

QUALITY MANAGEMENT PRINCIPLES AND PRACTICES IMPACT ON THE COMPANIES' QUALITY PERFORMANCE

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Abstract

Purpose - The aim of this paper is to expose the conceptual model which pretends to reflect the relationship between the use and implementation of quality management principles and practices and their impact on the companies' quality performance.

Design/methodology/approach – Based on the literature review carried out, we have identified the most common and used quality management principles and practices. Hence, we have proposed a conceptual model relate those quality management principles and practices to the companies' quality performance. In order to validate these quality management principles and practices and consequently the conceptual model developed, we conducted several semi-structured interviews with the Portuguese Quality Leaders. The following phase consisted in developing a questionnaire, based on the literature review carried out and on the main contributions of the semi-structured interviews. This questionnaire was sent to all the Portuguese companies certified according to the ISO 9001 standard. Our main purpose is to validate the model developed based on the structural equation modeling technique (SEM). Currently we are in the survey phase.

Findings - It is expected that the results show a significant and positive relationship between the implementation of quality management principles and practices and their impact on the companies' quality performance.

Originality/value - As far as we were able to find out in the literature review phase, the conceptual model proposed is a new approach to characterize the direct results and effects of quality management principles and practices in the companies' quality performance.

Keywords: Quality management, Performance Measures Indicators, principles, practices and Modelling.

Article Classification - Research paper.

1. Introduction

There is a considerable number of publications that is focused in the link between quality management and organizational performance. However, the analysis of the direct effects and results of the quality management principles and practices in Portuguese organizations quality performance is an innovative issue.

The American Society for Quality (ASQ) research entitled “The Global State of Quality Research Overview” (2013) highlight the best quality management organizational structure which includes the quality management principles and practices that lead to a maximization of the organization results.

From the ASQ study, explanatory key factors, which are extensively being used during the whole research and which are highly related to the variability in the application of principles and practices, were established. 1) There are significant differences in the use and application of quality management and practices in organizations from the industry sector as well as in organizations from the service sector. 2) There is a general idea that the organizations of higher dimension tend to use more mature quality practices. Although this idea is appropriate for various practices, in general, the dimension of the organization has less impact than the organization activity sector concerning the application of mature quality practices. 3) There is no relevant indication that the use of quality principles and practices differs per region, generally. Some variations do exist, but normally they are related to the dimension, sector or other unidentified factors. (ASQ, 2013).

The aim of this research is to develop and propose a conceptual model that reflects the relationship between the implementation of principle and practices quality management and their impact on the quality performance of the Portuguese organizations.

The goal of this research is to analyze if the implementation of QMPPs results in an improvement of companies' quality performance, namely in manufacturing and service sectors.

Our final conceptual model will be statistically validated based on a survey that will be sent to the Portuguese companies. The structural equation modeling (SEM) will be our statistical methodology support.

2. Quality Management

Quality Management (QM) has been defined as a “philosophy or an approach to management” made up of a “set of mutually reinforcing principles, each of which is supported by a set of practices and techniques” (Dean and Bowen, 1994).

QM represents one of the most significant research themes in operations management. Today QM is a widely accepted organizational goal for several companies (Nair, 2006). With the tremendous growth of literature in both academic and practitioner oriented outlets, the term QM has been diluted to mean different things and the scope of activities underlying QM lack consensus (Watson and Korukonda, 1995).

The study conducted by Sousa and Voss, (2002), commenting on the validity of quality management, conclude that, “QM as espoused by its founders, can be reliably distinguished from other strategies for organizational improvement and there is substantial agreement in the literature as to which practices fall under the QM umbrella”.

2.1 *Quality Management Principles and Practices*

The quality practices of an organization (which take place within a quality culture or context) are defined as the actions and procedures undertaken by a company or organization to ensure the delivery of a high-quality service or product.

Sousa and Voss, (2002) mention that “practices are the observable facet of QM, and it is through them that managers work to realize organizational improvements. Principles are too general for empirical research and techniques are too detailed to obtain reliable results. The quality management principles can be used by senior management as a framework to guide their organizations towards improved performance. There are many different ways of applying these quality management principles. The nature of the organization and the specific challenges it faces will determine how to implement them. Some of the conflicting results reported in the literature may have to do with different levels of analysis of QM. Several studies operationalized QM as a multi-dimensional construct (Anderson et al., 1995; Flynn et al., 1995; Mohrman et al., 1995; Powell, 1995; Adam et al., 1997; Grandzol and Gershon, 1997; Ahire and O’Shaughnessy, 1998; Forza and Flippini, 1998; Rungtusanatham et al., 1998; Dow et al., 1999; Samson and Terziovski, 1999; Das et al., 2000; Wilson and Collier, 2000; Ho et al., 2001; Kaynak, 2003) while others conceptualized it as a single construct (Hendricks and Singhal, 1996, 1997; Chenhall, 1997, Choi and Eboch, 1998; Easton and Jarrell, 1998; Douglas and Judge, 2001).

