis is an important strategic tool that helps organizations assess their strengths, weaknesses, opportunities and threats. Below is a detailed SWOT analysis for the company, together with suggestions for improvement:

Strengths

- Continuous innovation: The company constantly invests in research and development, offering state-of-the-art technological solutions tailored to market requirements.
- Diversification: The company is not dependent on a single sector, with a strong presence in the automotive industry, but also in other areas (energy, industrial automation, telecommunications).
- Solid reputation: The company is a trusted supplier to large companies in the automotive industry, being associated with quality and reliability.
- Global Presence: The company has production sites and offices in many countries, enabling it to respond quickly to international market requirements.
- Proposals to reinforce strengths:
- Organize internal brainstorming sessions and workshops to encourage employees to generate innovative ideas and create a dedicated innovation fund to support promising projects.
- Assessing emerging markets and identifying opportunities for expansion, conducting market analysis to discover new areas of business that could bring additional revenue.
- Implementing a customer feedback program to constantly assess customer satisfaction and improve services, promoting case studies and customer testimonials to strengthen brand image.
- Investing in communication technologies to facilitate collaboration between teams in different locations and developing localized marketing strategies to better meet the needs of specific markets.

Weaknesses

- Dependence on the automotive industry: Although diversified, the Company is still highly dependent on the requirements of the automotive industry, which can be influenced by economic fluctuations or rapid technological changes.
- High research and development costs: Constant investment in innovation and cutting-edge technologies can entail high costs, which can affect profit margins in times of economic uncertainty.
- Operational complexity: With a wide range of products and markets, the Company may face challenges in managing a complex organizational structure with multiple product lines and requirements.

Proposals to address weaknesses:

- Diversify customer and product portfolio by expanding into other industries, such as consumer technology or renewable energy, to reduce the impact of fluctuations in the automotive industry.
- Working with universities and research institutes to share development costs and access external research funding, implementing open innovation processes to reduce costs.
- Implementing project management software solutions to facilitate coordination between teams and streamline processes, review organizational structure to reduce redundancies and improve efficiency.

Opportunities

- The growth of electric vehicles: The development of the electric vehicle market provides an opportunity to expand the offering for innovative electric charging solutions and technologies.
- Expansion into emerging markets: Increasing demand for technology solutions in emerging markets (Asia, Africa) can offer significant growth opportunities.
- Smart technologies and automation: Growing demand for industrial automation solutions and smart technologies (IoT) can generate new business opportunities.

Measures to exploit opportunities:

- Investing in research and development to create innovative charging solutions and electric technologies such as fast charging stations and energy management systems, partnering with electric vehicle manufacturers to integrate the Company's technologies into their products.
- Conduct market research to understand the specific requirements of emerging markets and tailor products to local needs, establish strategic partnerships with local distributors to facilitate entry into these markets.
- Developing customized automation solutions to meet the specific needs of customers in various industries, participating in technology fairs and exhibitions to promote these solutions and attract new customers.

Threats

- Intensified competition: The market for electronic and automotive components is highly competitive, with large companies such as Bosch or Continental representing strong competition.
- Rapid changes in market requirements: Rapid changes in technology and automotive market requirements (e.g. electrification of vehicles, digitalization) can put pressure on the Company to adapt quickly.
- Global economic fluctuations: Global economic instability can affect demand and production capacity, particularly in industries sensitive to economic cycles, such as the automotive industry.

Measures to Counter Threats

- Strengthening customer relationships through personalized service and innovative solutions, investing in marketing and promoting the competitive advantages of products to attract new customers.
- Creating a dedicated R&D team to monitor market trends and propose fast and tailored solutions, implementing agile product development processes to respond faster to industry changes.
- Diversify product portfolio and markets to reduce dependence on a single source of revenue, establish strong relationships with suppliers to ensure supply chain stability in times of economic instability.

In addition to the SWOT analysis, the Company should consider the following proposals for improvement:

- Diversification of customer portfolio: In addition to the automotive industry, the Company could benefit from greater diversification into other industry sectors to mitigate the risks associated with fluctuations in demand.
- Investments in artificial intelligence and automation solutions: Given the growing importance of automation and artificial intelligence, the Company should step up investments in these technologies to maintain its market leadership position.
- Supply chain improvement: Optimize the supply chain to better cope with economic fluctuations and global crisis challenges.

