The interplay between organizational culture and the use of quality tools, and its impact on performance

do Nascimento Gambi , Lillian; Boer, Harry; Cecílio Gerolamo, Mateus ; Cesar Ribeiro Carpinetti, Luiz ; Jørgensen, Frances

Published in:
Proceedings of the 20th International EurOMA Conference on Operations Management at the Heart of the Recovery

Publication date:
2013

Document Version
Early version, also known as pre-print

The interplay between organizational culture and the use of quality management techniques, and its impact on performance

Lillian do Nascimento Gambi (lgambi@sc.usp.br)
Department of Industrial Engineering, School of Engineering of São Carlos, University of São Paulo

Harry Boer
Center for Industrial Production, Aalborg University

Mateus Cecílio Gerolamo
School of Engineering of São Carlos, University of São Paulo

Luiz Cesar Ribeiro Carpinetti
School of Engineering of São Carlos, University of São Paulo

Frances Jørgensen
School of Business and Social Sciences, Aarhus University

Abstract
This study analyzes the relationships between and among quality techniques, organizational culture, and performance. The research models and hypotheses proposed are tested using data collected from 250 manufacturing companies. The findings indicate that 1) some cultural profiles predict the use of some quality techniques better than others, and 2) quality techniques contribute to improve performance, provided they are supported by appropriate cultural characteristics.

Keywords: Organizational culture, Quality techniques, Performance

Introduction
Attempting to improve quality and performance many companies have focused on quality management initiatives. Much has been written on the benefits of quality to improve organizational performance (Baird et al., 2011; Sila, 2007). However, in spite of the benefits claimed, a closer examination of the literature shows that many QM initiatives have not achieved the intended results (Asif et al., 2009; Beer, 2003; Harari, 1993; Hubiak and O'Donnel, 1996). One reason is that the whole set of quality management practices is not universally applicable (Sousa and Voss, 2001) – the performance effects of individuals practices are context dependent.

Among the contextual variables that have been identified to enhance quality management success, organizational culture has been highlighted (Asif, 2009; Baird et al., 2011; Irani, 2004; Kull and Wacker, 2010; Rad, 2006; Wu et al., 2011). Indeed, many companies are now taking their cultural characteristics into account prior to implementing quality management initiatives (Maull et al., 2001). Accordingly several studies have analyzed the relationships between and among quality management, organizational culture and performance (Naor et al., 2008, Prajogo and McDermott, 2005, 2011; Zu et al., 2010).

Most studies assessing the influence of organizational culture have focused on quality *practices*. The objective of this study is to empirically examine the relationship between and among quality *techniques*, organizational culture and performance. Quality techniques are important since they play not only a role in the institutionalization of practices and principles of quality management, but also affect performance (Handfield et al., 1999).

This study adopts the Competing Values Framework (Cameron and Quinn, 2006) to identify organizational culture profiles. After a presentation of the theoretical background, hypotheses and design of the study, the association between culture and the use of quality techniques is analyzed. Next, the impact of this relationship on performance is studied.

Theoretical background

This paper takes its departure in two observations.

First, quality management has a positive effect on company performance (Baird et al., 2011; Flynn et al., 1994; Kaynak, 2003; Naor et al., 2008, Prajogo and McDermott, 2011). However, quality management comprises both "hard" elements, i.e. quality tools and techniques, as well as "soft" elements, including leadership, engagement, teamwork, and empowerment (Rahman and Bullock, 2003). There is some debate on the relative importance and possible interaction between these elements. Some studies (e.g. Powell, 1995; Dow et al., 1999; Samson and Terziovski, 1999) suggest that "soft" elements can improve performance without the "hard" elements. Other studies (e.g. Dean and Bowen, 1994; Flynn et al., 1994) show that the interplay between "soft" practices and "hard" tools is essential to improve performance. Thus, Sousa and Voss (2002) call for further research to clarify this interplay. Naor et al. (2008) take up that challenge and conclude that "soft" practices, which they call infrastructure quality practices, do not affect the "hard", so-called core quality, practices and can enhance performance without their presence. A question left open is: can "hard" elements, i.e. quality techniques, enhance performance without the presence of "soft" practices? Techniques such as statistical process control, and quality function deployment can help reduce process variability, avoid defects and waste, allow for fast responses if something unexpected happens, which lead to higher performance. Indeed, Handfield et al. (1999) find significant relationships between various quality techniques and performance, but do not analyze the extent to which the presence of "soft" practices affected their findings.

