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ORIGINAL ARTICLE

Quality Management Systems: correlation study between leadership and maturity

Sistemas de Gestão da Qualidade: estudo de correlação entre liderança e maturidade

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Abstract: Leadership is a key element of quality management, and, as such, it has been identified as an influential factor in the maturity of quality management systems (QMSs). Some of the previous studies on the relationship between leadership styles and QMS performance have argued that no universal best leadership style exists, stressing that leadership practices should be appropriate to the context. Thus, this research aims to further explore this relationship by considering the QMS context, namely the practitioners' leadership profile and the QMS maturity. Accordingly, the primary objectives of this study are 1) to understand if a leadership style is predominant depending on the QMS maturity and 2) to understand the relationship between the leadership practices of different styles and the dimensions of the QMS maturity. An exploratory quantitative study was developed in companies located in Portugal through a survey based on the maturity model developed by Nascimento et al. (2016) and the Multifactor Leadership Questionnaire®-5X Short Leader Form MLQ of Avolio and Bass (1995). The diagnosis disclosed that only 32% of the sample had a QMS with higher maturity levels (4 and 5, a scale of 1 to 5). The results highlighted that no single leadership style dominates a specific maturity level. Furthermore, a significant positive correlation was demonstrated between several practices of transformational and transactional leadership styles and the dimensions of QMS maturity. As a practical contribution, a guideline was provided with some examples of leadership practices and their impacts on the specific dimensions of QMS maturity. Some steps were also proposed to enable organisations to develop a tailored programme to foster leadership practices suitable to the internal context and promote QMS maturity.

Keywords: Quality management system; Maturity; Leadership styles; Multifactor Leadership Questionnaire.

Resumo: A liderança é um elemento chave da gestão da qualidade e, como tal, tem sido identificada como um factor com impacto na maturidade dos sistemas de gestão da qualidade (SGQ). Alguns estudos sobre a relação entre estilos de liderança e desempenho do SGQ concluíram que não existe um melhor estilo de liderança universal, realçando que as práticas de liderança devem ser adequadas ao contexto. Assim, este trabalho pretende aprofundar esta

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relação, considerando o contexto do SGQ, nomeadamente o perfil de liderança dos profissionais de qualidade e a maturidade do SGQ. Assim, os principais objectivos deste estudo são 1) compreender se existe um estilo de liderança predominante dependendo da maturidade do SGQ e 2) compreender a relação entre as práticas de liderança dos diferentes estilos e as dimensões da maturidade do SGQ. Assim, foi desenvolvido um estudo quantitativo exploratório em empresas localizadas em Portugal com suporte no modelo de maturidade desenvolvido por Nascimento et al. (2016) e no Questionário Multifactor Leadership Questionnaire®-5X Short Leader Form MLQ de Avolio e Bass (1995). O diagnóstico revelou que apenas 32% da amostra apresentaram um SGQ com níveis de maturidade mais elevados (4 e 5, numa escala de 1 a 5). Os resultados evidenciaram que não existem um estilo único de liderança dominante num nível de maturidade específico. Além disso, foi demonstrada uma correlação positiva significativa entre várias práticas de estilo de liderança transformacional e transaccional e as dimensões da maturidade do SGQ. Como contributo prático, foi proposto um guia com práticas de liderança e os seus impactos em dimensões específicas da maturidade do SGQ. Foram também propostas algumas medidas para permitir às organizações desenvolver um programa customizado para fomentar práticas de liderança adequadas ao contexto interno e promover a maturidade do SGQ.

Palavras-chave: Sistemas de gestão da qualidade; Maturidade; Liderança; *Multifactor Leadership Question*.

1 Introduction

Quality management has been an important area in discussions concerning modern management and is acknowledged as an effective strategy in a market that is increasingly competitive and has a high degree of uncertainty (Barbosa et al., 2017).

van Kemenade & Hardjono (2019) argue for a new quality management paradigm – the emergence paradigm – more suited to the current needs. This new paradigm defines quality holistically, i.e., it addresses the needs and expectations of all stakeholders and relies on networking (internal and external), being open to change, solving problems effectively, and building a quality culture. Organisations must be ready for continuous change during emerging paradigm, and following procedures is no solution (van Kemenade, 2014). However, the change happens not only in the external environment but also in the organisational structures internally, namely in a very important asset, the workforce (Barbosa et al., 2017). As such, it is crucial to focus on leadership in quality management systems (QMSs) by reinforcing an organisational environment that promotes employees' involvement in quality and the importance of each one in the organisational purpose.

Thus, the QMS cannot be locked and static; instead, it needs to evolve and assist companies in coping with such challenges as change, innovation, and flexibility, and we call this evolution as maturity. The assessment of the QMS maturity helps to describe the level of practice consolidation adopted by the organisation, pointing to a progressive path for organisational development (Silveira, 2009).

Various factors have been pointed out for the scale-up of maturity levels, including structural, technical, technological, and behavioural. This research focuses on the behavioural factors, seeking to deepen the relationship between leadership styles and the QMS maturity since there are leadership styles more conducive to a culture of ownership, change, and commitment to overcoming the challenges imposed.