The implementation of an integrated quality management system in the organization. Standards relevant to the company

Implementing an integrated quality management system is essential for any organization that wants to ensure high-quality products and services, improve operational efficiency and increase customer satisfaction. Such a system integrates various management standards and practices to create a coherent and effective framework. In the case of the studied organization, a global company in the automotive and electronics industry, the implementation of an integrated quality management system is particularly important due to the complexity of the products and stringent customer requirements.

The company, as a major supplier in the automotive industry, has to adhere to industry specific standards, but also to general quality management and information security standards. The most relevant standards include as shown in Figure 3:

Figure 3. Company relevant standards
(Source: Authors' research)

SR EN ISO 9001:2015 - Quality management systems. Requirements.

This particular standard establishes the necessary criteria for a quality administration framework, applicable across all organizational structures, irrespective of their scale, industry, or the products and services they deliver. Key attributes of ISO 9001:2015 encompass:

- A methodology centered on risk assessment: Entities are required to discern and mitigate potential risks that may impede the attainment of quality goals.
- Versatility and customization: The standard facilitates the tailoring of the quality management system to the specific operational environment and requirements of each organization.
- Emphasis on client fulfillment: A primary objective is the maintenance of elevated levels of customer contentment.
- Comprehensive organizational engagement: Active participation from all facets of the organization is mandated in the quality management procedures.

- Perpetual enhancement: Continuous process refinement is fundamental for optimizing the system's efficacy and effectiveness.

Benefits of implementing ISO 9001:2015:

- Increased customer satisfaction.
- Improved internal processes.
- Access to new markets.
- Increased credibility.
- Performance monitoring and evaluation.

IATF 16949:2016 - Quality management systems in the automotive industry

This global quality management standard for the automotive sector sets out the requirements for an effective quality management system.

- Adherence to this standard is mandatory for many automotive manufacturers and suppliers.
- IATF 16949:2016 is to be implemented in addition to and through integration with ISO 9001:2015.
- The standard uses the basic structure common to ISO standards.
- Enhancements to the standard to address recent industry issues:
- Requirements for components and processes impacting automotive safety.
- Improved product traceability requirements.
- Requirements for embedded software products.
- The warranty management process, including the NTF ("no trouble found") approach and the use of guidelines.
- Clarifying requirements for subcontractor management and developing relationships with subcontractors.
- Addition of corporate responsibility requirements.

ISO/IEC 27001 - Information Security Management System

- This standard provides requirements for establishing, implementing, maintaining and continuously improving an information security management system.
- It is recognized globally and was recently adopted in Romania as SR/EN/ISO/IEC 27001:2023.
- It addresses global cyber security challenges and improves digital trust.
- The new version brings new areas of information security into focus and changes the structure of technical controls.
- Organizations must improve their resilience and implement policies to reduce cyber threats.

Basic principles of an information security management system:

- Restricted Access: Data is accessible solely to designated personnel.
- Data Accuracy: Modifications to information are limited to authorized individuals.
- Accessibility on Demand: Approved users can access information whenever required.

Advantages accrued from establishing an information security management paradigm:

- Universal Data Protection: Securing information across all formats.
- Enhanced Resistance: Fortifying defenses against digital intrusions.

- Unified Security Architecture: Establishing a singular, comprehensive system for data protection.
- Enterprise-Wide Security: Providing comprehensive protection throughout the organization.
- Immediate Threat Response: Facilitating real-time reactions to security breaches.
- Cost-Effective Security: Minimizing expenditures related to information protection.
- Preservation of Data Reliability and Privacy: Safeguarding data integrity and confidentiality.
- Cultivating Stakeholder Confidence: Building trust with clients and associated parties.

SR EN 61508-6:2011 - Functional safety of safety-related electrical/electronic/ programmable electronic systems.

This part of IEC 61508 focuses on specifications for the design, implementation and maintenance of functional safety systems.

It is used to ensure that safety-critical processes and systems operate safely throughout their lifecycle.

Purpose SR EN 61508-6:2011:

- Provide guidance and requirements for the design, implementation and maintenance of functional safety systems.
- Minimizing the risks associated with failures in these systems.
- Main contents of SR EN 61508-6:2011:
- Life cycle of a functional safety system includes all stages from planning, design, implementation, operation, maintenance and decommissioning.
- Requirements for the design and implementation of functional safety systems: Guidelines for the correct design of systems and implementation of verification and validation measures.
- Testing and maintenance of functional safety systems: Procedures required for testing and maintenance of systems, including preventive maintenance.
- Risk assessment and safety level determination: Identification and assessment of risks, including Safety Integrity Level (SIL) determination.
- Benefits of Implementing SR EN 61508-6:2011:
- Improved the safety of industrial systems.
- Reduced risk of system failure.
- Compliance with international regulations and standards.
- Increased customer confidence.
- Optimize maintenance costs.
- Implement a systematic risk assessment framework.