It would be relevant that future studies should make explicit at what level they are addressing QM content: principles, practices or techniques.

Researchers should also strive for a standardization of definitional terms. For example, different terms have been used for “practices”, such as “factors” (Saraph et al., 1989; Powell, 1995), “implementation constructs” (Ahire et al., 1996; Anderson et al., 1995) and “interventions” (Hackman and Wageman, 1995).

Based on the literature review carried out, we have identified the most common and the most implemented quality management principles and practices. It is important to refer that this selection was based on two sectors which will be target of our study: manufacturing and service. Hence, it is believed, in fact, that these quality management practices and principles are comprehensive because they:

- Have highest frequency of occurrences by different researchers in the service industries and identified as the key aspects in TQM implementation in both manufacturing and service industries (Saraph et al., 1989; Antony et al., 2002; Zhang et al., 2000; Khamalah and Lingaraj, 2007);
- Represented the hard and soft aspects of quality management;
- Encompass the most prestigious quality award and standards criteria widely accepted by quality management scholars and practitioners;
- Have been considered as critical practices in quality management (Sila and Ebrahimpour, 2002);
- Significantly associated in services and in the promotion of service quality (Behara and Gundersen, 2001).

In order to do a preliminary validation of the quality management practices and principles as well as the quality performance indicators selected, we conducted a series of semi-structured interviews with national and international *Quality Leaders*, such as: academics, specialists in this area, managers and consultants.

Therefore, the eight generic quality management principles identified (P_{A1}-P_{A8}): Leadership, Customer Focus, Employee Involvement and Commitment, HR Management (incentive and recognition), Strategic Planning Management, Process Management, Supply Chain Management, Continuous Improvement and Innovation as well as the quality management practices (P_B): Quality Tools and Business Excellence

Models, were valued in a scale from 1 (Nothing Important) to 5 (Extremely Important) by each Quality Leader Interviewee. All data collection and following statistic analysis which is illustrated in figure 1, allowed the presentation of the conclusions presented in the next paragraphs.

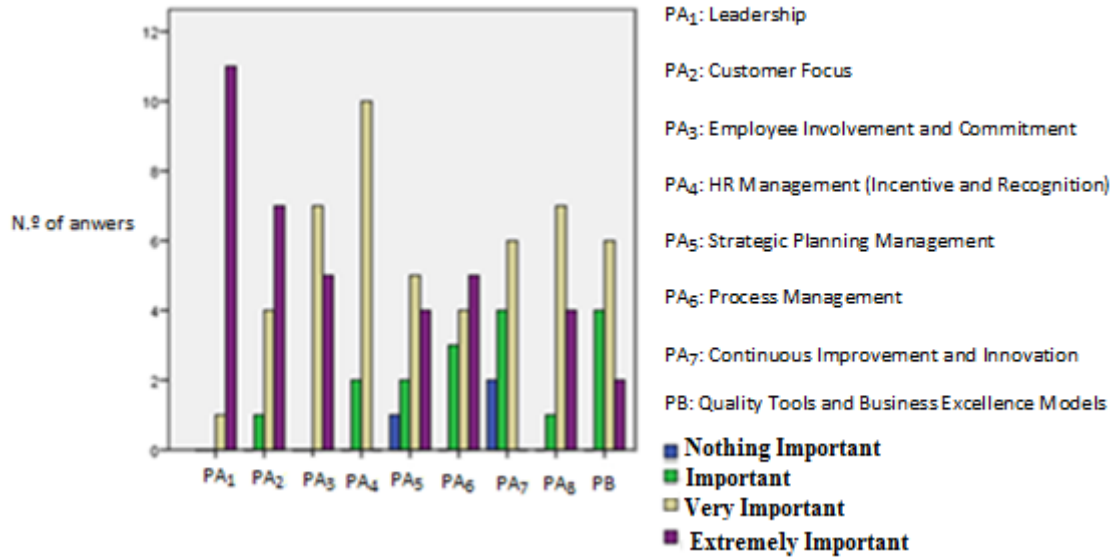


Figure 1 – General view of the quality management principles and practices.

Through figure 1 analysis, one may conclude that from the quality management principles presented (PA1-PA8), we may distinguish as *Extremely Important*: Leadership, Customer Focus and Process Management; as *Very Important*: Employee Involvement and Commitment, HR Management (incentive and recognition), Strategic Planning Management, Process Management, Supply Chain Management, Continuous Improvement and Innovation. The Quality Tools and Business Excellence Models (PB) were distinguished as *Very Important*.