Second, there are two competing cultural views of quality management. While the unitarist view suggests that the success of quality management is associated with a single culture, the pluralist view supports the idea that it can thrive in heterogeneity of cultures. Prajogo and McDermott (2005) test these two competing views and conclude in favor of the pluralist view: the adoption of different subsets of "soft" quality practices (i.e. leadership, strategic planning, customer focus, information and analysis, people and process management) is determined by different types of cultures. Adding Six Sigma

practices to the set of quality *practices* considered, Zu et al. (2010) arrive at a similar conclusion. The question is: does this conclusion also hold if "hard" quality *techniques* are considered?

Research objective and hypotheses

While most studies focus on "soft" quality *practices*, this paper studies the relationships between and among "hard" quality *techniques*, organizational culture and performance, and examines the following hypotheses:

H1: *The culture of an organization affects the set of quality techniques it adopts*.

H2: *Fit between the set of quality techniques adopted and organizational culture affects performance positively*.

Research design

Method

Data for this study are drawn from a survey questionnaire e-mailed to a random sample of 1822 (actually 2066; 244 e-mails bounced back) Brazilian and Danish manufacturing companies (SIC codes 20-39) in 2012/2013. The response rate was 13.7% (250 companies). A small number of missing points were replaced by medians. The unit of analysis is the manufacturing plant and the respondents occupy management positions.

Table 1 – Quality technique groups, characteristics and examples

Quality technique groups	Characteristics	Examples
Goal Setting	Techniques which emphasizes process and product design based on best practices and customers' needs and wants. These techniques are useful to help an organization to set goals which lead to better results.	QFD, benchmarking
Continuous Improvement	Techniques which are people-oriented, they help the employees to use their knowledge effectively to support continuous improvement. These techniques emphasize openness, participation, contibuting to people involvement.	Brainstorming, kaizen event, quality tools, 5S
Measurement	Techniques which are related to measure quality indices and provide information about the efficiency and effectiveness of activities to reach quality goals. These techniques help the organization to take fast actions based on data, besides of promoting alignment regarding the quality goals.	Quality performance indicators, visual boardings.
Failure Prevention and Control	Techniques which are related to avoid uncertainty either for identifying causes which contribute to the variation in manufacturing quality, to provide useful information for product design or either with the purpose of eliminating defects by preventing, correction errors as they occur. in the manufacturing process. These techniques are helpful to contribute to a stable and controlled production flow.	SQC, FMEA, foolproofing devices, preventive maintenance

Operationalization

Quality techniques – McQuarter et al. (1995) define quality techniques as "practical methods, skills, means or mechanisms that can be applied to particular tasks". According to Handfield et al. (1999), companies do not actually use many of the techniques described in the literature. This study considers a narrow range of techniques, that *are* used in practice, namely: quality function deployment (QFD), benchmarking, brainstorming, kaizen event, problem identification and prioritization tools, problem analysis tools (including Pareto analysis, Ishikawa diagram, histograms),

continuous improvement tools (e.g. the PDCA cycle), 5S, visual control, performance measurement, statistical quality control (SQC), failure mode and effect analysis (FMEA), poka-yoke (mistake-proof) devices, and preventive maintenance. Based on their characteristics they four groups were formed as described in Table 1. Ahire (1996), Flynn et al. (1994), Naor et al. (2008) and Zu et al. (2010) were used to measure the use of each of the techniques on five-point Likert scales ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree".

