

21ST CENTURY QUALITY: LOOKING INTO THE "CRYSTAL BALL"

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Abstract

The discussion of possible scenarios for the future of Quality is on the priority list of major Quality Practitioners Societies. EOQ – European Organization for Quality (EOQ, 2014) main team for its 58th EOQ-Congress held June 2014 in Göteborg was "Managing Challenges in Quality Leadership" and ASQ - American Society for Quality (ASQ, 2015) appointed "the Future of Quality" for Quality Progress Magazine November 2015 issue. In addition, the ISO 9001:2008 revision process carried by ISO/TC 176 aims to assure that ISO 9001:2015 International Standard remains stable for the next 10 years (ISO, 2014) contributing to an increased discussion on the future of quality.

The purpose of this research is to review available Quality Management approaches and outline, adding an academic perspective, expected developments for Quality within the 21st Century. This paper follows a qualitative approach, although data from international organizations is used. A literature review has been undertaken on quality management past and potential future trends. Based on these findings a model is proposed for organization quality management development and propositions for the future of quality management are advanced.

Firstly, a state of the art of existing Quality Management approaches is presented, for example, like Total Quality Management (TQM) and Quality Gurus, ISO 9000 International Standards Series (with an outline of the expected changes for ISO 9001:2015), Six Sigma and Business Excellence Models.

Secondly, building on theoretical and managerial approaches, a two dimensional matrix – Quality Engineering (QE - technical aspects of quality) and Quality Management (QM: soft aspects of quality) - is presented, outlining five proposed characterizations of Quality maturity levels and giving insights for applications and future developments. Literature review highlights that QM and QE may be addressing similar quality issues but their approaches are different in terms of scope breadth and intensity and they ought to complement and reciprocally reinforce one another.

The challenges organizations face within the 21st century have stronger uncertainty, complexity, and differentiation. Two main propositions are advanced as relevant for 21st Century Quality:

- QM importance for the sustainable success of organizations will increase and they should be aware of the larger ecosystem to be managed for improvement, possibly leading to the emergence of a new Quality paradigm, The Civilizational Excellence paradigm.

- QE should get more attention from QM and the Quality professionals will have to:

- a) Master and apply in wider contexts and in additional depth the Quality Tools (basic, intermediate and advanced);*
- b) Have the soft skills needed for its success;*
- c) Be results oriented and better understand and demonstrate the relationships between approaches and results*

These propositions challenge both scholars and practitioners for a sustained and supported discussion on the future of Quality. "All things are ready, if our mind be so." (Shakespeare, Henry V, circa 1599).

Key words: *quality management, quality engineering, future of quality.*

Introduction

Knowing where you came from helps you recognize where you need to go and Quality history is quite considerable.

Juran (1995) mentions a history of quality management even going back to the Xia

Dynasty of the twenty-first century BC in ancient China. Quality Management Systems (QMS), however, are basically from the 20th Century.

But the challenges organizations have to face in the 21st have considerably increased uncertainty, complexity and differentiation between companies due to issues like globalization, financing and pricing pressures, global supply chains and increased logistics complexity, need for Innovation, ICT developments, compliance with increasing government and inter-government regulations and social responsibility demands.

According to Dahlgaard-Park (2008) there has been an evolution of Quality starting with inspection, moving to Statistical Process Control, Quality Assurance and finally the Business Excellence Models. This perspective sees Quality Management (QM) as a management philosophy that has evolved from a narrow and mechanic perspective known as Statistical Quality Control (SPC) to a broader and holistic one, known as Total Quality Management (TQM) and Business Excellence. More recently Kemenade (2010) has advanced with three quality paradigms: the control paradigm (focus on end product and conformity to requirements), the continuous improvement paradigm (satisfying the customer and PDCA-cycle) and the commitment paradigm (focus on people and Quality Management is seen as exceeding the customers' expectations).

Starting with a Literature review of the quality gurus and TQM, the ISO 9001 International Standards are addressed followed by the Six Sigma methodology and the Business Excellence Model approach.