It is important to mention that, through the course of the interviews, it was proposed that quality management practices category (PB) could be divided in three dimensions, such as: a) Quality Tools; b) Quality standards and c) Business Excellence Models.

Therefore, in our present research, based on the validation and on the main contributions of the semi-structured interviews phase, the quality management principles that are going to be the target of study are: Leadership, Customer Focus, Employee Involvement and Commitment, HR Management (incentive and recognition), Process Management; Strategic Planning Management, Supply Chain Management and the Continuous Improvement and Innovation. On the other hand, as mentioned above, the quality management practices that are going to be the target of study are the following dimensions: Quality tools, Quality standards and the Business Excellence Models (Figure 4: Conceptual Model: Relationship between QMPPs and their impact in quality performance).

2.2 Quality Performance Measures Indicators

Numerous studies have examined the positive and negative (or non-significant) relationships between quality principles and practices and various performance measures indicators. While examining the relationship between quality principles and practices and performance scholars have used different performance types such as financial, innovative, operational and quality performance.

Sousa and Voss, (2002) mentioned that quality management practices have a significant and strong impact on quality (internal process and product) and operational performance. In some studies a multidimensional operationalization of performance is considered (Mohrman et al., 1995; Das et al., 2000; Wilson and Collier, 2000) while others considered single performance construct (Anderson et al., 1995; Ahire and O'Shaughnessy, 1998; Rungtusanatham et al., 1998; Ho et al., 2001).

In this study, we considered quality performance as our indicator for measuring company's performance. The reasons for choosing quality performance as an indicator for measuring company's performance are:

- It can be measured and reflected into number of ways as articulated in past empirical studies on TQM (Ahire et al., 1996; Flynn et al., 1994; Su et al., 2001; Yang, 2006; Arumugam et al., 2008; Prajogo and Sohal, 2003; 2004).
- It has been used by Malcolm Baldrige National Quality Award (MBNQA) model under the 'quality results', the only criterion used for organizational performance measurement. MBNQA model that represent TQM practices is accepted by several researchers across the world (Ahire et al., 1995; Dean and Bowen, 1994; Juran, 1998; Prajogo and Sohal, 2003; 2004);
- Several past research studies on TQM and organizational performance have taken quality performance as indicator for measuring the performance (Ahire *et al.*, 1996; Zhang *et al.*, 2000; Arumugam *et al.*, 2008; Dow *et al.*, 1999; Flynn *et al.*, 1994; Saravanan and Rao, 2007; Cua *et al.*, 2001; Prajogo and Brown, 2004) and the results were obtained. These studies investigated the relationships between TQM practices and quality performance in different *sectors* and *countries*.

As we mentioned before, in order to do a preliminary validation of the quality performance indicators selected, we conducted a series of semi-structured interviews with national and international *Quality Leaders*, such as: academics, specialists in this area, managers and consultants.

The eight selected quality performance indicators are: Product/service quality level; customer relationship; reliability, productivity, durability, conformance to specification; number of non-conforming products and number of complaints.

This eight quality performance indicators (QP₁-QP₈) were valued in a scale from 1 (Nothing Important) to 5 (Extremely Important) by each *Quality Leader* Interviewee. All data collection and following statistic analysis which is illustrated in figure 2, allowed the presentation of the conclusions presented in the next paragraphs.