ISO TS 16949 - Quality management system in the automotive industry

1This framework delineates the specialized prerequisites mandated by vehicle producers. Developed by the ISO Technical Committee ISO-TC 176, the ISO 16949 standard caters to the global automotive sector. Its genesis involved integrating industry-specific stipulations derived from the ISO 9000 series. This standard consolidates diverse regional and national automotive benchmarks, including ISO/TS 16949, AVSQ (Italy), EAQF (France), VDA6 (Germany), and QS-9000 (USA), alongside ISO 9001 quality management principles, into a singular, unified standard. The automotive and motorcycle industries are renowned for their stringent demands on a global scale. These sectors operate under intense pressure regarding both cost and time constraints. Paramount importance is placed on maintaining supplier secrecy.

Quality policy of the organization

The company's quality policy is integrated into its management system, which complies with ISO 9001, IATF 16949, ISO 14001, ISO 50001, ISO 45001 and TISAX. This policy aims primarily to satisfy customers through high quality products and services, delivered on time and in an economical and sustainable manner.

Key elements of the company's quality policy include:

- Customer Satisfaction: the central objective is to meet and exceed customer expectations in terms of quality, delivery times and service.
- Continuous Improvement: Commitment to constantly improve environmental, energy, occupational health and safety, and information security performance.
- Defect-free products and services: Ensuring that products and services are delivered on time, in the quantities required and without defects throughout the product lifecycle.
- Compliance with mandatory requirements: Compliance with applicable laws, regulations and standards.
- Stakeholder relations: Build relationships with suppliers, partners and other stakeholders based on the same internal standards for quality, environment, energy, occupational health and safety and information security.
- Standardized improvement processes: Using the Company Improvement Process (CIP) and the Company Idea Process to standardize continuous improvement across the company.
- Resource Management: Ensuring the efficient use of resources, products, services and equipment, with a focus on energy efficiency and environmental protection.
- Occupational health and safety: Prioritize employee-friendly workplaces and working conditions, eliminate hazards and minimize health and safety risks.
- Employee involvement: Providing an appropriate framework for employee consultation and participation, ensuring continuous qualification and maintaining a healthy, satisfied and motivated workforce.

Quality objectives and strategies

The company has set a number of clear quality objectives aimed at continuous improvement, reducing defects, increasing customer satisfaction, certification and compliance with standards, optimizing processes and promoting quality culture. Table 1 details these objectives.

Table 1. Quality objectives

No..	Objectives	Detail
1	Continuous improvement of products and services	The company is committed to maintaining a continuous improvement process by implementing a feedback system and analyzing performance data. This will ensure rapid adaptation to market requirements and customer needs while maintaining high quality standards.
2	Reduce defects and scrap	The implementation of strict quality control measures at all stages of production will lead to a reduction in the percentage of defective and reworked products. By using advanced technologies and continuous employee training, the company can minimize losses and improve production efficiency.

3	Increasing customer satisfaction	The company will use satisfaction surveys and other forms of feedback to constantly monitor and improve customer experience. Customer satisfaction is a key indicator of the quality of products and services offered.
4	Certification and compliance with international quality standards	Obtaining and maintaining ISO certifications and complying with international quality regulations are essential for the company. This not only ensures legal compliance but also enhances the company's credibility in the market and with business partners.
5	Optimizing production processes	By implementing advanced quality management techniques such as Six Sigma and Lean Manufacturing, the company aims to optimize production processes. This will reduce cycle time, improve efficiency and help reduce operational costs.
6	Promoting quality culture within the organization	Developing an organizational culture that emphasizes the importance of quality in all aspects of the business is crucial. The company will invest in training and development programs for employees, ensuring that all team members understand and adhere to the company's quality standards.

Source: Authors' research

Concrete measures to implement quality management

In order to achieve the quality objectives, the company will implement a number of concrete measures, detailed in the following tables. These measures include specific activities, sub-activities and how to implement them, covering all important aspects of quality management. The continuous improvement of products and services is presented in Table 2.