The major conclusions of the ASQ Future of Quality Reports are also reviewed and the papers end by proposing:

- A two dimensional matrix - Quality Engineering (QE - technical aspects of quality) and Quality Management (QM: soft aspects of quality) - outlining five proposed characterizations of Quality Maturity level of organizations within a continuum development approach and giving insights for applications and future developments;

- Two main propositions as relevant for 21st Century Quality:

1) QM importance for the sustainable success of organizations will increase and they should be aware of the larger ecosystem to be managed for improvement;

2) QE should get more attention from QM and the Quality professionals will have to master Quality Tools, have relevant soft skills and be more result oriented.

Literature Review

Major contributions to the TQM movement come from the quality gurus like Juran (1979), Crosby (1979), Feigenbaum (1983), Deming (1986), Ishikawa (1986) and Taguchi (1986). Actually Feigenbaum (1983) was the first to use the term and also made the point of the need for top management involvement. To go even further back in time, we could say that the movement started in the US more as Quality Control (in the 1950's) went back to Japan and came back to the US strengthened as a management philosophy: Total Quality Management (TQM). The major contributions of these quality gurus are summarized below: From the US, Juran (1979) stressed the need for Top Management involvement and developed the Quality Trilogy (Planning, Control and Improvement), made familiar the use of the Pareto Technique and of the Quality Costs Measurement.

- Also from the US, Crosby (1979) was the author of the concepts of Quality is Free by doing it Right First Time and Quality as conformance to standards. He also raised the need for Cost of Quality measurement and Top Management involvement.
- Feigenbaum (1983), still from the US, was the author of the Total Quality Management concept stressed the need for a Total Company Wide Quality Control, with the involvement of all People and Top Management leadership.

- Last US author on this short list is Deming (1986) that proposed the 14 points for quality improvement. He also came up with the PDCA Cycle (Plan – Do – Check – Act - original from Shewhart, 1931). Shewart and Deming were pioneers on the concepts of identifiable and fortuity causes and the use of statistical methods for quality improvement. Deming focused on the need for Top Management involvement and constancy of purpose.
- Ishikawa (1986, Japan) emphasized the use of Quality Tools (e.g., the Cause and Effect Diagram) and of Quality Control at all levels of the organization. He also highlighted the notion of Internal Customer.
- Taguchi (1986) also from Japan introduced the Loss Function Concept, the Signal to Noise Ratio and the Orthogonal Design of Experiments methods, in addition to emphasizing the importance of robust designs.

The quality gurus had major initial success mainly with top management by mentioning the steps they should take for their organization's success. However, can we presently state that the academic world supports TQM as a scientific and valid approach or is TQM mainly supported by the gurus principles and practitioners?

According to Powell (1995) 'TQM is an integrated management philosophy and a set of practices that emphasizes, among other things, continuous improvement and meeting customers' requirements'. Powel additionally found support for the hypotheses that TQM could be a strategic resource that generates economic value and provides the firm with sustainable competitive advantage (Powell, 1995). Other authors have come into support of the proposition that there is a positive link between TQM and performance (Sousa and Voss, 2002 and 2008; Martinez and Jimenes, 2008; Martínez-Costa, Choi, Martínez, and Martínez-Lorente, 2009). Although a majority of academicians generally agree that there is no consensus on the definition of TQM, Dahlgaard-Park (2001) made a literature survey that noted common underlying, implicit agreements concerning the definition, scope and the core principles and concepts of TQM, as presented in Table 1:

Table 1. Core principles and concepts of TQM.

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1. Strong Management Commitment/Leadership/strategically based.
 2. Continuous Improvement.
 3. Focus on Customers/Customer-driven organization.
 4. Total Involvement/Total Commitment/Total Responsibilities.
 5. Actions based on Facts/Scientific Approach.
 6. Focus on Processes.
 7. Focus on employees/Teamwork/Motivation/Empowerment.
 8. Focus on Learning & Innovation/Training and Education.
 9. Building Partnership between Suppliers, Customers, and Society.
 10. Systematic Approach/ Building a TQM culture.
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More recently Dahlgaard-Park, (2011) stated that TQM since the start of this century, shows some signs of losing its attractiveness in the industrialized parts of the world and instead new terms like Business Excellence, Six Sigma and Lean appear to have overtaken the position of TQM even though the contents of these new terms are within the framework of TQM and can be traced back to the beginning of the TQM movement (e.g. the PDCA cycle).

