



Digital Cultures, Ethics, and Corporate Responsibility: Perspectives in Contemporary Innovation

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ISO 9001 Quality Management System as a driver of Process Innovation

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This text is a chapter of the doctoral thesis project in Management Sciences, which focuses on the impact of the Quality Management System (QMS) on process maturity and business performance.

Introduction

In the current context of organizational transformation, success is no longer determined solely by economic capacity, but by the ability of organizations to learn, adapt, and innovate continuously. In this regard, Quality Management Systems (QMS) aligned with the ISO 9001 standard have emerged as strategic tools, enabling process monitoring focused on continuous improvement and innovation (Fonseca, 2021; Fonseca & Domingues, 2018).

This chapter examines the evolution and effects of QMS in certified service companies in Colombia, emphasizing their role in fostering improvement, learning, and innovation in organizational processes. It is grounded on the seven universal principles of quality, which aim to achieve satisfaction among customers and all stakeholders. The central research question is: How does the implementation of the ISO 9001 QMS contribute to process innovation in certified companies in the service sector in Colombia?

Evolution of ISO 9001

In 1987, the ISO 9000 standards were published for the first time, aimed at design, production, installation, and inspection processes, and differentiated by requirements and demands according to the type of organization (López, 2016). In 1994, it was updated and a second edition was launched without significant changes in its structure, in order to support QMS certification by company management.

The third version, published in 2000, introduced major modifications, such as customer focus, process orientation, and continuous improvement. The fourth version was updated in 2008, with changes in wording, explanatory notes, and some numerals, although without substantial changes compared to the previous version (Claver & Tarí, 2010; López, 2016).

The fifth edition, which replaced the 2008 version of the ISO 9001 standard, is considered an enhanced version and was published both as an International Standard (IS) and as a Colombian Technical Standard (NTC) in 2015 (ICONTEC, 2015b). ISO 9001:2015 takes into account operational performance, process and risk management, and employs the continuous improvement cycle aligned with organizational processes (Dentch, 2017). It also emphasizes how employees' skills generate added value to internal activities (Zayas-Mateo & Martínez-Lorente, 2021). The standard was consolidated under the High-Level Structure (HS), which is aligned with other international standards in the ISO series (Dentch, 2017; Lizarzaburu, 2016; Marimon, Melão, et al., 2019; Zayas-Mateo & Martínez-Lorente, 2021).

The standard has evolved to adapt to a dynamic environment, with a focus on stakeholder-

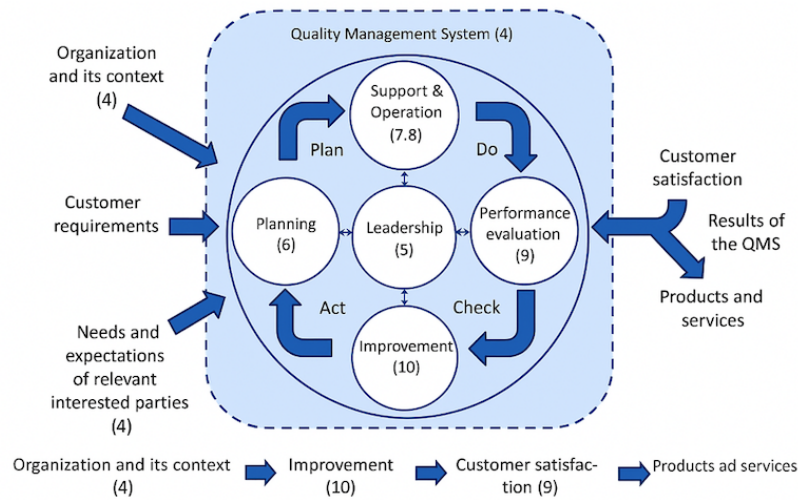
centered improvement. A systematic literature review (SLR) from all stakeholders, confirmed that the ISO 9001:2015 version will remain in force for an additional five to seven years without major revisions. However, recommendations such as the inclusion of new terms like financial performance and circular economy will be considered in future updates (International Organization for Standardization, 2021).