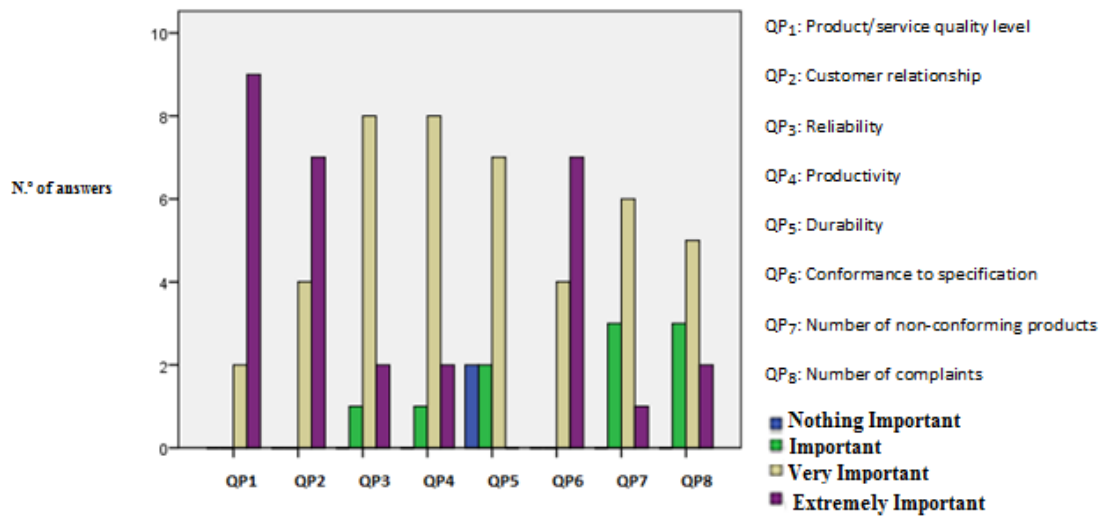


Figure 2 – General view of the quality performance indicators.

In an analogous way, through figure 2 analysis, one may conclude that from the quality performance indicators presented (QP₁-QP₈), we may distinguish as *Extremely Important*: Product/service quality level; customer relationship, conformance to specification; as *Very Important*: reliability, productivity, durability; number of non-conforming products and number of complaints.

Through the course of the interviews others indicators to the quality performance measurement arouse, as well as, changes to the denominations of some indicators that were presented.

Hence, the indicators to the quality performance measurement suggested were: Customer satisfaction; Flexibility; Quality Management Systems maturity; Complaints management; Employee satisfaction; stakeholders satisfaction.

Regarding to the changes of the denominations of some indicators that were presented, one may detach (Table 1):

Table 1 – Compilation of the change suggestions to the denominations of some indicators.

QUALITY PERFORMANCE INDICATORS PRESENTED	CHANGE SUGGESTION
QP ₁ : Product/service quality level	Perceived Quality
QP ₂ : Customer relationship	Customer loyalty
QP ₃ : Reliability	Product reliability
QP ₄ : Productivity	
QP ₅ : Durability	Product durability and service continuity
QP ₆ : Conformance to specification	Fulfilment of the customer requirements
QP ₇ : Number of non-conforming product	Number of non-conforming product/service
QP ₈ : Number of complaints	

Therefore, in our present research, based on the main contributions of the semi-structured interviews phase, the indicators that were used to the quality management performance measurement are:

Perceived Quality; Customer satisfaction; Customer loyalty; Product durability and Service continuity; Fulfilment of the customer requirements; Non-conforming

product/Service; Product reliability; Productivity; Flexibility; Lead time; Quality Management Systems maturity; Stakeholder satisfaction and Number of complaints.

3. Relationship between Quality Management and Performance

In general, research studies have argued a direct relationship between quality management principles and practices and performance.

Sampaio, 2009 mentioned that the majority of the studies that try to relate the impact of quality management principles and practices (QMPPs) over organizational performance that have been carried out, conclude that there is a positive relationship between the implementation of QMPPs and organizational performance improvement (Mann and Kehoe, 1994; Maani et al., 1989; Adam et al., 1997; Curkovic and Pagell, 2000; Terziovski and Samson, 1999; Gupta, 2000; Romano, 2000; Dick et al., 2002; Ozgur et al., 2002; Tari and Molina, 2002; Tari and Sabater, 2004; Quazi and Jacobs, 2004). However, others recent research on this link finds contradictory outcomes. That is, quality procedures may not consistently result in a positive or favorable organizational outcome (Foster, 2007; Kaynak 2003; Montes et al., 2003; Zu, 2008).

Note, however, that, there is also evidence of complex cross relations among QMPPs in extant literature.

There are some researchers who found that the implementation of QMPPs did not improve performance. For instance, Dow *et al.* (1999) showed that some QMPPs contribute to superior quality outcome and others QMPPs do not contribute to the improvement of organizations performance. Terziovski and Samson (1999) investigated the relationship between QMPPs and organizational performance in Australia and New Zealand and obtained mixed results, showed that a typical manufacturing organization is more likely to achieve better performance with QMPPs than without QMPPs implementation.

The mixed findings and the need to gain further insights into generalized QMPPs-performance link provide motivation for several research articles.

Given the inconsistent findings attempting to link quality management to firm performance in the past (Kaynak, 2003), the authors believe that deconstructing quality management into the separate constructs of quality practices and quality context, and examining the causal sequence connecting these constructs, will prove beneficial.

In order to perceive the *Quality Leaders Interviewees'* opinions about the relationship between quality management and performance, it was requested a valuation in a scale from *A (weak, 1 point)* to *C (High, 3 points)*, of the relationship between each QMPPs (P_{A1-8} e P_B) and each quality performance indicators (QP_1 - QP_8) presented. All data collection and following statistic analysis allowed the elaboration of the figure 3. This graphic illustrates the most significant relationships between QMPPs (P_{A1-8} e P_B) and quality performance indicators (QP_1 - QP_8).