Table 2. Continuous improvement of products and services

No.	Activities	Sub activities	How to implement the sub-activity
1	Implementing a Feedback System	Collecting Customer Feedback	Create effective channels to gather feedback from customers through surveys, interviews and online review platforms.
		Feedback Analysis	Using data analysis tools to identify common trends and issues mentioned by customers.
		Corrective and Preventive Actions	Developing action plans based on customer feedback to address shortcomings and prevent future occurrences.
2	Investment in Research and Development (R&D)	Product Innovations	Investing in R&D teams to develop new functionality and improvements to existing products.
		Quality Testing	Rigorous testing to ensure that new products and enhancements meet quality standards.
		Benchmarking	Benchmarking the company's products and services against the competition to identify opportunities for improvement.

Source: Authors' research

Table 3 shows how to reduce defects and scrap.

Table 3. Reduce defects and scrap

No.	Activities	Sub activities	How to implement the sub-activity
1	Quality control in production stages	Inspections at every stage of production	Implement regular and detailed inspections at all stages of the production process to identify and correct problems before products advance to the next stage.
		Standardization and documentation	Create and constantly update standard operating procedures (SOPs) to ensure compliance and consistency of production processes.
2	Employee training and development	Continuing training programs	Organization of training sessions and workshops for employees, focusing on quality control, defect identification and rectification.
		Regular evaluations	Conduct regular employee skills assessments to identify training needs and ensure compliance with quality standards.

Source: Authors' research

Table 4 shows how to increase customer satisfaction.

Table 4. Increasing customer satisfaction

No.	Activities	Sub activities	How to implement the sub-activity
1	Analyze feedback and implement improvements	Analysis of feedback data	Using data analysis tools to interpret the feedback received and identify areas for improvement.
		Action plans	Develop action plans based on customer feedback to address the issues identified and implement necessary improvements.
2	Communication and transparency with customers	Informing customers	Maintain open and transparent communication with customers on actions taken to improve products and services as well as important updates.
		Accessible communication channels	Provide easily accessible communication channels for customers, such as hotlines, email and online chat.

Source: Authors' research

Table 5 shows certification and compliance with international quality standards.

Table 5. Certification and compliance with international quality standards

No.	Activities	Sub activities	How to implement the sub-activity
1	Obtaining and maintaining ISO certification	Initial assessment	Conduct an initial assessment of current compliance with the requirements of relevant ISO standards such as ISO 9001.
		Preparation of documentation	Develop and update documentation required for certification, including procedures, policies and quality manuals.
		Internal audit	Conduct internal audit to identify non-conformities and implement corrective actions.
2	Employee training	Training programs	Organize training sessions for employees on the requirements of international quality standards and the importance of compliance.
		Professional accreditations	Encourage employees to obtain internationally recognized professional credentials in quality management.

Source: Authors' research

Table 6 shows the optimization of production processes.

Table 6. Optimizing production processes

No.	Activities	Sub activities	How to implement the sub-activity
1	Lean Manufacturing principles	Eliminating losses	Identify and eliminate all activities that do not add value to the production process, such as waiting times, unnecessary transportation and surpluses.
		Implement standardized working methods	Establish standardized operating procedures for all stages of the production process to ensure consistency and efficiency.
2	Implementation of Six Sigma methodology	Improvement projects	Launching Six Sigma projects to address critical quality and production efficiency issues.
		Using DMAIC	Apply the DMAIC (Define, Measure, Analyze, Improve, Control) methodology to analyze and optimize processes.

Source: Authors' research

Table 7 shows Promoting quality culture within the organization.

Table 7. Promoting quality culture within the organization

No.	Activities	Sub activities	How to implement the sub-activity
1	Implement a continuous feedback system	Suggestion boxes	Placing suggestion boxes in accessible places so that employees can suggest quality improvement ideas.
		Online platform	Creating an online platform where employees can propose suggestions and solutions and the best ideas can be rewarded and implemented.
2	Effective internal communication	Awareness campaigns	Launch internal campaigns to promote the importance of quality in all departments and levels of the organization.
		Open communication	Implement open communication channels where employees can share ideas, problems and solutions related to quality.

Source: Authors' research

Quality strategies

To achieve quality objectives, the company can implement a number of viable strategies tailored to each specific objective.

Strategies for continuous improvement of products and services:

- Adopt the Kaizen methodology: Implement a philosophy of continuous improvement at all levels of the organization, encouraging employees to propose and implement small daily improvements.
- Constant feedback from customers: Using customer feedback to identify and implement specific product and service improvements.