Organizational culture – The Competing Values Framework (CVF) (Quinn and Rohrbaugh, 1983) was adopted to identify organizational culture profiles. This framework has been used as a method for analyzing organizational development (Denison and Spreitzer, 1991) and, more recently, in quality management studies (e.g. Deter et al., 2000; Naor et al, 2008; Prajogo and McDermott, 2005; Wu et al., 2011; Zu et al., 2010).

The CVF is based on two main dimensions: the flexibility-control and internal-external axes, respectively. Combined, these dimensions result in the four cultures indicated in Figure 1 together with their key characteristics.

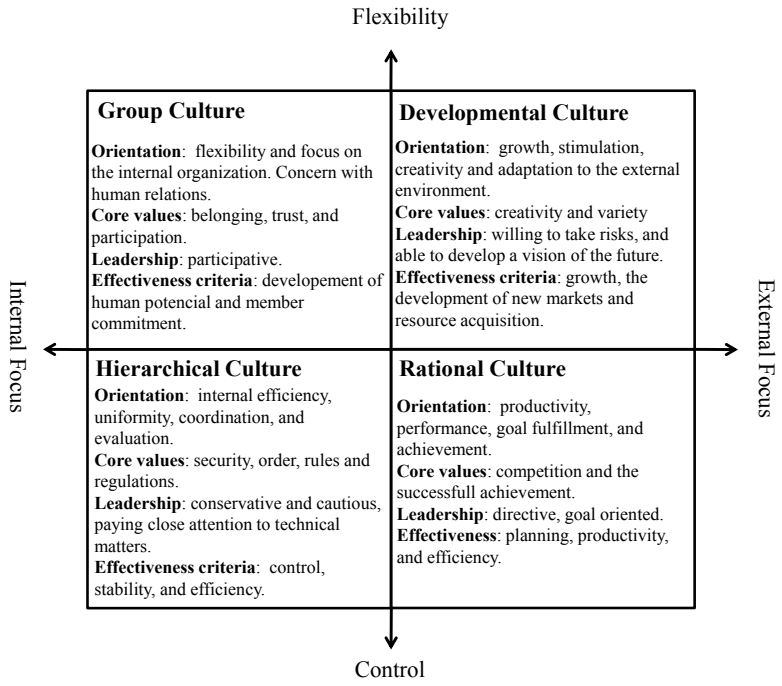


Figure 1 – Competing Values Framework (Cameron & Quinn, 2006; Denison & Spreitzer, 1991)

The survey instruments employed by Cameron and Quinn (2006), Flynn et al. (1994), Naor et al. (2008), Prajogo and McDermott (2011) and Zu et al. (2010) were used to measure culture on five-point Likert scales ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree".

Performance – The survey instruments reported by Baird et al. (2011), Kaynak (2003), Naor et al. (2008), Prajogo and McDermott (2011) and Samson and Terziovski (1999) were used to measure customer (satisfaction), operational (cost, time, quality), human resource (turnover, absenteeism) and relative-to-competitors (product, product development, process/technological change) performance on five-point Likert scales, using terms such as sometimes meets expectations/exceeds expectations (customer