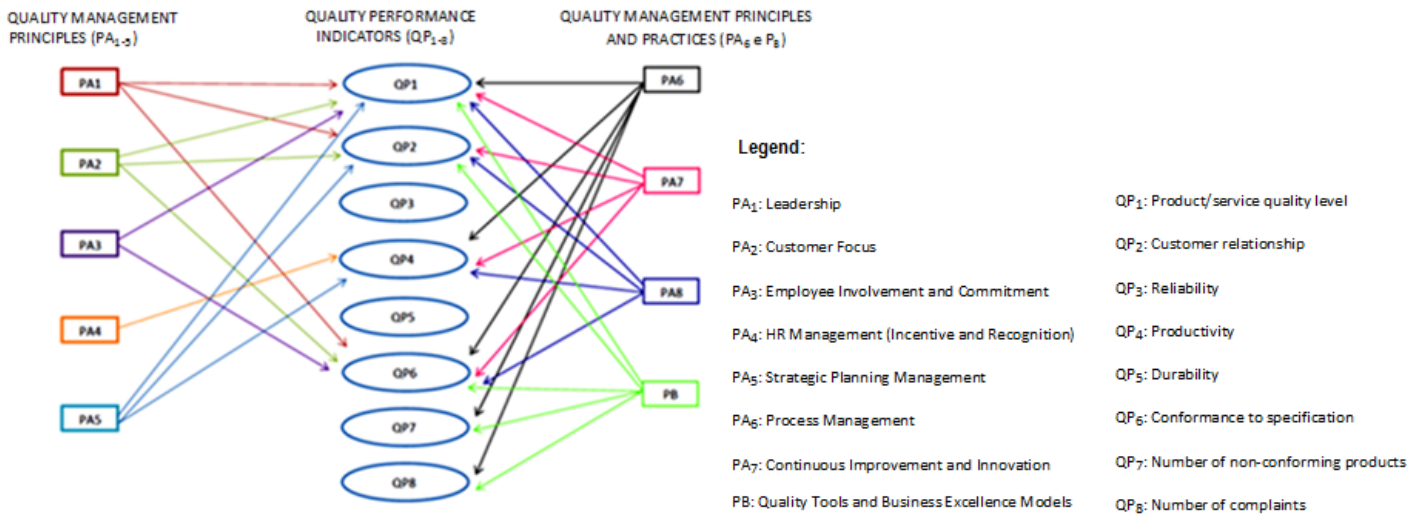


Figure 3 - Most significant relationships between QMPPs (PA₁₋₈ e PB) and quality performance indicators (QP₁₋₈).

4. Conceptual Model

This interview phase allowed us, in fact, to inquire the national and international acknowledged specialists in the quality management field trying to validate an subsequently improving the initial Conceptual Model which was elaborated through literature review. Therefore, the new Conceptual Model proposal is presented as follows:

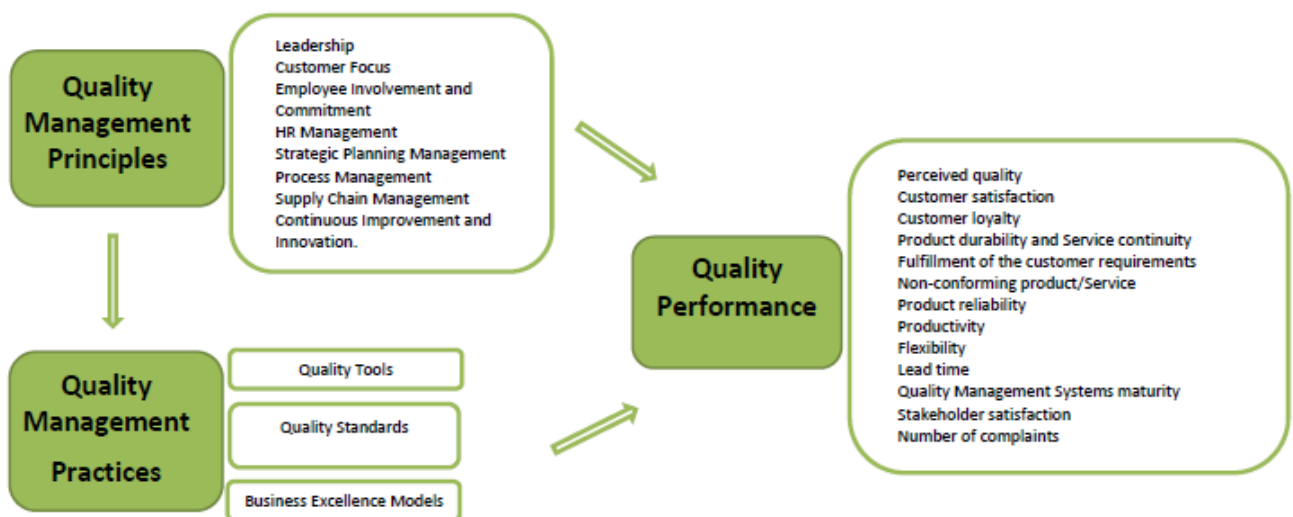


Figure 4 - Conceptual Model: Relationship between QMPPs and their impact in quality performance.