As an overall conclusion concerning the quality gurus teachings, there is still no full consensus (both from the practitioners and the academic worlds, as it happens in another

key theories and management practices) that TQM is an effective driver of strategic choices and sustainable business results. If top managers believe in the quality gurus and are willing to commit time and resources to achieve real transformation, the probability of achieving positive results and sustainable improvements has considerably increased.

Another big pillar of today's Quality movement are the ISO 9000 series of International Standards, first published by ISO© (www.iso.org) back in 1987 as a key tool to allow for the growing internationalization of business and the need for common quality management system standards. ISO always highlighted that "output matters" but some see ISO 9001 and the certification of the Quality Management System most likely driven by external pressures than the real and effective business improvement model that can be realized (Levine and Toffel, 2010).

Although ISO 9001, Quality management systems – Requirements, International Standard cannot be considered as a TQM or a Business Excellence Model it does indeed incorporate many of the principles of those models and may be considered as a step towards that direction (Martinez-Costa, Choi, Martínez and Martínez-Lorente, 2009). There are common dimensions between ISO 9001 International Standards and TQM (e.g., process management), however, companies that implemented and certified their ISO 9001:2000 Management Systems would still fall far short of implementing a comprehensive TQM system (Martinez-Costa, Choi, Martínez and Martínez-Lorente, 2009). However, we should remark that after the 2000 revision, in 2008, a new version was issued and ISO 9001:2015 edition will close even further the gaps between ISO and TQM, making the expected ISO 9001 International Standard 2015 edition an effective step towards TQM by continual improvement and alignment of the all organization towards that goal (Fonseca, 2015a).

As per Figure 1, ISO 9001:2008 International Standard has achieved great international visibility with more than one million organizations with ISO 9001 certified Management Systems (MS) all over the world (ISO Survey 2013, accessible at www.iso.org).

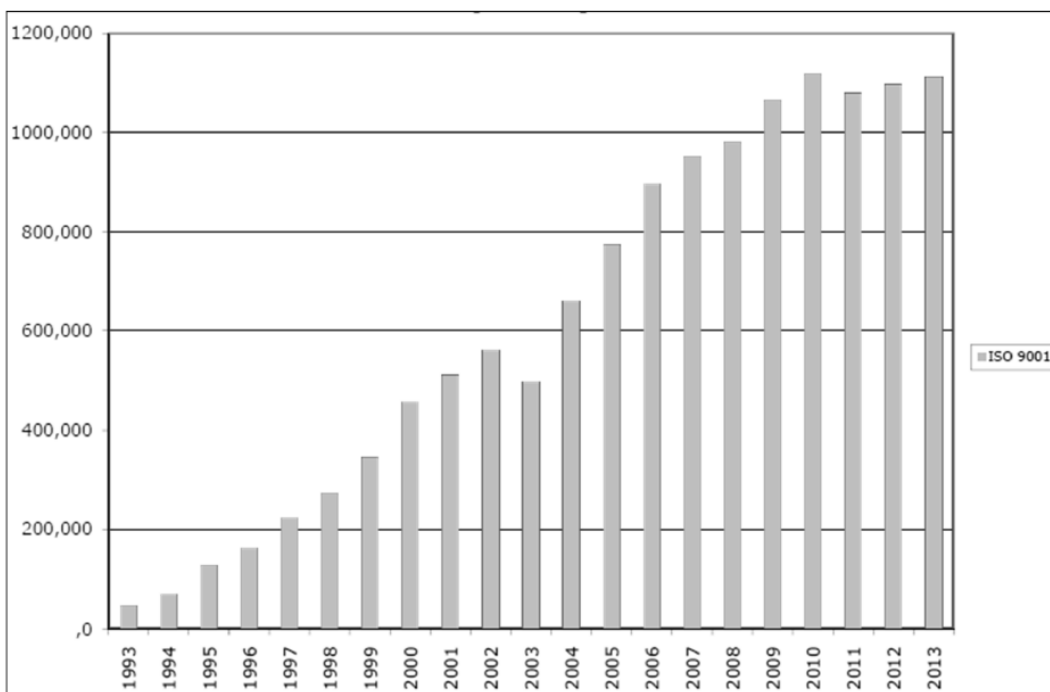


Figure 1: ISO 9001 certified organizations survey trends.