The relationship between leadership styles and quality management is an emerging research area (Pires et al., 2019). However, some studies argue that this analysis should not be generalised and that no single best leadership style exists. Thus, further studies are needed to deepen this knowledge by considering the QMS background, namely the quality managers' profiles and the systems development level (Barbosa et al., 2017).

Given the problem presented, this study attempts to further explore the relationship between leadership styles and QMS maturity through the main research question, “What is the relationship between leadership styles and QMS maturity levels?” Consequently, two specific research questions are outlined:

- Is there one leadership style more decisive for achieving higher maturity levels?
- How can leadership skills be used in QMS maturity development?

As a result, it is intended to propose a set of steps to assist organisations in developing a tailored programme to improve the leadership practices with the most significant impact on their QMS development.

This research was underpinned by theoretical concepts (described in section 2) related to QMS, maturity models, and the interrelationship of leadership and quality management. The following section describes the quantitative research methodology using a survey sent to certified companies based in Portugal. Section 4 outlines the data analysis conducted through descriptive and inductive statistics, internal consistency tests, parametric ANOVA tests, and correlation tests. Section 5 is left for discussion, where we aim to address the research questions. And finally, section 6 highlights the research's main contributions, limitations, and future research lines.

2 Literature review

In keeping with the research focus, this section is framed by three main topics: QMS, QMS maturity, and the interrelationship of leadership and quality management.

2.1 Quality Management System

QMS implementation and maintenance has been a goal of many organisations to be more competitive, given the effective management of their higher value-added processes. A QMS, as its name implies, is defined as a set of elements for establishing policies and processes to achieve the objectives (Rebelo et al., 2016). Underlying the QMS design and implementation is the identification of comprehensive processes, from engineering and product design and operational activities to after-sales service.

According to Fotopoulos & Psomas (2009), QMS implementation models have evolved rapidly, and there is currently a diversity of solutions, such as EFQM (European Foundation for Quality Management), Malcom Baldridge, CAF (Common Assessment Framework), ISO 9001:2015, Six-Sigma, and TQM.

ISO 9001 is one of the most widespread standards in implementing these systems (Barbosa et al., 2017); it is also expected that ISO 9001 certification will continue to grow in the future (Ikram et al., 2021). Under the definition adopted by ISO 9001, a QMS allows the definition of objectives and the management of the processes to achieve the desired results, providing value to all stakeholders. It has the particularity of actively integrating top management in the optimisation of resources and data analysis, culminating in the definition of a continuous improvement strategy driven by the Plan-Do-Check-Act (PDCA) cycle (ISO, 2015).

The same standard states that the QMS can be implemented in organisations of any dimension, focused on products or services, by structuring requirements into a management model that leads to good practices for excellence. The ISO 9001:2015 edition emphasised the organisation's context analysis, stakeholder management, risk-based thinking, enhanced applicability to services, more focus on leadership and

achieving results, knowledge management, and introduction of innovation (ISO, 2015). The research carried out by Rogala & Wawak (2021) shown that, in general, quality management professionals recognise that the ISO 9000 family is structured and includes important elements for the organisation's management, such as quality management principles and the requirements for QMS implementation.

QMS allows analyse the deviations along the entire supply chain, identifying their root cause and thus defining effective solutions (Pires, 2016). Therefore, a QMS shapes the organisational structure at the level of resources, procedures, and responsibilities to consistently drive, control, and ensure quality through a continuous improvement culture (Santos et al., 2018). In short, the benefits of QMSs can be divided into two major groups (Tarí & Sabater, 2004; Terziovski et al., 2003; Terziovski & Samson, 1999):

- Marketing tool: the QMS represents an efficient tool for communicating internal processes to customers and suppliers.
- Internal improvement tool: the QMS helps to improve the organisation's performance, specifically for companies that are in the early stages of their implementation.

Pekovic & Galia (2009) asserted that QMS implementation improves performance in innovation and manufacturing system reliability as poor-quality costs are reduced significantly after certification. However, when organisations develop their QMSs solely seeking marketing advantages, it limits process-effectiveness improvement (Midor & Wilkowski, 2021).

Thus, QMSs should not be exclusively addressed to achieve customer satisfaction by preventing nonconformities of products and services. A QMS has to be driven by customer satisfaction and must also quickly respond to the market context (Tsim et al., 2002).

The QMS´s internal and external benefits will certainly be conditioned by the implementation process and subsequent QMS monitoring. Therefore, a regular QMS assessment is necessary, allowing the identification of its weaknesses and strengths, as well as the development of a continuous progression and improvement strategy. To this end, some models have been developed to assess the QMS maturity, further described in the next section.

2.2 Quality Management Systems' maturity

The academic community has shown increasing interest in exploring the relationship between higher levels of maturity and organisational performance (Irfan et al., 2020). The concept of process maturity emerged with the total quality management movement. The application of statistical process control techniques has shown that improving the maturity of any process leads to a reduction in the process variability and an improvement in their performance (Cooke-Davies & Arzymanow, 2003).