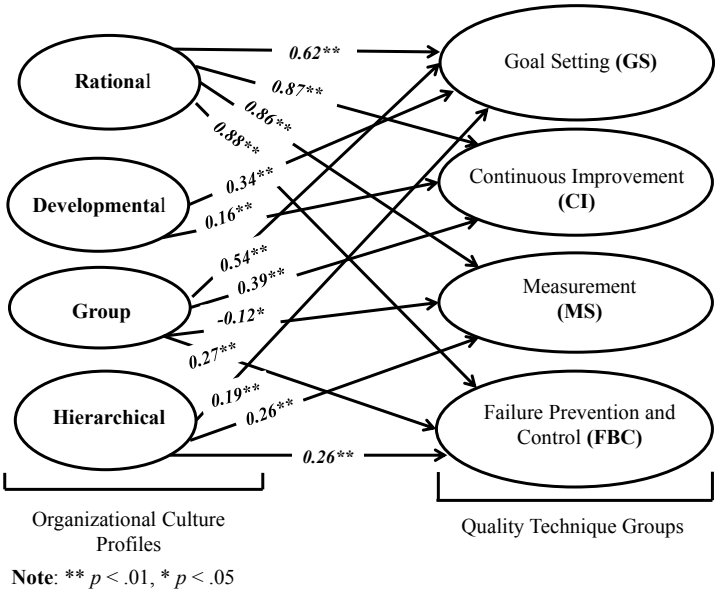
satisfaction), consistently increasing/consistently decreasing (operational and human resource performance) and poor (or very low)/superior (performance relative to competitors) to describe the ends of the scales.

Research models

Two research models (presented in the results section) were devised to test the hypotheses. First, the survey scales were assessed for reliability (using Cronbach's alpha, performed in SPSS 17). One observed variable from hierarchical culture was dropped from the scale. Preliminary tests also included descriptive statistics and bivariate correlations for the constructs in the research models. Second, confirmatory factor analysis was performed in Amos 20 to assess the measurement model for each construct, the validity of the scales as well as overall fit indices. Third, Structural Equation Modeling was used to analyze the interplay between and among organizational culture, quality management techniques, and performance.

Results

Hypothesis 1 was tested based on the structural model path coefficients. With four times four relationships, sixteen paths from culture profiles to quality technique groups were estimated. The initial findings showed that not all of these 16 paths were significant. The non-significant paths ($p > 0.1$) of the initial structural relationship were then deleted. Overall statistics for the model retained are $x^2/df = 2.04$, CFI = 0.83, IFI = 0.83, TLI = 0.82 and RMSEA = 0.06, fit indices that are commonly used in the literature. As a guideline to analyze them, RMSEA < .05 (good model fit), .05 < RMSEA < .08 (reasonable model fit) and RMSEA > .08 (poor model fit) were adopted. For normed chi-squared (x^2/df), a number smaller than 2.0 is considered very good; between 2.0 and 5.0 is acceptable (Hair et al. 2009). Incremental fit indices (CFI, IFI, and TLI) range from 0.0 (not fit) to 1.0 (perfect fit) (Hair et al. 2009; Tabachnik and Fidel, 2007). The overall fit of the model appeared to be good – see Figure 2 for the model and its path coefficients (γ).



Note: ** $p < .01$, * $p < .05$

Figure 2 – Structural model of the relationship between organizational culture profiles and quality technique groups

The results support H1, namely that the relationship between culture and quality techniques varies across different culture profiles and quality technique groups:

- The rational culture is positively associated with, that is, predicts the use of, all quality technique groups: goal setting, continuous improvement, measurement, and failure prevention and control.
- The developmental culture is positively related to goal setting and continuous improvement. The path coefficients from this culture to measurement and to failure prevention and control techniques are not statistically significant ($p > .10$). These two paths were dropped from the model.
- The group culture is positively linked to the use of goal setting, continuous improvement, and failure prevention and control techniques. The association with measurement techniques is negative. Thus, the stronger the characteristics describing this culture, the lower the use of measurement techniques.
- The hierarchical culture is positively related to the use of goal setting, measurement, and failure prevention and control techniques. The path coefficient from hierarchical culture to continuous improvement techniques is statistically insignificant ($p > .10$).

Thus, the rational culture shows stronger relationship with all quality technique groups than any of the other culture profiles. The group and developmental cultures are stronger indicators of the use of goal setting and continuous improvement techniques than the hierarchical culture, which, in turn, is a stronger predictor of the use of measurement techniques than the group and developmental cultures.