Scientific studies (Boiral, 2012), have linked the success with the implementation of ISO 9001 QMS to organization motivations (most significant results when the motivations are internal rather than external) and to the way the standard is interpreted and implemented. Also, the studies of Levine and Toffel (2010, Harvard Business School) concluded, by analyzing one thousand organizations of which five hundred with QMS implemented and certified and another five hundred without QMS implemented and certified, the first presented a set of indicators significantly more favorable than the others: 9% higher sales volume and consequent additional profits; more employment (10%) and better wages (7%) due to higher sales volumes and profitability and in combination with ISO 14001 less waste and incidents (these effects are more pronounced in small organizations). Also, authors like Heras, Dick and Casadesús (2002), Casadesús, Heras and Karapetrovic (2007), Casadesús, Marimón and Heras (2008), Sousa and Voss (2002 and 2008), Martinez and Jimenez (2008) and Tari et al (2012), consider that there is a positive relation between quality and performance. In addition, ISO 9001 International Standard can be integrated with other ISO International Standards like ISO 14001, Environmental management systems — Requirements with guidance for use (Karapetrovic, 2002).

According to Fonseca (2015b) the following aspects should be taken in consideration for ISO 9001 research:

- There are considerable methodological differences and control variables on studies concerning ISO 9001 certification impacts.
- There is a need for a better understanding of the conditions and how variations in QMS implementation may benefit organizational environmental and overall performance results.
- Certification to ISO 9001 should be a result of a well implemented QMS, not just "certification" and give additional confidence that the organization is able to comply with the applicable standard requirements and achieve the desired results.
- Studies should take into consideration the time factor to access if positive results are indeed sustainable and caused by superior approaches, so there is a lack of longitudinal studies of organization results involving repeated observations of the same variables over long periods of time.

ISO has a Directive (ISO/IEC Directives, Part 1, 2014) governing the publication of standards (to be reviewed every 5 years) and the ISO 9001:2008 revision process started by the ISO / Technical Committee - ISO/TC 176 aims to assure that the future ISO 9001:2015 International Standard reflects the changes of an increasingly complex, demanding and dynamic environment and remains stable for the next 10 years. The requirements should be clearly understandable and adequate to provide assurance that organizations by complying with them are able to provide conforming products and services that satisfy their customers (Hadfield & Fonseca, 2014). Table 2, summarizes (based on ISO 9001:2015 Final Draft International Standard version, available at <http://www.iso.org/iso/home.html>) the major expected changes:

Table 2. Major expected changes for the future ISO 9001:2015

In response to the proliferation of different MS Standards the core elements have been standardized by the "Annex SL" (or "High Level Text" as it is sometimes referred to) and it follows, the Plan Do Check Act (Clauses 6, 8, 9 and 10).

There will be more emphasis on process approach and less on documentation.

Products and Services terminology will be used.

Risk Based thinking was introduced giving additional credibility to ISO 9001 within Business and Top Management by adding some systematic evaluation of potential and actual issues with the aim of making processes more robust and capable.

Organizational context should be considered and Interested Parties concept was also introduced but with the precaution we are referring to relevant parties that must have some actual or potential impact on the quality of products and services.

Change Control and Strategic Direction will be reinforced on the future ISO 9001:2015 International Standard with the aim of further alignment and embedment of ISO 9001 and Business Management.

Another QM approach that was made very popular by Motorola and General Electrical is the Six Sigma Methodology. Six Sigma is a disciplined approach for dramatically reducing defects and producing measurable financial results (Anand, 2006; Linderman, Schroeder, Zaheer & Choo, 2006). There are other Six Sigma definitions some more oriented toward methodologies e.g. DMAIC-Define, Measure, Analyze, Improve and Control for effectiveness improvements (McAdam & Lafferty, 2004), Lean Six Sigma for effectiveness and efficiency improvements; DFSS- Design For Six Sigma using DMADV- Design, Measure, Analyze, Define and Verify for incremental improvements and IDOV- Identify, Design, Optimize and Validate for radical improvement (Yang & El-Haik, 2003; McCarty, Bremer, Daniels & Grupta, 2004; Werkema, 2005). Other definitions focus on metrics like process capabilities. Six Sigma definition as a Management Approach incorporates the other definitions and several authors emphasize that it should not be a simple statistical tool, but rather a strategic management approach by supporting key projects aligned with the business goals and the customer requirements and will be the framework used for this research.