In this context, the recognised Crosby's Quality Management Maturity Grid emerged, composed of five phases: uncertainty, awakening, enlightenment, wisdom, and certainty (Crosby, 1979). These phases were later changed to uncertainty, regression, awakening, enlightenment, and certainty (Crosby, 2016).

Later, the Software Engineering Institute proposed a maturity model derived from Crosby's model, designated as the Capability Maturity Model (CMM). This model is likewise formed of five maturity levels structured according to 18 processes, 52 objectives, and more than 300 critical practices (Lianying et al., 2012). The initial model focus was centered on the software industry, having been disseminated to other areas with the main purpose of

identifying critical problems, leading to the development of optimised processes and consequently better organisational performance (Irfan et al., 2020).

According to Nascimento et al., (2016)., p. 251), "[...] the main purpose of a maturity model is to describe a typical behavior of consolidated practices for each criterion, embracing what can be considered as good practice, as well as, methods of transition between levels". These maturity models assist managers in organizational structured development path Silveira (2009)

QMS maturity can be described by the number of years of its implementation and certification (Sousa & Voss, 2001), by the relationship with the best practices employed (Patti et al., 2001), or may even be associated with the evaluation of the customers´ perceived quality and the process management efficiency (Rosnah & Wan, 2010). By reviewing these definitions, it is possible to identify different perspectives associated with the maturity concept:

- Maturity is associated with the temporal dimension or age, indicating a more advanced state over the years (Fraser et al., 2002; Sousa & Voss, 2001);
- Capability is the complete development of the processes, following a continuous improvement philosophy (Nascimento et al., 2016);
- Evolution defends the evolving concept by adopting combined practices for adapting to the organisational context (Lahti et al., 2009).

Nascimento et al. (2016), by compiling other recognised maturity models, namely the Crosby Maturity Grid (Crosby, 2016), Quality Award PNQ (FNQ, 2011), and standard JIS Q 9005 (JIS, 2005), developed a QMS maturity model with 5 levels, in which the last one contemplates questions related to innovation and suitability to the environment (Table 1).

Table 1. QMS maturity levels (Nascimento et al., 2016).

Level	Planning	Results
1	Projects are not executed as planned, and failures occur.	Level 1 indicates a poorly defined QMS with unstructured practices, no performance prediction, and high costs. Low levels of functional cooperation and customer satisfaction are also associated with this level. The expected results are not achieved, and results are likely to be lower than those of the competition.
2	ISO 9001 is a reference for the development of procedures and instructions.	A basic QMS characterises the second level, although it is more structured than the previous one because the organisation's processes are prepared and documented, which makes its performance more predictable. It is at this level that companies usually decide on ISO 9001 certification, resulting in greater customer satisfaction, although still at a high cost.
3	The organisational profile is defined, and planning is effective.	At level 3, process management is improved, allowing for greater cooperation between departments, suppliers, and customers. Such alignment usually translates into a higher customer satisfaction level.
4	The organisational profile is clearly set against the competition. Important procedures are implemented, which support effective and efficient planning.	At the fourth level, strategic interaction and cooperation already exist among the organisation and its suppliers and customers, and an assessment of performance is conducted, thus resulting in increased control and a drastic cost reduction. Competitive advantage is attained by increasing customer satisfaction as well as team building.
5	The planning is innovative and suitable for environmental changes. Employees share experiences and lessons learned within the organisation.	At this level, the company's quality management becomes a reference for competitors due to its efficiency and better ability to adapt to the challenges imposed by the organisational context.

As stated previously, for QMS development and consequent level transition, there are several factors, such as structural, technical, technological, and behavioural ones. This paper focuses on the behavioural factors, particularly the role of leadership styles in maturity level transition. So, the following section is reserved for framing the relationship between leadership and quality management.

2.3 Leadership and quality management

Leadership approaches are related to analysing the variables that impact organisational change that allows the fulfilment of objectives (Chiavenato, 2004). Leadership is linked to personality profiles that can influence others in the developing activities to pursue the organisation's goals focused on satisfying the needs and expectations of its customers. A charismatic leader earns the trust and respect of his followers, establishing more easily a commitment to the organizational vision (Barbosa et al., 2017).

In accordance with ISO 9001:2015 (ISO, 2015), leadership is one of the quality management principles that has a strong impact on the other principles and is therefore considered a success factor in quality management programmes (Barbosa et al., 2017). In driving a QMS, the leaders' behaviour is seen as an example in terms of attitudes and values (Mlkva et al., 2011). In addition, the literature argues that leadership is one of the five most important competencies of quality management professionals (Fundin, 2018). van Kemenade (2014, p. 655) also mentions that “[...] intercultural competencies, adaptability, flexibility, and the ability to build synergies” are essential in leading a QMS.

Leadership involvement is a precondition for achieving above-average efficiency levels as it helps bring transparency of action and a positive employee atmosphere. In addition, such a leader's commitment gives the workforce greater motivation and involvement in the organisation's policies and culture (Mlkva et al., 2011). A lack of top management commitment is a major barrier to QMS implementation, while the opposite leads to very positive results, such as “[...] improved quality, increased productivity, and improved management models” (Barbosa et al., 2017, p. 446).

