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2nd International Conference on Quality Engineering and Management

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FOREWORD

Welcome to the 2nd International Conference on Quality Engineering and Management!

After the successful organization of the **1st International Conference on Quality Engineering and Management** in 2014, it is our pleasure to welcome you to the conference **2nd edition** at the University of Minho, again in the historic city of Guimarães, Portugal.

This event combines two areas that are not usually brought together: Quality Engineering and Quality Management. We hope that the results of our effort will translate into a successful venture, making gradually of this conference an important scientific event in the field of Quality.

As was our aim, since the beginning, the conference covers different topics related to Quality Management and Quality Engineering, including Standards, Continuous Improvement, Supply Chain Quality Management, Management Systems, Six Sigma, Quality Tools, Quality Management in Higher Education, Quality Management in Services and Total Quality Management.

In this 2nd edition the balance between Quality Management papers and Quality Engineering ones is more clear, thus accomplishing one of the fundamental goals of this conference. Approximately 120 papers have been submitted and almost 85 were accepted for presentation, after review from the Conference Scientific Committee. Additionally, some of these papers were selected by the Scientific Committee to be considered for a special issue that will be published by the International Journal of Quality and Reliability Management (SCOPUS indexed journal). Papers accepted correspond to authors from all around the world, with more than 20 countries represented at this level. Therefore, a warm acknowledgment to all speakers and authors is well deserved – Thank You! The success of this second edition derives from their efforts and participation!

We would like to thank all of our four keynote speakers, who will be with us during the two days of the event: **Eric Rebentisch, Jiju Antony, Lars Sorqvist** and **Marco Reis**. We have here the chance to listen to their contributions and new research development insights, coming from some of the most influent current Quality Academicians.

Many thanks also to all the excellent work carried out by the Scientific Committee during the papers selection process.

We must acknowledge as well the institutional support received from the School of Engineering of the University of Minho, University of Coimbra, University of Girona, International University of Catalunya, Portuguese Association for Quality, Algoritmi Research Centre, Luso-American Foundation, American Society for Quality, Portuguese Institute for Quality, Brazilian Association of Production Engineering, Brazilian Society of Quality and Excellence in Management, Quality for Excellence Consultancy, BQualidade, Target and Cempalavras.

Again, let's take advantage of this great opportunity and make with your contributions an event with Quality, shared and built by such a top level group of participants!

Enjoy your conference! Thank you all!

University of Minho, July 14, 2016.

Paulo Sampaio (Conference Chair)



Conference Co-founders

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A Metamodel of Excellence Models

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Abstract

Currently, several Excellence Models (EM) exists, like the EFQM Excellence Model, the Baldrige Excellence Framework, or the Deming Prize on top of other excellence prizes more tailored for particular countries (e.g Singapore, Canada).

With this paper, we will create a metamodel that will incorporate the concepts (via a common ontology) and practices that the top three EMs have.

With our work, we expect to deliver the following:

- a common understanding of the embodied concepts in the EMs. Despite the different origin cultures of the EMs, the understanding of the concepts by different individuals, or the language used to describe the EMs, the concepts can be compared and levelled if needed;

- more accurate comparisons of EMs. Because the comparisons of the distinct EMs can be made in an higher semantic level, the metamodel level, the comparisons are expected to be more accurate than comparisons at the EM level;

- a proposal for a set of rules and constraints to be applied when modeling with the excellence metamodel;

- a proposal for a new EM, embodying a selection of the more valuable concepts and practices available in the metamodel. Such EM can be applied to multicultural and international organizations;

Design of Experiments: Literature and case studies review

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Abstract

Statistical experimental design methods, under the Design of Experiments (DOE) umbrella, have been applied to quality control problems in many engineering fields by several competitive industries, including chemical, pharmaceutical, automotive, electronics, environment & energy, industrial assembly and maintenance, among others. These methods are often employed to optimize the operational performance of a process or the functioning of a product. Welding processes play a very important role in modern manufacturing. There are many welding techniques to melt and fuse steel, metals and alloys. This paper describes a case study where DOE methods were employed to study the statistical influence of different controllable parameters of a copper resistance welding machine on the quality of the product, in order to determine which levels of the significant factors optimize the process outcome. This paper starts by an updated literature review on the DOE subject, being followed by a step-by-step description of the case study, and by the discussion of the results that were achieved.