ISO 9001 Process Innovation

One of the principles of the ISO 9001 QMS is the process approach, which is based on the circle of continuous improvement Plan–Do–Check–Act (PDCA) continuous improvement circle, created in 1930 to demonstrate how variability can become a cycle that improves production processes (Shewhart, 2012). In the 1950s, this tool was considered the circle of continuous improvement for the entire organization, involving people and management processes. The PDCA seeks to identify and eliminate the causes that do not allow the improvement of QMS processes (Deming, 1989). This makes it possible to verify the relationships between the processes that make up the QMS to achieve an effective implementation of the requirements aligned with the quality strategy and policy (Rajagopalan, 2020).

The circle of continuous improvement PDCA is implemented in four moments that are executed throughout the cycle: 1) Plan, which consists of projecting objectives, processes, resources and identifying risks; 2) To do, which consists of executing what is planned; 3) Verify, which implies checking through measurements that what is planned is being fulfilled; and 4) Acting, which requires implementing actions to improve performance (Aguar & Loos, 2017; Lodgaard et al., 2013; Rajagopalan, 2020). Likewise, the process approach helps the organization to achieve planning by implementing prevention mechanisms that minimize negative results and make the most of the opportunities that arise (Garengo & Biazzo, 2013).

Figure 1 graphically represents the ISO 9001:2015 QMS model through the PHVA continuous improvement circle. This circle identifies the sections of the standard from 4 to 10, since these contemplate the requirements of the QMS, thus, section 4 addresses the requirements of the QMS related to the organization and its context, followed by section 5 that addresses leadership, then section 6 corresponds to the planning stage (P), sections 7 and 8 address the execution (H) of the plan and the implementation of new processes, in section 9 there is verification (V) through the presentation of the results and evaluation and, finally, section 10 corresponds to improvement and is represented by action (A), which identifies the causes that prevent a process from achieving the goals (ICONTEC, 2015b). It is important to note that this circle of continuous improvement has no end and is based on a constant search for problem prevention. Therefore, the PDCA allows processes to achieve effectiveness and efficiency (Wilson & Campbell, 2018).

Figure 1. PDCA - NTC-ISO-9001.

The PDCA is the basis of to constantly improve according to the ISO 9001 standard, which allows to guarantee satisfied customers and the reduction of internal costs to maximize the company's performance (Cronemyr & Danielsson, 2013). Therefore, process management is considered to be more effective than the traditional management model (Bawden & Zuber-Skerritt, 2002). A process is defined as a series of interactions that generate value (Barros-Bastidas and Gebera, 2020) and (Terziovski & Guerrero, 2014). As for the types of processes, the following can be mentioned: a) strategic, also known as management, b) missional or realization, which aim to comply with what is projected in the mission and reason for being, c) support, the transversal in the organization and are interrelated with all processes, and d) measurement, analysis and improvement, also known as (MAM), which are created in favor of continuous improvement

Maturity Levels

The ISO 9004 standard has been considered as a floor for the development of models of excellence such as those of EFQM, or the Baldrige, due to its systemic nature and its attention to sustainability and the creation of value for each stakeholder (Boys et al., 2004). Organizational maturity in improvement, learning, and innovation is defined in five levels. It evolves from informal and unstructured practices (Level 1) to partially documented and reactive approaches (Level 2), structured and consistent processes (Level 3), strategic and performance-driven management (Level 4), and finally, full integration where innovation and continuous improvement are part of the organizational culture (Level 5)

The study adopted a quantitative, descriptive and cross-sectional approach, aimed at characterizing the implementation of practices related to continuous improvement, organizational learning and innovation in 131 Colombian companies in the service sector that have ISO 9001:2015 certification.

For data collection, a structured instrument was designed composed of 20 items organized into four key dimensions: D1-General, D2-Improvement, D3-Learning and D4-Innovation, based on the guidelines of the ISO 9004:2018 standard. Each dimension was evaluated through five levels of maturity, using a Likert-type scale with values from 1 to 5, where level 1

represents an informal or incipient practice, and level 5 reflects a full integration into the organizational culture and management strategy.

The questions allowed us to assess from reactive and non-systematic approaches (level 1) to the existence of consolidated structures, committed leaderships and formal mechanisms that promote continuous improvement, shared learning and transversal innovation (level 5).

Subsequently, descriptive statistical analyses were applied for each dimension, including measures of central tendency (mean and median), dispersion (standard deviation) and extreme values (minimum and maximum). These analyses facilitated the identification of general patterns of behavior in the responses, as well as the level of development achieved by the organizations in each of the practices evaluated.