According to Silva & Matos (2020), leadership is increasingly important within the emerging quality management paradigm, due to its role in the QMS evolution and change management. Several authors have investigated the impact of different leadership styles on quality management performance. Some previous studies have argued that transformational leadership has a few advantages in quality management as it supports a long-term vision, enables continuous improvement, and fosters teamwork, commitment, personal development, and the exchange of experiences and knowledge (Laohavichien et al., 2009; McFadden et al., 2015; Parzinger et al., 2001; Rosenkrantz, 2011). QMS implementation involves organisational changes, which can be perceived as obstacles by employees. Transformational leadership can play an active role in this process of unavoidable discomfort by encouraging people to improve their skills (Xu, 2017).

Another study revealed that transactional leadership has a higher-than-expected impact on quality management performance (Laohavichien et al., 2011). Along the same line, Barbosa et al. (2017, p. 446) argue that “[...] transactional leadership can support operational activities”.

Thus, several authors merged both leadership styles, making a single “transformational-transactional” style. On the one hand, engagement in the goals and

objectives based on the team's motivation and interests is part of transformational leadership, but on the other hand, it also provides the exchange of rewards for effort and commitment to the work done, which is part of transactional leadership (Alharbi & Yusoff, 2012; Hirtz et al., 2007).

Barbosa et al. (2017) added one more variable to the discussion. They argued that there is no one best leadership style for QMS monitoring but that it depends on the culture, values, and context of the QMS development.

3 Methodology

From the above studies, there is a consensus that leadership is a critical element in quality management. Nevertheless, no pattern exists in the relationship between leadership styles and quality management. Some researchers have focused on transformational leadership, others on the impact of transactional leadership, and still others on the necessity of merging the two styles into a transformational-transactional mix. More recently, Barbosa et al. (2017) have stated that there is no one best leadership style; instead, it should be suitable to the quality management context. Thus, it is relevant to deepen the relationship between leadership styles and quality management, although in a more tailored manner to each situation, avoiding generalisation.

Thus, this research has the following main objectives:

1) To understand whether there is a leadership style that is a determinant in reaching higher levels of maturity. In this sense, three hypotheses were posited, as described in Table 2.

Table 2. Hypothesis: different leadership styles and maturity.

Hypothesis	Theoretical Foundations
H1: There is a difference in the mean of transformational leadership at different maturity levels. H2: There is a difference in the mean of transactional leadership at different levels of maturity. H3: There is a difference in the mean of laissez-faire leadership at different levels of maturity.	Barbosa et al. (2017); Chan et al. (2016); Quddus & Ahmed, (2017); Rahman et al. (2020); Rosenkrantz (2011); Soliman (2018)
Test: ANOVA comparison of means of leadership styles at different maturity levels	

2) To determine the relationship between the practices of each leadership style and the dimensions of QMS maturity (Table 3).

Table 3. Hypothesis: correlation leadership styles and maturity.

Hypothesis	Theoretical Foundations
H4: The leadership practices and the QMS maturity dimensions are correlated.	Barbosa et al. (2017)
Test: Test of significant correlation at a significance level of 0.05	

Through the analysis of these results, we aimed to define a programme composed of steps to help organisations empower leadership practices, taking into account the internal context of QMS development.

According to the model of Saunders et al. (2019), this work adopted a positivist research philosophy based on a deductive approach led by the theories of leadership and QMS maturity models. The research strategy comprised a survey of a non-probabilistic sample since the companies were selected based on an intentional criterion, namely the QMS-certified companies. Data collection is typified as a cross-sectional study, and data analysis was supported by descriptive and inductive statistical techniques, pursuing a quantitative methodology. The next sections explain in more detail the questionnaire structure as well as the data collection, validation, and reliability processes.

3.1 Measurement instrument

As mentioned, this study followed a quantitative approach based on exploratory research by developing a survey in three parts and disseminated by Google Forms:

Part 1 – This was composed of sociodemographic questions related to the companies and the quality management professionals.

Part 2 – For assessing the QMS maturity level, the instrument created by Nascimento et al. (2013) was directly adopted after proper authorisation. This instrument is organised into 25 questions, clustered according to six dimensions:

A - Leadership and communication: This dimension comprises nine questions intended to assess top management support in QMS monitoring as well as the organisation's ability to prepare employees for management positions. It also considers the regular review of the QMS objectives to meet customer needs and expectations and the employees' awareness of their importance in achieving the objectives;

B - Agility and integration with information technology (IT) support: This dimension includes three questions aiming to understand how the company uses IT to integrate the management systems of customers and suppliers. It also seeks to understand the degree of problem recurrence;

C - Process management This dimension has four questions aiming to assess how the company faces customer audits and the suppliers' role in developing and improving the company's processes. Also, it reflects the process improvement plan to strengthen environmental and occupational safety performance;

D - Valuing employees: Four questions analyse the process of retaining key employees in the critical processes. In addition, it scrutinises the reward programmes to reach performance targets;

E - Information availability: Two questions focus on the customer's role in the development of the company's processes as well as on the management of clear information to carry out the activities;

F - Cost management: In three questions, an evaluation of the cost-reduction initiatives for poor quality (defects and complaints) and the QMS's role in the reduction of operating costs is sought.