To test H2 another model was devised taking performance into account. Figure 3 presents the general model employed. Pairs of cultural profiles and quality technique groups were tested to evaluate if matching a specific culture with a specific quality technique group affects performance. In this model there are two direct effects on the dependent variable "performance", one from the independent variable "organizational culture profiles" and one from the other dependent variable "quality technique groups".

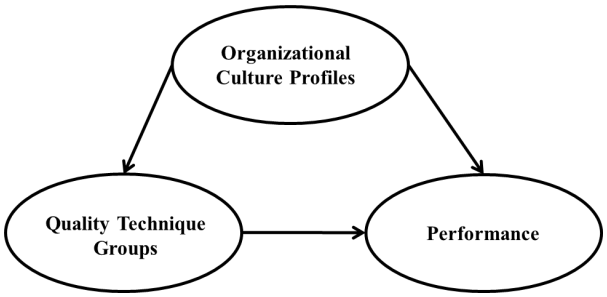


Figure 3 – General structural model of the relationships among culture, quality and performance

With four cultural profile and four quality technique groups, sixteen models were tested. The overall model statistics show that they have a good fit ($x^2/df < 2.00$, CFI > .89, IFI > .89, TLI > .88, and RMSEA < .06).

Table 2 shows the direct, indirect, and total effect of each pair of quality and culture on performance. It appears that the developmental and group cultures contribute directly and indirectly to performance, irrespective of the quality technique group considered. All quality technique groups contribute directly. The hierarchical culture contributes directly to performance for three of the four technique groups considered, and indirectly for all four groups. The rational culture only has direct effect on performance. That is, it does not affect performance through the quality groups.

Discussion

The results depicted in Figure 1 indicate a significant relationship between organizational culture and the use of quality techniques. The magnitude of this relationship varies across the paths from culture to quality techniques, which supports H1, as follows.

The rational culture shows a stronger relationship with all groups of techniques than any of the other cultural profiles. This is not surprising for the MS, FPC, and GS techniques, as this culture profile is related to control and performance, but interesting for CI – since CI techniques are more related to people involvement we should expect the path coefficient between the group culture and CI techniques to be the strongest one. These results seem to support the findings of Prajogo and McDermott (2005), who conclude that control and people-oriented practices can coexist in harmony. Another interesting finding is that the group culture is negatively related to MS quality techniques. Considering the characteristics of this culture we should expect a low path coefficient, but not necessarily a negative one. Apart from this negative relationship, the group culture is a significant indicator of the use of the other quality technique groups. Thus, a rational culture functions as it should be expected to do: rationally, by relying heavily on (any) tools and techniques. *Mutatis mutandis* the same holds for the group culture: it relies on "softer" techniques (GS, CI), less so on FPC, and not on MS.

The hierarchical culture does not have a significant relationship with continuous improvement techniques ($p > 0.1$), which can be explained by the fact that this culture focuses on internal efficiency and control. Accordingly, the hierarchical culture is significantly related to MS and FPC techniques. The developmental culture is an indicator of the use of GS techniques such as QFD and benchmarking. This culture also shows a positive, albeit relatively weaker, relationship with CI techniques. The relationships with the MS and PFC groups are insignificant ($p > 0.1$). Also these

Table 2 – Effects analyses between each pair of quality and culture variables on performance