However, for some authors (Werkema, 2002) Six Sigma brought really nothing new to the existing portfolio of quality tools and methodologies and it is not the tools and methodologies by themselves that assure the success, but rather their implementation process.

Several authors have also studied the relevant factors for Six Sigma Project success (Fonseca, Leite & Lima, 2014; Conceição & Major, 2011; Antony, Kumar & Labib, 2008; Antony & Banuelas, 2002; Chang, 2002; Banuelas Coronado & Antony, 2002; Kwak & Anbari, 2006; Henderson & Evans, 2000). They identified the following Six Sigma success factors, as presented in Table 3:

Table 3. Six Sigma success factors.

Six Sigma training.

Top management commitment.

Use of Six Sigma as a strategic tool aligned with the organization strategy.

Projects Return of Investment quantification.

Adequate soft skills of the teams and employees.

Each Six Sigma project should have a team with people with diverse knowledge and from different hierarchical levels.

As a final word of caution, Six Sigma should be more than a continuous improvement program and involvement of all the employees in the companies is very important.

Another possible path on the Quality journey is the use of Business Excellence Models, including the Deming Prize (JUSE established in 1951 in Japan), the Malcolm Baldrige (USA, 1987) and the EFQM © (Europe, 1988).

The EFQM model has been realized by a relatively small number of Top Managers and aims toward the Top Management with the key message that Business Excellence is the key for sustainable organizational success. The present version being used is the 2013 one and according to EFQM (www.efqm.org) more than 30,000 Organizations are using the EFQM Excellence Model.

EFQM model will be used to illustrate this pillar of the Quality movement. EFQM (www.efqm.org) defines Excellent Organizations "as the ones that achieve and sustain outstanding levels of performance that meet or exceed the expectations of all their stakeholders" The EFQM Model© (EFQM, 2013) is based on the following elements, presented in Table 4:

Table 4. EFQM model elements.

The Fundamental Concepts of Excellence that define the underlying principles that form the foundation for achieving sustainable excellence in any organization.

The Model Criteria, based on Enablers and Results, that define the underlying principles that form the foundation for achieving sustainable excellence in any organization.

The Radar that is a tool for driving systematic improvement in all areas of the organization.

The EFQM Model aims to assess organizational performance by identifying the strengths and improvement areas, integrating existing tools, procedures and processes, introducing a new way of thinking on the organization and identifying the key actions that can drive results. Although ISO 9001 International Standard cannot be considered as a TQM or a Business Excellence Model it does indeed incorporate many of the principles of these models and can be considered as a step towards that direction (Martinez- Costa et al, 2009). Heras et al (2013) concluded that ISO 9001 enables getting a better score on the EFQM model and Fonseca (2015c) found a moderate positive correlation between the number of years of ISO 9001 certification and the results of the organization EFQM model scoring. This supports the assumption that ISO 9001 International Standard is consistent with EFQM Business Excellence Model and can be considered as a step towards that direction.

ASQ future studies of quality

ASQ (American Society for Quality, www.asq.org) conducted its first Future of Quality Study in 1996 and has repeated the study every three years. The last study performed, was

the ASQ, 2011 Future of Quality Study (available at: <http://asq.org/knowledge-center/future-of-quality/index.html>) and more than 140 individual experts participated, representing 33 countries. They started by identifying the forces shaping the future of quality and eight key forces, presented in Table 5, were identified on the ASQ, 2011 Future of Quality Study (pp. 32):

Table 5. Key Forces shaping the future of Quality (ASQ, 2011 Future of Quality).

1996 Study	2006 Study	2011 Study
Changing Values		Global responsibility
Globalization	Globalization	Consumer awareness
Information Revolution	Innovation, Creativity, Change	Globalization
Velocity of Change	Outsourcing	Increasing rate of change
Increased Customer Focus	Consumer Sophistication	Workforce of the future
Leadership	Value Creation	Aging Population
Quality in New Areas	Changes in Quality	21 st Quality
Change in Quality Practices		Innovation

It is also interesting to remark that according to the ASQ 2011 Future of Quality study, "statistically 50 percent of the panelists say it is impossible to define quality, while the other 50 percent say that without a definition it's unclear what we're talking about" (pp. 38).