Each question is rated on a 5-point Likert scale, where 1 is “strongly disagree” and 5 is “strongly agree”. Thus, given all the questions, the maximum score is 125 points, and each maturity level is assigned the following score ranges, as in Table 4:

Table 4. Transition points on the maturity scale (Nascimento et al., 2016).

Maturity Levels	Transition Points
Level 1	25-74
Level 2	75-92
Level 3	93-103
Level 4	104-112
Level 5	113-125

Part 3 – The Multifactor Leadership Questionnaire®-5X Short Leader Form MLQ (leader's view) (Avolio & Bass, 1995) was used for the self-assessment quality management professionals' leadership style, after being licensed by Mind Garden, Inc. Its 45 questions were directly adopted, organised according to three dimensions that measure different leadership styles, and subdivided into subscales as shown in Table 5:

Table 5. Multifactor Leadership Questionnaire® dimensions (Avolio & Bass, 1995).

Leadership Styles	Dimensions
Transformational Leadership	Idealised Influence (Attributed)
	Idealised Influence (Behaviour)
	Motivational Inspiration
	Intellectual Stimulus
	Individualised Consideration
Transactional Leadership	Contingency Reward
	Exception Management (Active)
Leadership Laissez-faire	Exception Management (Passive)
	Laissez-faire

These questions are also structured on a 5-point Likert scale, with 0 meaning “never”, 1 “rarely”, 2 “sometimes”, 3 “often”, and 4 “always”.

3.2 Collecting data

As previously mentioned, we selected companies located in Portugal with certified QMS since the certification process ensures a minimum structured level in conformity with standards. Thus, we used a list of all certified organisations released by IPAC (Portuguese Institute for Accreditation). Some industrial associations were contacted to collaborate in the questionnaire's dissemination, and some additional contacts were made also via the social network LinkedIn.

For this, an e-mail was sent introducing the research project, requesting the answers from top management or middle management personnel, linked to the QMS implementation process. The data-gathering process took from November 2020 to May 2021. From a total of 64 responses received, one was excluded for duplication. Thus, 63 responses were accepted and validated as the sample for the study.

To analyse the data consistency, we calculated the reliability degree using the Cronbach's alpha coefficient (Table 6).

Table 6. Data reliability (*Cronbach's alpha*).

Scales	Cronbach's Alpha
Maturity Assessment	0.924
Transformational Leadership	0.879
Transactional Leadership	0.616
Laissez-faire Leadership	0.708

The Cronbach's alpha coefficient values were all above the minimum acceptable value for internal scale consistency ($\alpha \geq 0.60$), meaning that items are all consistent in providing the intended measurement for each scale (DeVellis, 2012). The validation of the selected assessment instruments, Multifactor Leadership Questionnaire® (Avolio & Bass, 1995) and QMS ´maturity levels (Nascimento et al., 2016), was assured by a literature search of other previously published works (Muenjohn & Armstrong, 2008; Nascimento et al., 2013).

4 Results

Data analysis was supported by IBM SPSS 26 and Microsoft Excel software, using descriptive statistics, parametric ANOVA tests, and correlation tests as presented in the following sections.

4.1 Sample description

The sample is broadly representative of Portuguese companies (81%), of which 40% were medium-sized, 46% are small and micro companies, and the remaining were large companies. About 44% were in the manufacturing industry. All companies have their QMSs certified by ISO 9001 or IATF 16949 and have some environmental and safety management certifications. Meanwhile, the years of certification were uneven; 23% had been certificated between 16 and 20 years, and 15% for over 20 years. The classes up to 5 years, 6 to 10 years, and 11 to 15 years accounted for 21%, respectively.

The professionals participating were mostly women (60%), aged between 23 and 62 years, with a more significant frequency in the class of 36 to 45 years (41%).

The respondents had been working in the company for more than 5 years (60%), with a greater incidence in the group between 16 and 20 years of experience, and 40% had been working for 5 years or fewer.

4.2 Diagnosis of the QMS maturity level

As previously mentioned, the QMS maturity levels survey (Nascimento et al., 2013) gathers 6 dimensions: A – leadership and communication, B – agility and integration of IT, C – process management, D – valuing employees, E – information availability, and F – cost management. The results presented in Table 7 notice some uniformity in the significance attributed to the different dimensions where leadership and communication (4.02) and

information availability (4.00) stand out. The leadership and communication dimension shows the relevance of top management support, as well as the discussion of the corporate targets and each stakeholder's role in meeting them. The emphasis on the information availability reveals the importance of spreading information about the needs and desires of customers and about the procedures for carrying out the activities. Valuing employees shows the lowest average value (3.37), with importance not being attributed to keeping people deemed key to the critical processes or to the reward for the results to achieve the goals.

Table 7. QMS maturity assessment.

Dimension (Scale 1 to 5)	Standard Deviation	Total Mean
Leadership and Communication	0.63	4.02
Agility and Integration IT	0.73	3.87
Process Management	0.69	3.81
Valuing Employees	0.89	3.37
Information Availability	0.71	4.00
Cost Management	0.73	3.90

Upon analysing the answers concerning maturity level, the percentage of companies at each level was counted (Table 8).