5. Conclusions

Based on the literature review carried out, we acknowledge that, in fact, there are still many doubts about the relationship between quality management and performance; hence, it is relevant to study in more detail the causal process that links QMPPs with quality performance in order to try to characterize the direct results and effects of QMPPs in the companies' quality performance.

Our final conceptual model will be statistically validated based on a survey that will be sent to the Portuguese companies. The structural equation modeling (SEM) will be our statistical methodology support. This validated model will not only contribute to bridge the gap, that is reflected in open literature, but it will also provide the quality professionals an approach to an efficient quality management implementation in the organizations. It may also be used by researchers to develop the quality management theory.

Undoubtedly, it will give impetus for practitioners adopting quality management principles and practices in their organizations.

References

- Adam Jr., E.E., Corbett, L.M., Flores, B.E., Harrison, N.J., Lee, T.S., Rho, B.H., Ribera, J., Samson, D., Westbrook, R., 1997. An international study of quality improvement approach and firm performance. *International Journal of Operations and Production Management* 17, 842–873.
- Ahire, S.L., Landeros, R. and Golhar, D.Y. 1995. Total quality management: a literature review and an agenda for future research. *Production and Operations Management*, Vol. 4, No. 3, pp. 277-306.
- Ahire, S. L., Golhar, D. Y. and Waller, M. W., (1996). Development and validation of TQM implementation constructs. *Decision Sciences*, Vol. 27, No. 1, pp. 23-56.
- Ahire, S.L., O'Shaughnessy, K.C., 1998. The role of top management commitment in quality management: an empirical analysis of the auto parts industry. *International Journal of Quality Science* 3 (1), 5–37.
- Anderson, J.C., Rungtusanatham, M., Schroeder, R.G., Devaraj, S., 1995. A path analytic model of a theory of quality management underlying the Deming Management Method: preliminary empirical findings. *Decision Sciences* 26, 637–658.
- Antony, J., Leung, K., Knowles, G., & Gosh, S. (2002). Critical success factors of TQM implementation in Hong Kong industries. *International Journal of Quality and Reliability Management*, 19(5), 551–566.
- Arumugam, V., Chang, H.W., Ooi, K.-B. and Teh, P.-L. 2009. Self-assessment of TQM practices: a case analysis. *The TQM Journal*, Vol.21 No.1, pp. 46-58.
- Arumugam, V., Ooi, K. B. and Fong, T. C., (2008). TQM practices and quality management performance- an investigation of their relationship using data from ISO 9001:2000 firms in Malaysia. *The TQM Magazine*, Vol. 20, No.6, pp. 636-650.
- ASQ, (2013). The ASQ Global State of Quality. American Society for Quality, with the collaboration of the APQC – American Productivity & Quality Center.
- Boronat, P., and Canard, F., (1995). Management par la qualite: A totale et changement organisationnel. *Les Nouvelles Forms Organisationnelles* (Paris, Economica).
- Blackiston, G. H. (1996). A barometer of trends in quality management. *National Productivity Review*, 16, 15-23.