Another relevant ASQ study is The ASQ Global State of Quality Research (available at <http://asq.org/global-state-of-quality/reports.aspx>) is an initiative that identifies quality successes and opportunities from around the world. This worldwide research was made through a survey with more than two thousand responses from organizations in more than twenty-two countries. Major conclusions are highlighted in Table 6:

Table 6. ASQ global of quality research (Discoveries 2013).

Issue	Discovery
What is the best governance and management structure for quality to maximize the impact on outcomes?	<i>Organizations that have executive leadership directly govern or manage the quality process are 30 percent more likely to view quality as a continuous improvement activity or method to manage organization-wide performance as compared to the average.</i>
What measures of quality should an organization use to drive value?	<i>Manufacturing-based, compared to service-focused, organizations, are nearly twice as likely to use quality measures to drive higher performance by promoting challenging goals, as part of variable performance compensation, and to support predictive analytics.</i>
How should quality be supported by an organization?	<i>Organizations that govern quality with a centralized group are roughly 30 percent more likely to provide quality training to staff than organizations where a senior executive governs the quality process.</i>
How can we affect the culture of quality to make it change the way we work?	<i>Only 68 percent of all organizations share information on product or service quality with customers. The connection between quality and the customer is a key element to the definition, activities, and ultimately the culture of an organization.</i>

These two major worldwide studies, allow us to infer that the following propositions related to 21st Century Quality are likely to occur:

- Although QM has been around for quite a long time and has proven to be one of the most successful business practices so far, there are still issues to be solved concerning quality initiative implementation (e.g. top management involvement, training).
- There is a significative rebound towards global quality and a look into Quality as a macro construct that incorporates other constructs (e.g., sustainability, innovation).
- A considerable number of new technological applications with high impact on Quality can be expected (e.g., more automated monitoring and feedback), but the future of quality is dependent on the development and successful application of unique and specific quality management models.

Results of the Research: Proposal for a Quality Management versus Quality Engineering Maturity level Matrix

Following the previous state of the art review the following propositions are made:

Firstly, there are several definitions and approaches for Quality Management (QM) but all share some common features, namely customer satisfaction and continuous improvement. There is evidence both from academics (QM has reached across many different disciplines, like operations management, marketing, organizational behavior, and strategy) and practitioners (see ASQ reports above) that the Quality construct is enlarging encompassing constructs like performance management, sustainability and innovation. There was a movement from an Operational Excellence paradigm to an Organizational Excellence paradigm and the author's proposition is that there will likely be another one during the 21st Century to a Civilizational Excellence paradigm. Under this paradigm key new additional issues ought to be:

- the relevance of stakeholder management and engagement;
- the sustainability/corporate social responsibility (in the sense of an umbrella construct based on the economic, environmental and social perspectives);
- agility, adaptability, and innovation;
- proven relationships between sustainable positive results and approaches and the capability of organizations to be active actors that can positively influence governments and society.

Secondly, QM research can be advanced by updating and expanding the QM maturity grid, by studying the common characteristics, not in organizations focused on short term financial gains but in the few ones that have been successful in continually improving for decades and by linking the QM approaches with the achieved results. There seems to be still some unknown paths on how the use of quality tools can affect operational performance and business performance.

Thirdly, while new technological is expected to play a significant role for QM improvement, the Human Factor and the dependence on QM models will continue to be relevant.

Fourthly, there are a significative number of both authors and managers that do consider that there is some kind of positive relation between quality and performance.

As a possible answer to QM maturity, implementation and the results of main issues, a two dimensional matrix - Quality Engineering (QE - technical aspects of quality) and Quality Management (QM: soft aspects of quality) - is presented (see Figure 2), outlining five proposed characterizations of Quality Maturity level of organizations within continuum desirable step by step development paths and giving insights for applications and future developments, both at theoretical and practitioners level. QM and QE may be addressing similar quality issues, but their approach is not the same in terms of depth and breadth and they should complement and mutually reinforce each other (Hassan, Baksh & Shaharoun, 2000).