Table 8. Companies' maturity levels.

Maturity Level	Number of Companies (n)	%	% Accumulated
1	4	6	6
2	18	29	35
3	21	33	68
4	10	16	84
5	10	16	100

It can be observed that 35% of the sample were at levels 1 and 2, with the remaining having a QMS maturity level equal to or greater than 3. Level 3 comprises the most significant number of companies (33%), suggesting effective planning and meeting objectives. The second most prominent is level 2, accounting for 29% of companies. At this level, the processes are defined and documented, and QMS certification usually happens, but it is still considered a QMS basic. Levels 4 and 5 also stand for 16% of participants, with more efficient and innovative planning levels, and obtaining results above their competitors (Nascimento et al., 2016). However, in contrast to expectations, since the selection criterion was QMS certification, 6% of respondents were still at level 1. This result may indicate insufficient continuity and consistency in the certification procedures.

In Table 9, it is also evident that higher levels of maturity are reached more consistently and comprehensively because as the maturity level rises, the average of all dimensions also increases. This means that organisations at level 5 have higher values in all dimensions of maturity compared to organisations at the previous level, and so on.

Table 9. Dimensions' averages by maturity level.

Level	A	B	C	D	E	F
1	2.75	2.75	2.69	2.06	2.63	2.67
2	3.52	3.39	3.28	2.75	3.61	3.39
3	4.09	3.92	3.99	3.42	4.02	3.00
4	4.46	4.40	4.25	3.88	4.50	4.30
5	4.86	4.57	4.43	4.43	4.70	4.83

A = Leadership and communication; B = IT agility and integration; C = Process management; D = Valuing employees; E = Information availability; F = Cost management.

4.3 Leadership style self-assessment

In Table 10, transformational leadership is the most highlighted (3.02), in which the motivational inspiration dimensions stand out (3.16) and idealised influence (attributes) had the lowest value (2.80). Transactional leadership, which is formed by two dimensions, namely contingency reward, and management by exception (active), obtained a mean of 2.66. The laissez-faire leadership style had the lowest average (0.82).

Table 10. MLQ descriptive statistics.

Leadership Styles (Scale 0-4)	Dimensions	Mean	Standard Deviation	Total Mean
Transformational	Idealised Influence (Attributes)	2.80	0.66	3.02
	Idealised Influence (Behaviour)	3.01	0.58	
	Motivational Inspiration	3.16	0.56	
	Intellectual Stimulus	3.08	0.52	
	Individualised Consideration	3.06	0.57	
Transactional	Contingency Reward	2.77	0.57	2.66
	Management by Exception (Active)	2.55	0.67	
Laissez-faire	Management by Exception (Passive)	1.04	0.50	0.82
	Laissez-faire	0.60	0.50	

4.4 Predominant leadership styles at each maturity level

To understand whether a determinant leadership style for reaching a specific maturity level exists (hypotheses H1, H2, and H3), we conducted comparative studies as depicted in Tables 11 and 12.

The transformational leadership style average was higher at levels 4 and 5; however, we did not find this for the transactional leadership style average. Concerning the laissez-faire style, it can also be seen that the average was considerably higher at maturity level 1 when compared to maturity level 5.

To verify whether these differences were statistically significant, a parametric ANOVA test was applied, assuring all previous conditions. Thus, the following results were noted:

Table 11. Comparison of the leadership styles' means at different maturity levels.

Level	Number of companies (n)	Mean Transformational	Mean Transactional	Mean Laissez Faire
1	4	2.93	2.56	1.00
2	18	2.88	2.55	0.88
3	21	2.99	2.69	0.81
4	10	3.26	2.93	0.93
5	10	3.15	2.54	0.55

Table 12. ANOVA test.

Test	P-value
H1: Is there a difference in transformational leadership mean across different maturity levels?	0.262
H2: Is there a difference in transactional leadership mean across different maturity levels?	0.330
H3: Is there a difference in laissez-faire leadership mean across different maturity levels?	0.252

Thus, for this sample, we cannot generalise that specific leadership styles are more evident at different maturity levels. In the same way, it is not possible to conclude that at level 5 of maturity, QMS professionals mainly adopt the leadership practices of a specific leadership style.

To further refine this analysis and understand the relationship between the practices of each leadership style with the QMS maturity dimensions (H4), we carried out a correlational study between the dimensions of leadership styles and maturity levels, as shown in Table 13.

Table 13. Correlation between dimensions of leadership styles and maturity levels.

Maturity Dimensions	A	B	C	D	E	F
Transformational						
Idealised Influence (Attributes)	0.184	0.090	0.047	0.037	0.039	0.199
Idealised Influence (Behaviour)	0.073	-0.019	0.037	0.018	-0.026	0.118
Motivational Inspiration	0.242	0.035	0.234	0.064	0.030	0.102
Intellectual Stimulus	**0.315***	0.103	0.156	0.095	0.147	**0.249***
Individualised Consideration	**0.263***	0.186	0.123	0.059	0.064	0.115
Transactional						
Contingency Reward	0.154	-0.189	0.209	-0.02	-0.110	0.084
Management by Exception (Active)	0.042	0.014	0.110	0.028	0.110	**0.252***
Laissez-Faire						
Management by Exception (Passive)	-0.114	-0.018	-0.038	-0.082	-0.108	-0.170
Laissez-faire	-0.222	-0.058	**-0.254***	-0.217	-0.169	**-0.261***

A = Leadership and communication; B = IT agility and integration; C = Process management; D = Valuing employees; E = Information availability; F= Cost management. *Significant correlation for a 0.05 significance level.