Effect on Performance								
	Quality	*Culture*	*Quality*	*Culture*	*Quality*	*Culture*	*Quality*	*Culture*
	GS	**Developmental**	**GS**	**Group**	**GS**	**Hierarchical**	**GS**	**Rational**
Direct	0.39**	0.34** (51%)	0.39**	0.33** (50%)	0.52**	0.18** (30,3%)	0.17^{ns}	0.60**
Indirect		0.33** (49%)		0.33** (50%)		0.41** (69,7%)		0.14^{ns}
Total	0.39**	0.67** (100%)	0.39**	0.66** (100%)	0.52**	0.59** (100%)		0.60** (100%)
	CI	**Developmental**	**CI**	**Group**	**CI**	**Hierarchical**	**CI**	**Rational**
Direct	0.39**	0.36** (55,4%)	0.37**	0.37** (56%)	0,47**	0.25** (42,7%)	0.04^{ns}	0.70**
Indirect		0.29** (44,6%)		0.29** (44%)		0.34** (57,3%)		0.04^{ns}
Total	0,39**	0.65** (100%)	0.37**	0.66** (100%)	0,47**	0.59** (100%)		0.70**(100%)
	MS	**Developmental**	**MS**	**Group**	**MS**	**Hierarchical**	**MS**	**Rational**
Direct	0.33**	0.47** (72,6%)	0.35**	0.49** (74,4%)	0,32**	0.36** (61,3%)	0.02^{ns}	0.70**
Indirect		0.18** (27,4%)		0.17** (25,6%)		0.23** (38,7%)		0.02^{ns}
Total	0.33**	0.65** (100%)	0.35**	0.66** (100%)	0,32**	0.59** (100%)		0.70**(100%)
	FPC	**Developmental**	**FPC**	**Group**	**FPC**	**Hierarchical**	**FPC**	**Rational**
Direct	0.39**	0.40** (60,2%)	0.38**	0.38** (58,3%)	0.49**	0.21^{ns}	0.15^{ns}	0.61**
Indirect		0.26** (39,8%)		0.27** (41,7%)		0.39**		0.13^{ns}
Total	0.39**	0.66** (100%)	0.38**	0.65** (100%)	0.49**	0.39** (100%)		0.61** (100%)

Notes - GS: Goal Setting techniques; **CI**: Continuous Improvement techniques; **MS**: Measurement techniques; **FPC**: Failure Prevention and Control techniques; ** $p < .01$; ^{ns}not significant

findings are consistent with the characteristics of this culture, which is oriented toward growth and adaptation to external environment and has creativity as core value.

Overall, taking it to the level of quality techniques, the findings support the assumption of the multidimensionality of quality management. That is, while Prajogo and McDermott (2005) and Zu et al. (2010) suggest that different sets of quality management *practices* are linked to different types of culture, the present study shows that this is also true for quality management *techniques*. This implies that managers should be actively aware of the cultural characteristics of their organization prior to adopting and implementing quality techniques.

The results also support H2, namely that performance is affected by matching culture and quality techniques. Organizational culture affects performance through the quality management techniques adopted, for most combinations of the cultural profiles and quality technique groups considered in this paper. Some interesting patterns emerge. For instance, the group and developmental cultures have a stronger interactive performance effect if combined with the GS, CI and FPC techniques than if these cultures are combined with the use of MS techniques.

If matched with MS techniques, the hierarchical culture has a considerable effect on performance – while adding culture increases the performance effects from .52 to .59 for the GS group, and from .47 to .59 for the CI groups, the effect increases from .32 to .59 for the MS group of techniques. Interestingly, this culture actually decreases the performance effects of FPC techniques, in spite of the relative popularity of these techniques in companies with a hierarchical culture (see Figure 1).

The rational culture does not affect performance through any of the quality technique groups. This finding could be explained by the fact that this culture has the strongest relationship of all cultural profiles with all quality technique groups (Figure 1) – using techniques is at the core of this culture and, in effect, it is the techniques rather than deeper aspects such as values, norms and beliefs, that determine the performance of organizations having a rational culture.

In recent times, companies have switched their attention from technical (i.e. quality techniques) to social aspects of quality (e.g. leadership, process management). Some studies (e.g. Handfield et al., 1999) maintain that quality techniques affect performance. Other researchers (e.g. Naor et al., 2008), however, conclude that the technical elements of quality management are not associated with performance. The present study provides counterevidence: the use of quality techniques does affect performance, both directly and in interaction with organizational culture. This confirms Handfield et al. (1999) as well as Sitkin et al. (1994), Dean and Bowen (1994) and Rahmann and Bullock (2005), who essentially point out that it is important to consider the link between technical and social elements of quality management in order to make the best use of the organization's culture and of the quality techniques adopted, so as to achieve positive performance outcomes.