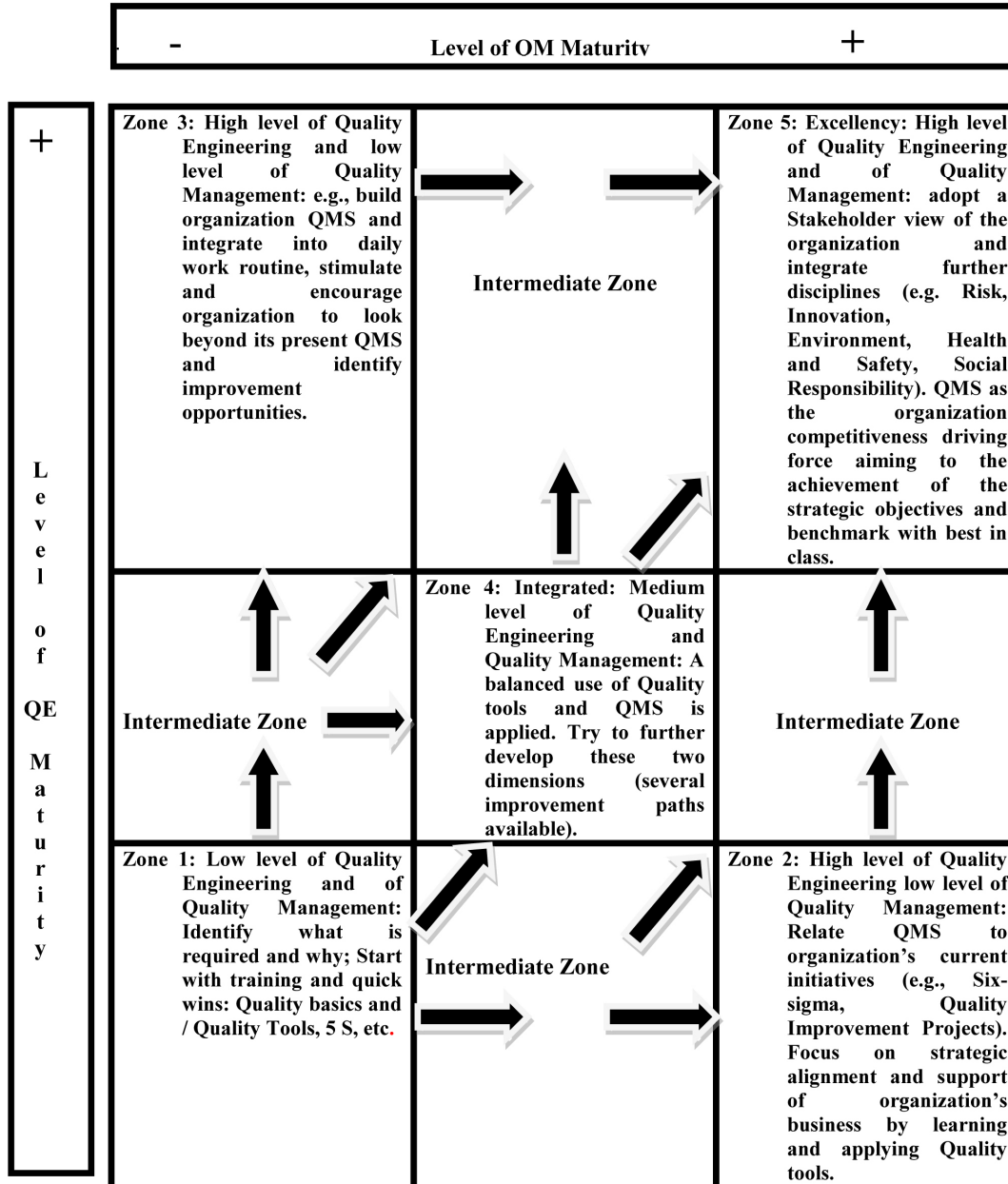


Figure 2: Quality Matrix Development Model (arrows: desirable continuum development step by step paths).

Discussion

Based on State of the Art review, in addition to the two dimensional matrix - Quality Engineering and Quality Management model for organizational development presented before (see figure two), two main propositions are also advanced as seen for 21st Century Quality and summarized and supported on Table 7:

- Proposition one: Quality Management importance for the sustainable success of organizations is increased (product quality is rather more quickly changed) and organizations should be aware of the larger ecosystem that ought to be managed for improvement: ASQ Key forces Global responsibility, Consumer awareness, Globalization, Increasing rate of change, Workforce of the future, 21st Quality and Innovation. A new Quality paradigm should emerge during the 21st Century, the Very Big Q, the Civilizational Excellence paradigm.