- Cua, K.O., Mc Kone, K.E. and Schoreder, R.G. 2001. Relationship between implementation of TQM, JIT and TPM and manufacturing performance. *Journal of Operations Management*, Vol.19, pp.675-694.
- Curkovic, S., Melnyk, S., Calantone, R., Handfield, R., 2000. Validating the Malcolm Baldrige National Quality Award Framework through Structural equations modelling. *International Journal of Production Research* 38 (4), 765–791.
- Das, A., Handfield, R.B., Calantone, R.J., Ghosh, S., 2000. A contingent view of quality management—the impact of international competition on quality. *Decision Sciences* 31, 649–690.
- Dean, J.W. and Bowen, D.E. 1994. Management theory and total quality: improving research and practice through theory development. *Academy of Management Review*, Vol. 19, No. 3, pp. 392-418.
- Dick, G., Gallimore, K., Brown, J. (2002), Does ISO 9000 accreditation make a profound difference to the way service quality is perceived and measured?, *Managing Service Quality*, 12(1), pp. 30-42.
- Douglas, T.J., Judge Jr., W.Q., 2001. Total quality management implementation and competitive advantage: the role of structural control and exploration. *Academy of Management Journal* 44, 158–169.
- Dow, D., Samson, D. and Ford, S. 1999. Exploding the myth: do all quality management practices contribute to superior quality performance? *Production and Operations Management*, Vol. 8, No. 1, pp. 1-27.
- Easton, G.S., Jarrell, S.L., 1998. The effects of total quality management on corporate performance: an empirical investigation. *Journal of Business* 71 (2), 253–307.
- Flynn, B. B., Schroeder, R. and Sakakibara, S., (1994). A framework for quality management research and an associated measurement instrument. *Journal of Operations Management*, Vol. 11, pp. 339-366.
- Flynn, B. B., Schroeder, R. and Sakakibara, S., (1995). The impact of quality management practices on performance and competitive advantage. *Decision Sciences*, Vol. 26, No. 5, pp. 659-692.
- Foster, S. T. Jr., (2007). Does Six Sigma improve performance? *The Quality Management Journal*, Vol. 14, No.4, pp. 7-20.
- Forza, C., Flippini, R., 1998. TQM impact on quality conformance and customer satisfaction: a causal model. *International Journal of Production Economics* 55, 1–20.
- Grandzol, J.R., Gershon, M., 1997. Which TQM practices really matter: an empirical investigation. *Quality Management Journal* 4 (4), 43–59.
- Guilhon, A., Martin, J., and Weill, M., (1998): Quality approaches in small or medium-sized enterprises: Methodology and survey results, *Total Quality Management*, Vol. 9, No. 8, pp. 689-701.
- Gupta, A. (2000), Quality management practices of ISO vs. non-ISO companies: a case of Indian industry, *Industrial Management & Data Systems*, 100(9), pp. 451-455.
- Hackman, J., Wageman, R., 1995. Total quality management: empirical, conceptual, and practical issues. *Administrative Science Quarterly* 40, 309–342.
- Hasan, M., and Kerr, R. M., (2003). The relationship between TQM practices and organizational performance in service organization. *The TQM Magazine*, Vol. 15, No 4, pp. 286-291.
- Hendricks, K.B., Singhal, V.R., 1996. Quality awards and the market value of the firm: an empirical investigation. *Management Science* 42, 415–436.
- Ho, D.C.K., Duffy, V.G., Shih, H.M., 2001. Total quality management: an empirical test for mediation effect. *International Journal of Production Research* 39, 529–548.

- Hoang, D.T, Igel, B. and Laosirihongthong, T. 2006. The impact of total quality management on innovation: findings from a developing country. *International Journal Quality and Reliability Management*, Vol. 23, No.9, pp. 1092-1117.
- Jabnoun, N., Khalifah, A. & Yusuf, A., (2003). Environmental Uncertainty, Strategic Orientation, and Quality Management: A Contingency Model. *The Quality Management Journal*. 10 (4), pp. 17 – 31.
- Juran, J.M. (Ed.) 1998. *A History of Managing for Quality*, ASQC Quality Press, Milwaukee, WI.
- Kaynak, H. (2003). The relationship between TQM practices and their effects on firm performance. *Journal of Operations Management*, 21(4), 405-35.
- Khamalah, J. N. and Lingaraj, B. P. 2007. TQM in the service sector: a survey of small business. *Total Quality Management*, Vol.18, No.9, pp. 973-982.
- Kumar, V., Choisne, F., Grosbois, D., and Kumar, U., (2009). Impact of TQM on company's performance. *International Journal of Quality & Reliability Management*, Vol. 26, No. 1, pp. 23-37.
- Maani, K., 1989. Productivity and profitability through quality—myth and reality. *International Journal of Quality and Reliability Management* 11 (7), 19–37.
- Mann, R., Kehoe, D., 1995. Factors affecting the implementation and success of TQM. *International Journal of Quality and Reliability Management* 12 (1), 11–23.
- Mathews, B. P., Ueno, A., Kekäle, T., Repka, M. Pereira, Z. L., Silva, G., (2001). European quality management practices: The impact of national culture. *International Journal of Quality & Reliability Management*, Vol. 18 No.7, pp. 692–707.
- Montes, F. L., Jover, A. V., & Fernandez, L. M. M. (2003). Factors affecting the relationship between total quality management and organizational performance. *International Journal of Quality & Reliability Management*, 20(2), 189-209.
- Ozgur, C., Meek, G., Toker, A. (2002), The impact of ISO certification on the levels of awareness and usage of quality tools and concepts: a survey of Turkish manufacturing companies, *Quality Management Journal*, 9(2), pp. 57-69
- Phusavat, K., Anussornnitisarn, P., Helo, P., and Dwight, R., (2009). Performance measurement: Roles and challenges. *Industrial Management & Data Systems*, Vol. 109, No. 5, pp. 646-664.
- Pinho, J. C. (2008). TQM and performance in small medium enterprises: The mediating effect of customer orientation and innovation. *International Journal of Quality & Reliability Management*, 25(3), 256-275.
- Powell, T.C., 1995. Total quality management as competitive advantage: a review and empirical study. *Strategic Management Journal* 16, 15–37.
- Prajogo, D.I. and Hong, S.W. 2008. The effect of TQM on performance in R & D environment: a perspective from South Korean firms. *Technovation*, Vol.28, pp. 855-863.
- Prajogo, D. I. and Brown, A., (2004). The relationship between TQM practices and quality performance and the role of formal TQM programs: An Australian empirical study. *Quality Management Journal*, Vol. 11, pp. 31–43.
- Prajogo, D. I. and Sohal, S. A., (2003). The relationship between TQM practices, quality performance, and innovation performance: an empirical examination. *International Journal of Quality & Reliability Management*, Vol. 20, No. 8, pp. 901-918.
- Quazi, H. A., Hong, C. W., and Meng, C. T., (2002). Impact of ISO 9000 certification on quality management practices: A comparative study. *Total Quality Management*, Vol. 13, No. 1, pp. 53-67.