Keywords: Copper resistance welding; Design of Experiments (DOE), quality control.

From Physics to Management: New approach to evaluate the effectiveness of leadership on Quality Culture

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Abstract

“Leadership is a process of influence” (Yuki, 2010). Leadership is considered as one of the main principles to implement, maintain & improve a quality system in any organizations. However, it is one of the main challenges too.

Evaluating the effectiveness of leadership on a quality culture is not an easy task, the commitment of leadership towards quality requirements is usually monitored by several formalities such as issuing the quality policies, objective & targets & other strategic requirements.

However in reality that's not enough, leaders must provide the necessary supports & recourses, they must reduce the fear to change & have the inspiration to improve & influence people towards continual improvements.

According to Denison (1996), culture is “the deep structure of organizations, which is rooted in the values, beliefs and assumptions held by organizational members.”

The quality management system aims to satisfy customers, thus improving or changing the culture of an organization is essential, where norms, values, beliefs and behaviors of people need to be aligned to serve the quality mission of satisfying customer's needs and expectations.

In this paper, the writer constructed a new formula to measure the momentum of leaders on quality culture, where the formula is a multiple function of two other functions, the improvements function & the fear to change function, 2

The concept is inspired by physics & the definition of the momentum, were momentum in physics can be defined as "mass in motion", the momentum of leadership $f(mol)$ on quality culture is defined as the amount of momentum created by the leaders to drive/influence people towards quality & build quality culture in a specified area of focus.

By using the formula constructed, we can evaluate the momentum of leaders in each field & monitor their effectiveness on the quality culture.

The new approach concluded by this paper can help the decision makers of an organization to evaluate their leaders & how they are acting positively or negatively on the quality culture of an organization. Pinpointing the strengths, weakness & opportunities to sustain quality culture stimulated by the momentum of motivated & inspired leaders.

Keywords: Quality culture; Momentum of leadership; Fear to change; Sustainable quality; Quality principles.

References:

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Implementation of ISO Standards to the Hotel Industry; “Challenges & Rewards”

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Abstract

Documentation is a major part of daily hotel operations and that fits rather well with ISO Standards requirements and applications. In this presentation, Implementation of ISO management standards, notably ISO 9001, to the hotel industry is projected. Integration of the QMS requirements with the various hotels activities are discussed and the value and importance of implementing certain standard elements, i.e., internal communication, are stressed. Also, differences between ISO audits, franchise audits and night audits - the last two being customary of hotel operations - are explained. Further, challenges facing the industry in implementing and maintaining quality management systems are noted and the rewards achieved in implementing them are listed.

Integrated management: Findings from the private and the public sectors

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Abstract

The integration of management systems (MSs) is being developed by an increasing number of companies in order to improve and optimize their organizational issues. A large stream of the available literature concerning this topic relies on quantitative methodologies, such as surveys, to identify and describe some of the issues that impact on the phenomenon. However, a deeper understanding of it asks for qualitative methodologies such as case studies in order to perceive the underlying relationships between these issues. This paper intends to report the preliminary findings of two case studies conducted in two different companies. Company A is devoted to the waste management of several municipalities that comprise the greater Porto area (Northern Portugal) and Company B produces electrical goods mainly for the automotive industry. Several research techniques (interviews, documental analysis and direct observation) were adopted to assure a proper data collection. The results reported were carefully scrutinized based on the convergence of the information collected from different sources. The two companies adopted different strategies to proceed with the integration of their MSs into a single integrated management system (IMS). Company A favoured the successive implementation of the quality MS (QMS- ISO 9001), the environmental MS (EMS- ISO 14001) and the occupational health and safety MS (OHSMS- OHSAS 18001). The ISO/TS 16949 was the primordial subsystem from where the organizational structure of Company B evolved to an IMS encompassing additionally the environmental MS (ISO 14001) and the occupational health and safety MS (OHSAS 18001). In this latter case, the audit function acted as an integrator concept due to the need to optimize their number and frequency to avoid excessive disruptions to the normal production process. In addition to the discussion of the aspects that seem to contribute to a successful implementation of the IMS in both companies, this paper seeks to present a thorough analysis of the audits reports and management reviews outputs.