- Proposition two: Quality Engineering should get additional attention from Quality Management and therefore the Quality professionals will have to:

- a) master and apply in wider contexts and in additional depth the quality tools (basic, intermediate and advanced);
- b) have the soft skills needed for its successful use;
- c) be result oriented and better understand and demonstrate the relationships between approaches and results.

Quality professionals must get out of their "comfort zone" and embrace new patterns of thought and behavior, bringing their creative and analytical skills to deliver real, measurable value while being responsive to the needs of businesses, customers, and society overall.

Table 7. Additional research propositions.

Proposition	Authors evidence	Practitioners evidence
QM importance for the sustainable success of organizations is increased (product quality can be much more quickly changed) and organizations must be aware of the larger ecosystem that should be managed for improvement. We will likely move during 21 st Century to a new Quality paradigm, the Very Big Q, Civilizational Excellence paradigm. QMS should be sensitive to organizational culture, responsive to increased speed of doing business and focused on real-time, improvement and a better overall Society.	See above state of the art review and reference of authors who considered that there is some kind of positive relation between quality and performance (Karapetrovic, Casadesus & Heras, 2008; Levine & Toffel, 2010; Boiral, 2012; Tari, Molina-Azorin & Heras, 2012). In addition, Stakeholder Theory (Freeman, 1984) emphasizes the importance of a firm's relationships with critical stakeholders that may lead to better performance, as organizations while integrating business and societal considerations create value for their stakeholders. These should be the triggers for a Very Big Q Paradigm to emerge for Quality in the 21st Century: Civilizational Excellence (Fonseca, 2012).	ASQ Key forces: Global responsibility, Consumer awareness, Globalization, Increasing rate of change, Workforce of the future, 21 st Quality and Innovation.
QE ought to get additional attention from Quality management and therefore the Quality professionals will have to: a) master and apply in wider contexts and in additional depth the quality tools (basic, intermediate and advanced); b) have the soft skills needed for its successful use; c) be results oriented and better understand and demonstrate the relationships between approaches and results. New patterns of thought and behavior, will be needed from Quality professionals to deliver real, measurable value while being responsive to the needs of businesses, customers, and society overall.	See Insights on the Future of Quality Management Research (Evans and Members of the QMJ/Editorial Board, 2013).	Quality started by dealing with problems of production and the tactical tools that lead to control and improvement. But since Juran pointed out to Big Q, quality has been viewed through a management lens: strategic and system-wide, or as we tend to say QM. However, the forces that are shaping today's future (see ASQ reports) ought to bring us to an even higher quality level paradigm where in addition to quality control and QM, we will have to address global issues like sustainability, responsibility and innovation and risk management.

Conclusions

This research reviewed several available paths for the Quality journey and outlined expected developments for Quality in the 21st Century, using a qualitative approach and data from international organizations. A literature review has been undertaken on quality management past and possible future trends, based both on academic and scientific studies and on practitioners and ASQ feedback studies. Supported by the literature review findings the subsequent proposals are made:

- of a Quality model for organizational development supported on Quality Management and Quality Engineering maturity levels.
- propositions for the future of quality management are advanced:
 1. Quality management importance for the sustainable success of organizations is increased and we will likely move during 21st Century to a new Quality paradigm, the Very Big Q, Civilizational Excellence paradigm;
 2. Quality engineering should get more attention from Quality management.

This paper aims to bridge the academic and practitioners areas, united for an improved, enlarged and even more relevant 21st Century Quality, by contributing to frame and support the ongoing discussions on the future of quality. However, several limitations should be acknowledged. There are other models and authors that were not addressed and this paper is partially supported on the author's personal viewpoints. This Further research could naturally be challenged both by academics future research and by practitioner's results. Further research work to operationalize the Very Big Q, Civilizational Excellence paradigm construct is also desirable. But in the very end, mankind is subject to some limitations (both in methodological issues and in achieved results) in prognostication the long run.

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