Conclusion

This study extends previous studies of the relationship between culture and quality management by focusing in quality techniques and considering how the interplay between culture and quality techniques affects performance. The findings support the hypotheses that some quality techniques are more suitable than others in view of the cultural characteristics of an organization, and that performance is influenced by matching quality techniques and cultural profiles. Thus, this research supports the idea that quality management is multidimensional, which holds an important implication for managers in the sense that they need to be actively aware of the cultural characteristics

of their organizations before adopting quality techniques. For instance, for an organization with strong group cultural characteristics, it may be much more difficult to benefit from techniques related to measurement than from techniques that are people-oriented, such as brainstorming and kaizen. In contrast, for an organization emphasizing a developmental culture, it should be easier to benefit from techniques related to process and product design than from techniques that are, for instance, related to uncertainty avoidance.

While the results of some studies ascertain that social elements of quality management can improve performance even without the technical elements (e.g. Samson and Terziovski, 1999; Naor et al., 2008), this study shows that techniques do contribute to performance improvement, if and when they are supported by appropriate cultural characteristics. This confirms studies, which claim that the integration between technical and social elements is essential to improve performance (e.g. Flynn et al., 1995; Sousa and Voss, 2002).

The study has certain limitations. First, the data was gathered via an e-mail survey questionnaire; the usual limitations associated with this research approach apply including a lack of control over who actually completes the survey. It is recommended that further research be undertaken using different methodologies including interviews, field studies or longitudinal case studies. Furthermore, companies function in a national, industrial, competitive, strategic context, all of which may affect the findings presented in this paper. It is important to explore if the performance effects reported here would be different if control variables such as manufacturing or competitive strategy, industry type and also company size are added and the sample is extended beyond Brazil and Denmark.

Acknowledgements

We thank the Brazilian agencies: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), the University of São Paulo, and the Center for Industrial Production at Aalborg University, Denmark, for the financial support for this study.

References

Ahire, S.L., Golhar, D.Y. and Waller, M.A. (1996), "Development and validation of TQM implementation constructs", *Decision Sciences*, Vol. 27, No. 1, pp. 23-56.

Asif, M., Bruijn, E.J., Douglas, A. and Fisscher, O.A.M. (2009), "Why quality management programs fail", *International Journal of Quality & Reliability Management*, Vol. 26, No. 8, pp.778-794.

Baird, K., Hu, K. and Reeve, R. (2011), "The relationships between organizational culture, total quality management practices and operational performance", *International Journal of Operations & Production Management*, Vol.31, No. 7, pp. 789-814.

Beer, M. (2003), "Why TQM programs do not persist: the role of management quality and implications for leading a TQM transformation", *Decision Sciences*, Vol. 34, No. 4, pp. 623-642.

Cameron, K.S. and Quinn, R.E. (2006), *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework*, Jossey-Bass, San Francisco.

Dean, J.W.J. 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.

Denison, D.R. and Spreitzer, G.M. (1991), "Organizational culture and organizational development: a competing values approach", *Research in Organizational Change and Development*, Vol. 5, pp. 1-21.

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.

Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1994), " A framework for quality management research and an associated measurement instrument", *Journal of Operations Management*, Vol. 11, pp. 339-366.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2009), *Multivariate Data Analysis*, Prentice Hall, Upper Saddle River.

Handfield, R., Jayaram, J. and Ghosh, S. (1999), "An empirical examination of quality tool deployment patterns and their impact on performance, *International Journal of Production Research*, Vol. 37, No. 6, pp. 1403-1426.

Harari, O. (1993), "Ten reasons why TQM doesn't work", *Management Review*, Vol. 82, No. 1, pp. 33-38.

Hubiak, W.A. and O'Donnel, S.J. (1996), "Do Americans have their minds set against TQM?", *National Productivity Review*, Vol.15, pp. 19-20.