Strategies to reduce defects and scrap:

- Implementation of Six Sigma methodology: Using Six Sigma methodology to reduce variability in production processes and eliminate the root causes of defects.
- Automation of quality control processes: Investment in advanced quality control process automation technologies to detect and correct defects in real time.

Strategies to increase customer satisfaction:

- Personalizing customer experience: Develop customized solutions to meet each customer's specific needs and enhance their overall customer experience.
- Loyalty program: Implement a loyalty program to reward loyal customers and encourage long-term collaboration.

Strategies for certification and compliance with international quality standards:

- Regular audits: Conduct regular internal and external audits to verify compliance with ISO standards and identify opportunities for improvement.
- Ongoing Training: Develop ongoing training programs for employees on the requirements and procedures associated with international quality standards.

Strategies to optimize production processes:

- Lean Manufacturing: Adopt Lean Manufacturing principles to eliminate waste and improve the efficiency of production processes.

- Advanced technologies: Invest in advanced manufacturing technologies, such as the Internet of Industry (IIoT) and artificial intelligence, to optimize and automate production processes.

Strategies to promote quality culture within the organization:

- Communication and Leadership: Promote a quality-oriented organizational culture through open communication and active leadership.
- Recognizing and rewarding employees: Recognizing and rewarding employees who contribute significantly to quality improvement in order to motivate and inspire the whole team.

Results and discussions

Performance evaluation of the quality management system

Implementing a quality management system, such as ISO 9001, IATF 16949 or ISO/IEC 27001, brings with it the need for continuous performance assessment. This evaluation allows organizations to measure the effectiveness of the system, to identify strengths and areas for improvement and to ensure that quality objectives are achieved. Performance assessment can be carried out through a variety of methods, including internal and external audits, analysis of customer satisfaction data, monitoring of key performance indicators (KPIs) and analysis of quality-related costs. In addition, feedback from employees and stakeholders can provide valuable information about the functioning of the system and its impact on the organization.

The impact of quality management on the organization

A well implemented quality management system has a profound impact on all aspects of an organization. Firstly, it helps to improve the quality of products and services, leading to increased customer satisfaction and a stronger market position. Secondly, quality management can increase operational efficiency by optimizing processes, reducing costs and minimizing waste. A quality management system can also improve internal communication, collaboration and organizational culture, creating a more motivating and productive work environment. Last but not least, certifications obtained through the implementation of quality standards can enhance the credibility of the organization and facilitate access to new markets and partnerships.

Benefits and challenges of implementing an integrated quality management system

Implementing an integrated quality management system (QMS) offers many benefits, but it also comes with challenges. Benefits include:

- Improved process efficiency and effectiveness
- Reduce costs and risks
- Increase customer and stakeholder satisfaction
- Improved reputation and image of the organization
- Facilitate access to new markets and partnerships

Challenges include:

- Initial implementation and certification costs
- Employee resistance to change
- Complexity of integrating different standards and systems
- Strong management commitment required
- Maintaining long-term compliance and continuous improvement

Conclusions and original contributions

The study underlined the importance of quality management for the success of organizations, highlighting the benefits of implementing quality management systems based on international standards. Such a system was found to contribute to improving the quality of products and services, optimizing processes, increasing efficiency and strengthening organizational culture. The study also showed that the implementation of Kaizen management and other continuous improvement methodologies can support organizations in achieving operational excellence and adapting to changes in the business environment.

This research has made an original contribution through a detailed analysis of quality management policies and practices in the company, proposing solutions and strategies tailored to the specifics of this organization. Personal contributions include:

- In-depth SWOT analysis of the company, identifying strengths, weaknesses, opportunities and threats
- Development of a comprehensive quality management program with detailed objectives, activities and strategies
- Proposals to improve processes and promote quality culture in the organization
- In-depth analysis of Total Quality, Zero Defects and Kaizen concepts with recommendations for implementation

Future research could explore in more detail the impact of emerging technologies such as artificial intelligence and the Internet of Things (IoT) on quality management. It would also be useful to investigate how organizations can more effectively integrate sustainability principles into their quality management systems. Other research directions include:

- Studying cultural factors influencing the implementation and effectiveness of quality management
- Comparative analysis of different quality management models and standards
- Developing innovative tools and methodologies for measuring and improving quality

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