Keywords: integrated management system, case study, Portuguese companies

ISO 9001 Financial Impact and ISO 9001 Withdrawal

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Abstract

After a first paper on the financial impact of ISO 9001 Withdrawal, presented at ICQEM 2014, the authors return to the topic with the aim of understanding the reasons why ISO 9000 withdrawal has grown so much in recent years.

The topic of ISO 9001 certification withdrawal, remains unexplored. This gap in the literature might be surprising given that it has already been considered as an interesting research topic (McGuire and Dilts, 2008), and because certification withdrawal is a phenomenon of increasing importance. In fact, in the period 2006–2011, the average annual growth rate in the number of decertified firms was 25%, and the average number of new decertified companies was 60 thousand per year (ISO, 2014). Hence, this paper continues filling in an important gap in the literature as it investigates the impact of ISO 9001 certification and withdrawal on firms' financial performance.

Manufacturing practices for high quality performance in the Portuguese food industry: A fuzzy-set approach

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Abstract

Literature identifies quality as one of the most important criteria that help food companies win the customer loyalty and proposed several ways for quality improvement (*e.g.*, TQM, TPM, JIT). The emphasis on quality is mainly due to customer requirements, changes in legislation resulting from food crises and the increasing competition in the market.

This study's objectives were identifying manufacturing practices implemented by Portuguese food companies and configurations of manufacturing practices – Total Quality Management (TQM), Total Productive Management (TPM), Just-In-Time (JIT) and Human Resource Management (HRM) – for high quality performance in the same companies.

Data was obtained through an online survey sent to 925 Portuguese manufacturing food companies with more than 10 employees listed in a database provided by Informa D&B. The level of analysis was the plant and the target respondents were plant managers. Data collection occurred in 2014. A total of 312 companies returned the questionnaire yielding a response rate of 33.7%. Among these, 178 questionnaires were excluded because of incomplete responses. As a result, this study analyzes 134 observations.

The scales used to measure manufacturing practices (TQM, TPM, JIT and HRM), and quality performance were adapted from the literature. This study applies the fsQCA technique to analyze data by using the fsQCA-2.5 software (www.fsqca.com).

FsQCA provides an adequate method to identify paths to the desired outcome, by systematic comparing cases sharing the same outcome of interest (high quality performance) and revealing common configurations of practices that occur across these cases.

The results indicate HRM and TQM as the most implemented practices and the presence of four sufficient configurations (equifinality) with two or more practices (conjunctural causation) to achieve high quality performance. These configurations are: high conjoint implementation of 1) TQM and HRM; 2) TPM and HRM; 3) JIT and HRM and 4) TQM, TPM and JIT. High implementation of TQM or TPM or JIT is nuclear for high quality performance which indicates a strong causal relationship with it. None of the practices alone is a necessary condition to achieve the outcome.

To the best of our knowledge this is the first study employing fsQCA to analyze the impact of manufacturing practices on quality performance.

Results are useful for plant managers since they show the practices they need implement to achieve high quality performance.

Quality management approaches and quality performance: some statistical insights

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Abstract

This study aims to explore the relationship between quality management approaches (quality management practices and principles) and quality performance influenced by the organization culture of quality. First, the most common and used quality management principles and practices as well as the performance measures indicators have been identified and classified into categories. Then, a conceptual model that relates those approaches to the companies' quality performance was developed. An international survey was carried out between March and July of 2015 and we were able to collect 272 valid questionnaires. The survey results recognize the influence of the culture of quality in the use of quality management approaches by the organizations.

The model proposed was validated based on the structural equation modeling technique (SEM). The results showed a positive causal relationship between quality management practices and quality performance, providing guidelines to achieve a sustainable competitive advantage.

Keywords: Culture of Quality, Quality management Approaches, Quality Performance and Structural Equational Modelling.

Quality Management in healthcare – a case study of the preanalytical stage of the laboratorial process in Clinical Pathology

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Clinical Pathology has an important role on diagnosis and prognosis of several pathologies. Studies have shown that 60-70% of the clinical decisions are based on the results of the in vitro diagnostics tests. The preanalytical stage is one of the stages of the laboratorial process. This stage, where usually 70% of the total errors occur, includes all the procedures made outside of the lab such as medical prescription, patient identification, blood drawing and storage, packaging and transportation of the blood samples to the lab.