Two of the five transformational leadership dimensions, namely intellectual stimulation and individualised consideration exhibited a significant positive correlation with one QMS maturity dimension: leadership and communication. A similar correlation

was found with the dimension management by active exception (transactional leadership) and cost management. The laissez-faire dimension had a significant negative correlation with two maturity dimensions, process management and cost management.

5 Discussion

The maturity diagnosis disclosed that 68% of the companies had developed their QMSs to equal to or greater than maturity level three. This information reflects that most of the participants recognised that their QMS's purpose exceeded the certification objective, perceiving it as an organisation's opportunity to improve its stakeholder interaction and cooperation, customer satisfaction, and the promotion of team spirit, by incorporating these factors into its competitive advantage. However, although these companies have shown an evolving process of their QMSs, only around 16% are at level 5. Thus, only a small percentage leverages the Q MS tools to adapt to changes and to develop a more innovative and flexible culture. As a result, it can be noted that a significant effort is still lacking among companies to strengthen their QMSs.

These findings reinforce the relevance of this work since it is essential to define clear guidelines for companies to reach a higher QMS maturity level.

As stated in the literature review, several factors are behind the maturity level transition, namely the behavioural factors, which include leadership. In accordance with the maturity model adopted (Nascimento, 2012), this evolving path considers the improvement of leadership and communication, agility and integration of IT, process management, valuing employees, information available, and also cost management. Thus, it can be noted that leadership is one of the QMS maturity dimensions with the most significant score attributed,representing a maximum of 36% of the survey scale. Thus, QMS maturity can be reinforced through leadership that promotes the following:

- top management support;
- training employees regarding leadership;
- the communication of goals and the importance of each one in reaching them;
- inclusion in the decision-making process;
- communicating and encouraging the adoption of good practices;
- engagement in the proposed solutions.

Therefore, the more suitable the leadership styles of quality managers in achieving these challenges, the more potential there is for consolidating the QMS maturity. So which practices of different leadership styles have a more significant impact on the QMS progression? And which QMS maturity dimensions would benefit the most?

The leadership style highlighted by the participants was transformational, expressed via their skills linked to motivational inspiration (ability to plan a future with optimism and motivation, enthusiasm about work plans, and confidence about meeting the goals). Within this style, their ability to stimulate employees intellectually by fostering new approaches to analysing and solving problems and allowing for different ways of performing tasks was also evident.

However, from the sample's results, it is impossible to conclude that there are any statistically significant differences in the leadership styles at different maturity levels. This result is consistent with the findings of previous authors (Laohavichien et al., 2011) that point to the importance of combining leadership styles in driving QMSs and the suitability of the leadership styles to the QMS context (Barbosa et al., 2017). On the

one side, there is transactional leadership through the reward exchange, while on the other, there is transformational leadership through the employees' involvement and motivation in the objectives set.

The findings shown in Table 13 have enabled us to pinpoint some significant correlations that may explain in more detail the multiplicity of leadership styles that, when combined, foster the QMS's development to a higher level of maturity. It was verified that the intellectual stimulation dimension of transformational leadership has a significant positive correlation with two QMS maturity dimensions, in particular leadership and communication and cost management. Thus, the adoption of leadership practices associated with the encouragement of different perspectives in seeking solutions to problems, as well as the willingness to stimulate new working methods in the tasks, will have a positive impact on these QMS maturity dimensions.

Therefore, such leadership practices can help to prepare managers to find faster solutions to customer needs and increase employees' awareness of their value in contributing to the company's goals. These leadership practices could also have an impact on the effective development of initiatives to reduce the costs of poor quality and on the improvement of project planning. This is an interesting relationship since the transformational leadership style had the highest mean values.

In terms of the transactional leadership style, the adoption of active exception management practices, usually focused on deviations, errors, failures, and complaints, had a significant positive effect on the cost management maturity dimension. However, this study revealed that the attitudes associated with the laissez-faire dimension, such as avoiding involvement in important issues by choosing to be away at decision moments, negatively impacts the QMS maturity, more concretely, in terms of cost management and effective process management.

As a synthesis, based on the identified correlations, we present a summary in Figure 1.