Irani, Z., Beskese, A. and Love, P.E.D. (2004), "Total quality management and corporate culture: constructs of organisational excellence", *Technovation*, Vol.24, No. 8, pp. 643-650.

Kaynak, H. (2003), "The relationship between total quality management practices and their effects on firm performance", *Journal of Operations Management*, Vol. 21, pp. 405-435.

Kull, T.J. and Wacker, J.G. (2010), "Quality management effectiveness in Asia: the influence of culture", *Journal of Operations Management*, Vol. 28, pp. 223-239.

Maull, R., Brown, P. and Cliffe, R. (2001), "Organisational culture and quality improvement", *International Journal of Operations & Production Management*, Vol.21, No. 3, pp. 302-313.

McQuater, R.E., Scurr, C.H., Dale, B.G. and Hillman, P.G. (1995), "Using quality tools and techniques successfully", *The TQM Magazine*, Vol. 7, No. 6, pp. 37-42.

Naor, M., Goldstein, S.M., Linderman, K.W. and Schroeder, R.G. (2008), "The role of culture as driver of quality management and performance infrastructure versus core quality practices", *Decision Sciences*, Vol. 39, No. 4, pp. 671-702.

Powell, T. (1995), "TQM as competitive advantage: a review and empirical study", *Strategic Management Journal*, Vol.16, No. 1, pp. 15–37.

Prajogo, D.I. and McDermott, C.M. (2005), "The relationship between total quality management practices and organizational culture", *International Journal of Operation & Production Management*, Vol. 25, No.11, pp. 1101-1122.

Prajogo, D.I. and McDermott, C.M. (2011), "The relationship between multidimensional organization culture and performance", *International Journal of Operation & Production Management*, Vol. 31, No. 7, pp. 712-735.

Quinn, R. and Rohrbaugh, J.A. (1983), "Spatial model of effectiveness criteria: towards a competing values approach to organizational analysis", *Management Science*, Vol. 29, pp. 363-377.

Rad, A.M.M. (2006), "The impact of organizational culture on the successful implementation of total quality management", *The TQM Magazine*. Vol. 18, No. 6, p. 606-625.

Rahman, S. and Bullock, P. (2003), "Soft TQM, hard TQM, and organisational performance relationships: an empirical investigation", *Omega*, Vol. 33, pp.73-83.

Samson, D. and Terziovski, M. (1999), "The relationship between total quality management practices and operational performance", *Journal of Operations Management*, Vol. 17, No. 4, pp. 393-409.

Sila, I. (2007), "Examining the effects of contextual factors on TQM and performance through the lens of organizational theories: an empirical study", *Journal of Operations Management*, Vol. 25, No. 1, pp. 83-109.

Sitkin, S.B., Sutcliffe, K.M. and Schroeder, R.G. (1994), "Distinguishing control from learning in Total Quality Management: a contingency perspective", *Academy of Management Review*, Vol. 19, No. 3, pp. 537-564.

Sousa R. and Voss C.A. (2002). "Quality management: universal or context dependent?", *Production and Operations Management*, Vol. 10, No. 4, pp. 383-404.

Tabachnik, B.G. and Fidell, L.S. (2007). *Using Multivariate Statistics*, Pearson, New York

Tata, J. and Prasad, S. (1998), "Cultural and structural constraints on total quality management implementation", *Total Quality Management*, Vol. 9, No. 8, pp. 703-710.

Wu, S.J., Zhang, D. and Schroeder, R.G. (2011), "Customization of quality practices: the impact of quality culture", *International Journal of Quality & Reliability Management*, Vol. 28, No. 3, pp. 263-279.

Zu, X., Robbins, T.L. and Fredendall, L.D. (2010), "Mapping the critical links between organizational culture and TQM/Six Sigma practices", *International Journal of Production Economics*, Vol. 123, pp. 86-106.