In this study, we analyze the preanalytical stage in one of the largest public hospitals in Portugal. All the steps, from the moment of the patient entrance in the service to the moment the sample is sent to the laboratory, were thoroughly analyzed, and the existing non-conformities were identified and measured. The best practices were identified and the procedures were standardized and formally recorded, paving the way for a future certification process.

This study illustrates a successful and costless quality improvement process that can be replicated in other laboratories and healthcare services, public or private. Given that the literature shows only a few studies about quality management in the preanalytical areas, this study can be seen as a contribution to both practitioners and the literature.

Keywords: Healthcare, Clinical Pathology, Preanalytical stage, Quality management, Process standardization

Quality management in the software industry in the European Union: an exploratory study

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Abstract

In the current economic context, for a company to be competitive and even to survive the use of methodologies that contribute to enhance the levels of efficiency and effectiveness of internal processes is of the essence. In organizations, in the areas of information technology (IT) and, in particular, of software development, quality management is still viewed as something mysterious. Nonetheless, the search for quality in software manufacturing organizations has motivated the development of quality models.

In this exploratory study, the primary goal was to identify the main Quality management practices of the software industry (namely, computer programming and computer consultancy companies) in the European Union.

The key variables captured were: quality management systems, quality initiatives, performance measures, quality management tools, certification and maturity of certification. The data were collected through an online survey sent to software companies (software developers and/or software consultants) from the twenty-eight countries of the European Union.

Our results indicate that, independently of the growing number of regulations, the quality management systems standard most widely adopted in Europe is the ISO 9001. In addition, we found that the main motivations for certification are internal, and that the new quality management tools are gaining popularity in this industry. We also present evidence regarding the main differences between certified and non-certified companies and the characteristics of this industry.

Although there is a wealth of studies on quality management, the same is not the case regarding quality management in companies operating in the software industry. With this study we contribute to address this gap in the literature.

Keywords: Quality Management Systems (QMS), Certification, ISO 9001, CMMI, ITIL, ITMark, eSCM-SP, Benefits of certification, Quality tools.

Quality Requirements in Heat Treatment Furnances in compliance with ASTM A991

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Abstract

It is intended to present the quality requirements on the heat treatment of castings and the importance of temperature uniformity surveys in heat treatment furnaces, in compliance with ASTM A 991 / A 991M. This test method covers the procedures used to conduct temperature uniformity surveys that allow the determination of the temperature variation within the heat treatment chamber and validate if such variation is within the permissible temperature. It is intended to determine the working zone of the furnace that meets the temperature requirements assuring the information regarding the dichotomy part / furnace temperature.

Risk-oriented Supply Chain Quality Management

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Abstract

This paper is part of a research study in the context of a dissertation project. The main objectives of the project examined the quality assurance management for global supply chains. With an empirical study made by a survey carried out in 2015 had been analyzed quality methods and aspects during the special phase of start and ramp up of serial production. It will be presented evaluations and results of the survey. More than two hundred international participations answered in detail questions concerning their practices in supply quality management. The results of the survey and the experience of a parallel guided long-term pilot formed the base for a recommended new process model of a preventive and risk-oriented supply chain quality management.

Keywords: Supply chain quality management, quality risk management, maturity level, SOP

Six Sigma within an ISO 9001 Quality Management System: A Case Study

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Abstract

Globalization, lacking of economic growth in most of the regions worldwide, shorter life cycle periods of the products are among a set of factors that pose real challenges to companies and enterprises in order to remain competitive. With the aim of ensuring the success and sustainability of their businesses, many organizations have been investing in the adoption of management systems models, including those based on the ISO 9001 standard, to continuously improvement the effectiveness of their business processes and in being able to better satisfy the requirements of their customers and of other relevant stakeholders. Moreover, they are also promoting the implementation of continuous improvement programs, such as Lean, Six Sigma, among others. The successful development of continuous improvement efforts largely depends on how a company is able to articulate such programs with its overall management system, including the quality system. This paper describes a case study where synergies among Six Sigma and an existing quality management system were explored and applied in a multinational organization with activity in Portugal. The case study is described after a careful literature review on the existing models to integrate Six Sigma with quality management systems. The results derived from the case study and the proposals for future work are discussed before the conclusions of the paper.