To ensure comparability of the results, the scores were maintained on a scale of 1 to 5, consistent with the design of the instrument and the maturity logic set out in ISO 9004.

Improvement, Learning and Innovation, which encompasses dimensions D1 to D4, illustrates the organization's ability to reflect on its activities, foster organizational learning, integrate innovation mechanisms and maintain continuous improvement cycles. This factor illustrates the ability to change and evolve proactively.

Overall Improvement, Learning and Innovation Outcomes

The Improvement, Learning and Innovation factor, composed of dimensions D1 to D4, evaluates the organization's capacities to self-evaluate its activities, promote organizational learning, incorporate innovation systems and sustain continuous improvement. This set of dimensions helps to determine the NM achieved by companies in relation to their ability to adapt to change and evolve proactively.

The results indicate that companies certified to ISO 9001:2015 have reached maturity levels. This finding suggests that QMS not only reinforces process standardization, but also adapts with the organizational environment that supports systematic innovation, sustained organizational learning, and continuous improvement.

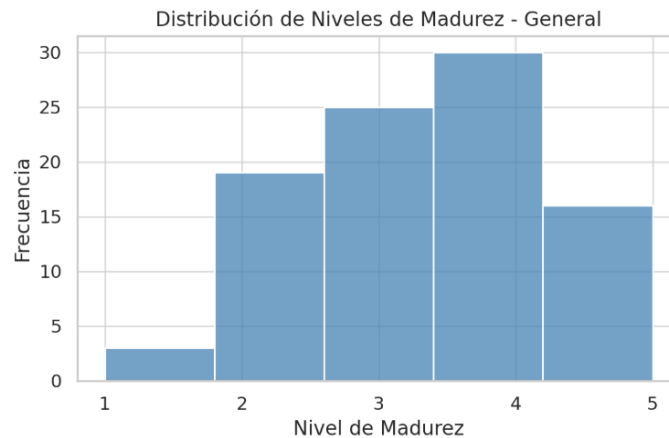
Notably, dimension 4 (Innovation) received the highest score among all certified companies. This finding indicates that companies with QMS seem to have practices that favor creative thinking, the adoption of emerging technologies, and the generation of value-added solutions. This behavioral pattern could be associated with an organizational culture of active change, motivated by leadership that encourages responsible experimentation, joint learning, and the adequate dissemination of knowledge.

Dimension 1: General

The results of the General dimension, which assesses the degree of strategic alignment of improvement, learning and innovation in the organization, show a mean maturity of 3.51, with a standard deviation of 1.13. This score reflects that ISO 9001:2015 certified organizations are at a moderate level of maturity, characterized by the existence of partially structured practices that, although documented and in execution, still present opportunities for strengthening in their full integration with the organizational strategy. The minimum value recorded was 1 and the maximum 5, which indicates heterogeneity in the degree of maturity reached among the participating companies.

The corresponding graph shows a distribution centered on levels 3 and 4, which suggests that most organizations have overcome incipient stages and are in the process of consolidating these practices as part of their organizational routine. However, there is still a considerable percentage of companies with low levels (1 and 2), indicating the need for specific interventions to strengthen these strategic foundations.

Figure 2. General Maturity Level.

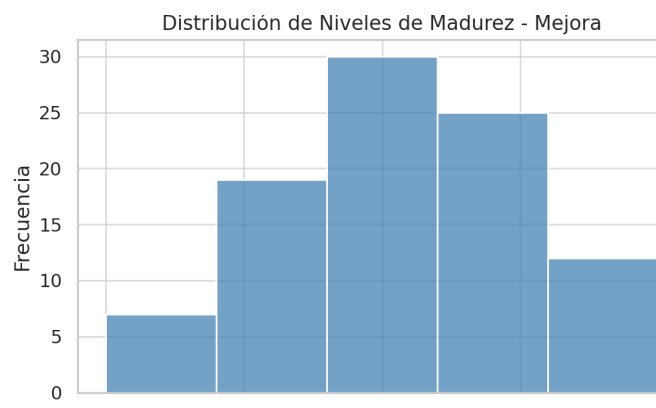


Dimension 2: Improvement

In the Improvement dimension, which includes the development of systematic processes to optimize products, services and internal procedures, the mean obtained was 3.32 with a standard deviation of 1.17. This score represents an intermediate level of maturity, where more structured improvement efforts are evident, although not necessarily constant or strategically managed. The range observed was from 1 to 5, which reaffirms the variability between organizations with respect to the commitment to continuous improvement.