- Quazi, H. and Jacobs, R. (2004), Impact of ISO 9000 certification on training and development activities, *International Journal of Quality & Reliability Management*, 21(5), pp. 497-517.
- Rao, S. S., Ragu-Nathan, T. S., and Solis, L. E., (1997). Does ISO have an effect on quality management practices? An international empirical study. *Total Quality Management*, Vol. 8, pp. 335-346.
- Romano, P. (2000), ISO 9000: what is its impact on performance? *Quality Management Journal*, 7(3), pp.38-56.
- Rungtusanatham, M., Forza, C., Filippini, R., Anderson, J.C., 1998. A replication study of a theory of quality management underlying the Deming method: insights from an Italian context. *Journal of Operations Management* 17, 77–95.
- Sampaio, P., Saraiva, P., Guimarães Rodrigues, A. (2009), ISO 9001 certification research: questions, answers and approaches, *International Journal of Quality & Reliability Management*, 26(1), pp. 38-58.
- Samson, D., Terziovski, M., 1999. The relationship between total quality management practices and operational performance. *Journal of Operations Management* 17, 393–409.
- Saraph, J. V., Benson, P. G. and Schroeder, R. G. 1989. An instrument for measuring the critical factors of quality management. *Decision Sciences*, Vol.20, No. 4, pp. 810-829.
- Saravanan, R. and Rao, K.S.P. 2007. The impact of total quality service age on quality and operational: an empirical study. *The TQM Magazine*, Vol.19, No. 3, pp. 197-205.
- Sousa, R., Voss, C.A., 2002. Quality management re-visited: a reflective review and agenda for future research. *Journal of Operations Management* 20, 91–109.
- Su, C.-T., Chen, M.-C. and Cheng, G.-C. 2001. TQM in Taiwan's computer and its peripheral industry. *Industrial Management and Data Systems*, Vol.101, No. 7, pp. 357-362.
- Tarí, J. and Molina, J. (2002), Quality management results in ISO 9000 certified Spanish firms, *The TQM Magazine*, 14(4), pp. 232-239.
- Tarí, J. and Sabater, V. (2004), Quality tools and techniques: are they necessary for quality management? *International Journal of Production Economics*, 92, pp. 267-280.
- Terziovski, M. 2006. Quality management practices and their relationship with customer satisfaction and productivity improvement. *Management Research News*, Vol. 29, No. 7, pp. 414-24.
- Terziovski, M. and Samson, D. 1999. The link between total quality management practice and organizational performance". *International Journal of Quality & Reliability Management*, Vol. 16, No. 3, pp. 226-237.
- Wilson, D.D., Collier, D.A., 2000. An empirical investigation of the Malcolm Baldrige National Quality award causal model. *Decision Sciences* 31, 361–390.
- Zhang, Z. H. 2000. Implementation of total quality management: An empirical study of Chinese manufacturing firms. Unpublished Doctoral thesis, University of Groningen, Groningen, The Netherlands.
- Zu, X., Fredendall, L., & Douglas, T. (2008). The Evolving Theory of Quality Management: The Role of Six Sigma. *Journal of Operations Management*, 26, 630 – 650.