Keywords: ISO 9001, Quality Management System, Six Sigma

Supply Chain Quality Management Integration

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Abstract

Purpose

This research aims to develop a conceptual framework to explain and to explore the relationships among the different dimensions of supply chain quality management (SCQM) and their impact on organizational performance, based on the four perspectives of the balanced scorecard (business process perspective, learning and growth perspective, customer perspective and financial perspective). The ultimate objective of the approach proposed aims at supporting companies to implement and/or improve SCQM practices to promote organizational excellence.

Design/methodology/approach

A comprehensive literature review on supply chain management (SCM) and quality management (QM) had been carried out in order to identify key critical management areas and factors that might have a particular impact on organizational performance. Based on the literature review performed, a conceptual model was developed aiming at providing deeper insight on the different dimensions of SCQM. An on-line international survey was undertaken with companies' top managers to obtain additional knowledge on the topic, identifying the relationships among the two areas. A comprehensive analysis of the results, including response bias, content validity and construct validity was carried out. The analyses performed allow one to define a set of guidelines for companies improve their SCQM implementation and performance.

Findings

This research identified some key practices of SCQM that might impact on organizational performance, including management and strategic planning, stakeholders' involvement and commitment, information, leadership and continuous improvement and innovation. From the supply chain management perspective, specific important dimensions are: procurement, internal logistics and distribution. Concerning quality management one pointed out product/service quality and culture of quality areas.

Relevance/ contribution:

SCQM is a system-based approach for performance improvement which integrates supply chain partners and takes advantages of upstream and downstream links in order to create value and to improve customer satisfaction (Foster, 2008). Therefore, there is a need to change the current organizational thinking that is focused in a company, and expand it to an inter-organizational behavior which involves customers, suppliers and other stakeholders. This strategic change will develop a more competitive organization.

The conceptual model proposal is an attempt to embrace the most important issues concerning SCQM. Additionally, the conclusions of this work will raise new management practices – best practices - that will be important for the worldwide companies.

Keywords: Supply chain quality management, best practices

The effects of quality management practices on product innovation: a set-theoretic approach

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Abstract

This study uses complexity theory to explore the apparent tension between quality management practices and product innovation. The research questions under this study are: Which sets of alternative quality management practices contribute more to achieve product innovation? Is there any quality management practice that is a necessary condition to achieve product innovation?

To address this research questions the study employed qualitative comparative analysis, which assumes that the influence of conditions (quality management practices) on a specific outcome (product innovation) depends on how the conditions are combined. The study uses six quality management practices as conditions: top management commitment, customer focus, supplier involvement, quality oriented human resources management, benchmarking, and design quality management. Most studies on the relationship between quality management practices and product innovation focuses on the average effects of single variables (quality management practices) rather than on the effects of combinations (sets) of several variables (quality management practices). Thus, this study differentiates from most studies by successfully addressing the assumptions of additivity and equifinality, both of which affect traditional correlational approaches.

The results show three equifinal configurations of the above mentioned conditions (quality management practices) that are sufficient to achieve product innovation. The first indicates that combining customer focus with top management commitment and supplier involvement leads firms to achieve product innovation. The second shows that combining customer focus with top management commitment with benchmarking, and with quality oriented human resources management also leads companies to achieve to product innovation. Finally, the third shows that combining customer focus with top management commitment, quality oriented human resources management, and design for quality management is also an alternative for companies to achieve product innovation.

The study also uncovers that two out of the six quality management practices studied are necessary conditions to achieve product innovation. This practices are top management commitment and customer focus.

In summary, results indicate that simple antecedent conditions (quality management practices) can be necessary but insufficient to achieve product innovation. Furthermore, different combinations of quality management practices can lead to product innovation. These findings shed light into the existing tension between the implementation of quality management practices and the innovation outcomes of the firm in the quality management literature.

Keywords: Quality management practices; product innovation, Fuzzy set QCA, Configurational analysis, necessary conditions, sufficient conditions