The graph reveals a concentration of responses at levels 3 and 4, with less participation at the extremes. This reflects a general trend towards the institutionalization of continuous improvement practices, although gaps are still perceived in the articulation of these actions with the organizational culture and with the performance evaluation mechanisms.

Figure 3. Maturity Levels-Improvement

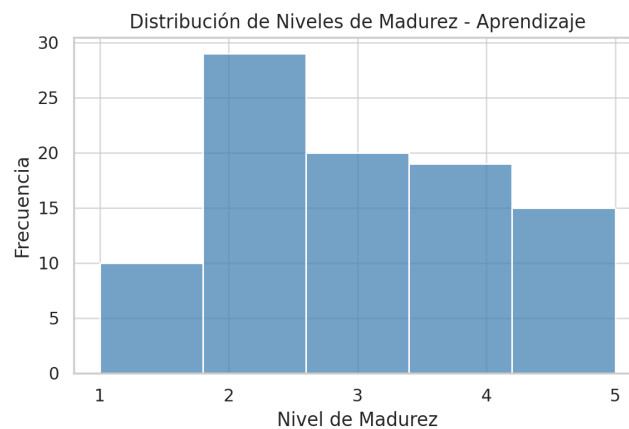


Dimension 3: Learning

Regarding the "Learning" dimension, a mean of 3.28 and a standard deviation of 1.12 were observed, with a minimum of 1 and a maximum of 5. These results show that organizational learning in the evaluated companies is in a transition stage, with the existence of collaborative practices and exchange forums, but with little systematization in some cases.

The graphical analysis shows a more homogeneous dispersion, although with a slight concentration on levels 3 and 4, which suggests that learning is present as a relevant organizational element but has not yet been fully recognized as a strategic pillar. It is still necessary to strengthen a culture that fosters learning from error, knowledge management and collaborative innovation.

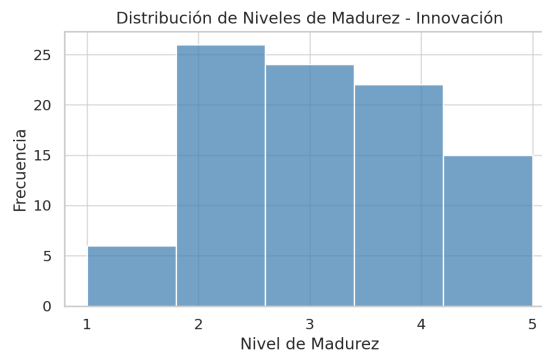
Figure 4. Maturity Levels-Learning



Dimension 4: Innovation

The "Innovation" dimension was the one that obtained the highest mean of the study (3.51), with a standard deviation of 1.16, and a range between 1 and 5. This score shows that certified organizations show greater maturity in innovation management, which may be due to the incorporation of emerging technologies, as well as the promotion of strategic leadership that promotes creativity and disruptive thinking.

The graph reflects a clear trend towards levels 4 and 5, indicating that a significant number of organizations have integrated innovation practices in a more systematic and cross-cutting way. Despite this, there are still companies at the lower levels, which highlights the need to extend these practices in a homogeneous way throughout the sector.

Figure 5. Maturity Levels-Innovation

Conclusions

The results of this study show that the implementation of the Quality Management System based on the ISO 9001:2015 standard significantly favors organizational maturity in key dimensions such as continuous improvement, organizational learning and innovation.

The integration of the process-based approach, results-oriented and evidence-based management, characteristics of QMS, allows the creation of structures that not only standardize and control processes, but also promote environments conducive to constant improvement, collaborative learning and the generation of value through innovation.

A higher level of maturity in the innovation dimension was identified within the certified organizations, which suggests that ISO 9001:2015 certification can act as a catalyst for organizational transformation, by strengthening an adaptive, change-oriented culture based on quality principles.

This finding reaffirms the strategic role of QMS as a driver for business evolution, not only in terms of operational efficiency, but also as a platform that drives dynamic capabilities essential for competitiveness in changing and demanding contexts.

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