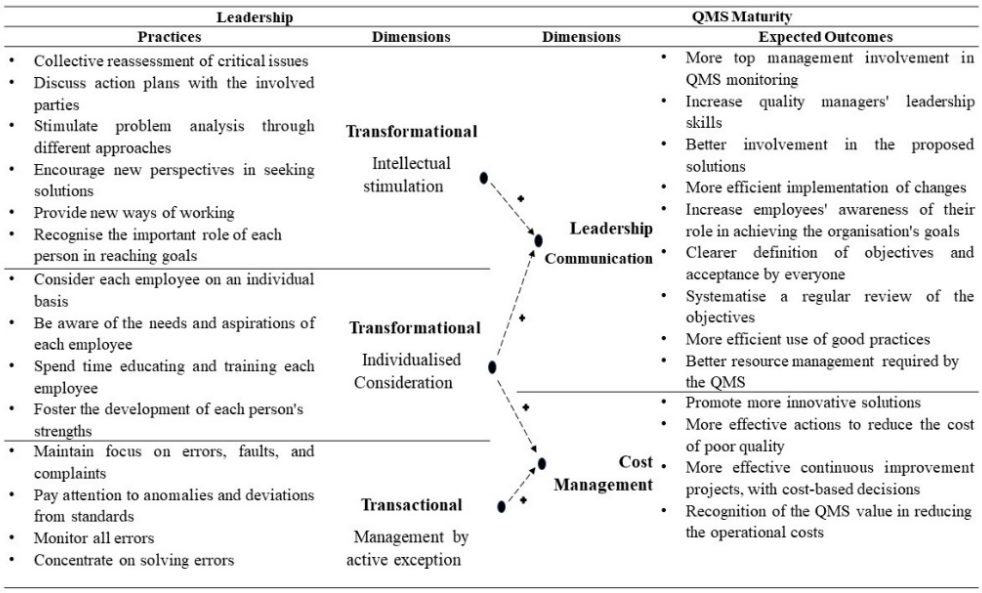

Figure 1. Guidance on leadership practices and their potential impact on the QMS maturity.

By analysing the results of this research, one can see that some practices related to different leadership styles, such as those listed below, have a significant impact in many relevant QMS areas:

- more support from top management in leading QMSs, which is manifested by assigning the necessary resources, and setting and reporting clear objectives;
- increasing employees' commitment by enhancing their awareness of the role of each one in meeting these objectives;
- greater involvement in the development of solutions;
- Continuous improvement through the development of innovative solutions to solve problems and reduce operating costs.

Via the main research results, a set of steps is suggested to guide an organisation to boost its quality professionals' leadership practices to improve its QMS maturity:

Step 1: Diagnose the leadership style of quality managers, focusing on intellectual stimulus, individualised consideration, and management by active exception, which are positively correlated with other QMS maturity dimensions. This assessment should encompass both the leader's perception as well as the perception of their collaborators;

Step 2: Evaluate QMS maturity to identify weaknesses, strengths, and less developed dimensions;

Step 3: Taking the previous steps into account and considering the relationships depicted in Figure 1, prioritise the leadership practices to be developed;

Step 4: Develop leadership competencies (training, learning by doing, team building, among others);

Step 5: Develop an action plan that measures the impact of leadership competencies on the QMS maturity improvement.

6 Conclusion

The current paradigm forces companies to rethink their management models to react to market changes with agility and flexibility. QMSs have been pointed out as management models that can help companies cope with these current challenges. Meanwhile, companies continually need to develop their QMSs to reach high maturity levels.

This paper has presented a QMS diagnosis, evidencing that although most have an interesting maturity level (68% with maturity levels above or equal to 3), only a small percentage has achieved level 5 (about 16%). This result underlines the organisations' need to develop efforts that will allow the progression of QMSs, leveraging the internal and external advantages of these management models progressively. Accordingly, this study proposes a range of leadership practices for organisations to understand how they can develop QMSs toward higher maturity levels.

Leadership is one of the QMS maturity dimensions with a relevant weight in comparison to other dimensions. For this reason, the more suitable the quality management professionals' leadership, the more potential for the QMS to evolve. But which leadership style has the most significant impact on QMS maturity? This research confirmed some previous findings (Alharbi & Yusoff, 2012; Barbosa et al., 2017; Hirtz et al., 2007) that no single leadership style has prevailed at the higher maturity levels but rather a combination of leadership practices across different leadership styles.

The theoretical implications of this study are the development of the interrelationship between quality management and leadership styles. A significant positive correlation was found between leadership practices and some QMS maturity dimensions. The results also proposed a leadership practices guide that impacts several QMS maturity dimensions, consequently promoting its progression. This research advocates that a leadership profile of quality management professionals must be adequate for the context. A mere leadership style focused on reward for results reached (transactional) is not enough since leadership practices that foster intellectual components and individual recognition (transformational) are likewise essential in facing the challenges associated with the current paradigm. Thus, a set of steps is recommended that promotes QMS maturity development through leadership practices, namely: 1 – Diagnose the leadership style; 2 – Assess the QMS maturity; 3 – Prioritise the leadership practices to be undertaken; 4 – Promote a leadership competencies development programme; 5 – Implement actions for improvement.

The detail proves the work's originality and the contributions it brings to the combined relationship between leadership styles and QMS maturity by identifying specific leadership dimensions and practices that have an impact on relevant QMS dimensions. The main limitations of this work are the sample size and that the leadership styles were only assessed from the leader's perspective. Thus, we plan to continue this investigation by expanding the sample size to other cultural realities, perspectives, and nationalities.

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